# BUSINESS INDEX NORTH

A periodic report with insight to business activity and opportunities in the Arctic

**People**

Gives an overview of the human dimension in the North, including demography, education, quality of life and work.

**Business**

Maps growth potential of the BIN area and highlights selected innovative clusters, companies and brands.

**Connectivity**

Focuses on the roles of maritime transport, digital infrastructure and broadband availability in increasing connectivity of the BIN area.

Issue #02 — April 2018

## Contributing authors and organizations

**Alexandra Middleton**
Assistant Professor,
University of Oulu,
*alexandra.middleton@oulu.fi*

**Anders Hersinger**
Professor,
Luleå University of Technology
*anders.hersinger@ltu.se*

**Andrey Bryksenkov**
Deputy Director of representative office Russian State Hydrometeorological University in Moscow
*ets-spb@mail.ru*

**Andrey Mineev**
Researcher, High North Center at Nord University Business School
*andrey.mineev@nord.no*

**Bjørn Gunnarsson**
Associate Professor,
Nord University Business School
*bjorn.gunnarsson@nord.no*

**Elena Dybtsyna**
Associate Professor,
Nord University Business School
*elena.dybtsyna@nord.no*

**Erlend Bullvåg**
Dean,
Dean, Nord University Business School
*erlend.bullvag@nord.no*

**Jaakko Simonen**
Professor,
University of Oulu
*jaakko.simonen@oulu.fi*

**Ossi Pesämaa**
Associate Professor,
Luleå University of Technology
*ossi.pesamaa@ltu.se*

**Peter Dahlin**
Assistant professor,
School of Business, Society and Engineering, Mälardalen University
*peter.dahlin@mdh.se*

**Sergey Balmasov**
Head of the NSR Information Office in Murmansk, Center for High North Logistics
*sergey@chnl.no*

**Sissel Ovesen**
Senior Advisor,
Bodø Science Park,
*so@kpb.no*

**Project partners**
Consortium partners responsible for R&D and technical work related to the production of BIN report:

Expert partners contributing to strategic development of the BIN project:

Basic funding provided by:

## Special thanks

We gratefully acknowledge the basic funding for the BIN project provided by the Norwegian Ministry of Foreign Affairs (through the Arctic 2030 program) and Nordland County Council (through the DA Nordland program).

We would like to thank our Expert Partners for contributing to the strategic development of the BIN project: Arctic Economic Council, Norwegian Shipowners' Association, MGIMO University, Akvaplan-niva, Maritime Forum Nord, Center for High North Logistics.

**Joonas Orkola** - Senior Specialist at the Finnish Communications Regulatory Authority for providing statistical data, analytical information and constructive comments on earlier drafts of the chapter Connectivity in the North.

**Bjorn Ronning** - Founder and CEO of Midgardsormen AS for constructive comments on earlier drafts of the chapter Connectivity in the North.

**Tatiana Fedorei** - Director of International Center of Arctic Cooperation and Project manager Maria Tserenia, both at the Northern Chamber of Commerce and Industry of Murmansk Region for advice regarding the Russian data for the chapter Innovations in the North.

**Svenn Are Jenssen** - Senior Adviser and Acting director at Bodø Science Park for constructive comments on the chapter Life and the North

**Carl Erik Nyvold** - Senior Adviser at Bodø Science Park for constructive comments on the chapters People and the North, Life and the North and Connectivity in the North

**Elizaveta Vassilieva** – Adviser for youth projects at the Norwegian Barents Secretariat for constructive comments regarding the chapter Life and the North

**Ken Coates** - Canada Research Chair in Regional Innovation at the Johnson-Shoyama Graduate School of Public Policy, University of Saskatchewan campus for constructive evaluation the chapter Innovations from the North.

**Nils Andreassen** – Executive director for Institute of the North for valuable consultations regarding chapter Connectivity in the North

Software engineer **Viktor Abramov** and Postgraduate student **Vladimir Lopukha** at Russian State Hydrometeorological University for work with the Russian statistics data.

Master students assistants for collecting data for the chapter Innovations from the North: **Peter Bakkemo Danilov**, **Sondre Fiskerstrand** and **Tord Skotmyr Løken** from Norway, **Milan Halas** and **Elina Nurmi** from Finland, **Petra Johansson** and **Malin Welén** from Sweden.

## Contacts

Chair of the BIN Project Board
**Erlend Bullvåg**, PhD,
Dean at Nord University Business School
Erlend.Bullvag@nord.no
+47 906 49 591

BIN project coordinator
**Andrey Mineev**, PhD
Researcher at the High North Center for Business,
Nord University Business School
Andrey.Mineev@nord.no
+47 957 26 128

For general inquiries: please use the contact form at website
***www.businessindexnorth.com***

Cover Image
People riding snowmobiles on the frozen lake at winter Rovaniemi, Lapland, Finland

## What is BIN?

Business Index North (BIN) is a project that contributes to sustainable development and value creation in the Arctic. The overall goal is to set up a recurring, knowledge-based, systematic information tool for stakeholders such as businesses, academics, governments and regional authorities, as well as media, in the Arctic states. The coordinator of the BIN project is the High North Center for Business and Governance at Nord University Business School (Norway). The project is implemented through the international network of partners from Norway, Sweden, Finland, and Russia. Nordland County Council (Norway) and The Norwegian Ministry of Foreign Affairs provide basic funding for the project.

This is the second "Business Index North" periodic analytical report that focuses on socio-economic developments in ten northern regions of Norway (Finnmark Fylkeskommune, Troms Fylkeskommune, Nordland Fylkeskommune), Sweden (Norrbottens Län and Västerbottens Län), Finland (Lapin Maakunta, Pohjois-Pohjanmaan Maakunta, Kainuun Maakunta) and North-West Russia (Murmansk Oblast' and Arkhangelsk Oblast'). These ten regions as statistic units corresponds to NUTS3 classification of territorial units introduced by the European Union. Hereafter in our report, we use the English names of these regions without word "region" from each corresponding language (e.g. Norwegian "Fylkeskommune", Finnish "maakunta", Swedish "Län", and Russian "Oblast'" are abandoned):

| Country | Regions analyzed | Names used in the BIN report |
|---|---|---|
| Norway | Finnmark Fylkeskommune | Finnmark |
| Norway | Troms Fylkeskommune | Troms |
| Norway | Nordland Fylkeskommune | Nordland |
| Sweden | Norrbottens Län | Norrbotten |
| Sweden | Västerbottens Län | Västerbotten |
| Finland | Lapin Maakunta | Lapland |
| Finland | Pohjois-Pohjanmaan Maakunta | Northern Ostrobothnia |
| Finland | Kainuun Maakunta | Kainuu |
| Russia | Murmansk Oblast' | Murmansk Region |
| Russia | Arkhangelsk Oblast'[1] | Murmansk Region (without NAO) |

Altogether, these 10 regions are referred as the "BIN area" (figure right). Our definition of the BIN area correlates with the EU concept of a macro-region . The BIN area runs across national borders has common characteristics and challenges. The BIN area can be viewed as a strategic layer across countries for future development and cooperation.


The BIN regions are compared with each other and also with the developments in their respective countries. As a basis for comparison for the Russian BIN regions we selected the Northwestern Federal District of Russia. This is a North-European part of the country which is more easily compared to the neighbouring Nordic countries and their northern regions. At the same time, Murmansk and Arkhangelsk regions are under the administrative jurisdiction of the Northwestern Federal District. Our plan for future reports is to gradually include in the analysis more northern territories of Russia, as well as the USA, Canada, Denmark (Greenland) and Iceland.

The present report gives both an overview and a detailed picture of the socio-economic development and business opportunities within the BIN area and highlights the following topics of major relevance for the area: People, Life, Work, Performance of Business, Innovations, Connectivity, and Maritime Transportation through the Northern Sea Route. Businesses should be able to use it to learn more about economic developments, investment opportunities and challenges. Local, regional and national authorities will be able to identify problems and regional development opportunities, and take decisions for political and regulatory support focused on the BIN area as a whole. For media stakeholders the report will make it easier to describe the development in a reliable way.

1. In this report, Arkhangelsk Oblast' (Region) excludes the Nenets Autonomous District (NAO). Although NAO is an administrative part of Arkhangelsk Region, in statistics they are normally considered as distinct subjects of analysis

2. An area including a territory from a number of different Member States or regions associated with one or more common features and challenges (EU definition).

## Executive Summary

The BIN Report represents a rigorous scientific approach based on proven transnational collaboration between academic researchers and project partners that have first hand familiarity with local conditions. The findings of the BIN Report contribute to the economic, social and environmental sustainability of Arctic Communities through increased global awareness of business opportunities in the circumpolar Arctic and High North Economic Region.

The BIN Report provides comparable indicators and indices that reflect wider social processes and economic change in the BIN area during the period 2007-2016. The BIN area includes eight northern regions of Norway (Finnmark, Troms, Nordland), Sweden (Norrbotten and Västerbotten) and Finland (Lapland, Northern Ostrobothnia and Kainuu) and two Russian regions (Murmansk and Arkhangelsk region without the Nenets Autonomous District). The report comprises seven key topics organized as chapters: People and the North, Life and the North, Work in the North, Business in the North, Innovations from the North, Maritime Transportation in the North, Connectivity in the North.

## Key findings:

### People, life and work

- The population growth in the Nordic BIN area is 2.7 times slower than in the Nordic countries as a whole
- The population in the BIN area including the Murmansk and Arkhangelsk (without NAO) regions has decreased by 3.1%
- The BIN area's population is ageing, population aged 65+ grew by 13.3%, while population aged 0-19 declined by 7.5% , aged 20-39 declined by 6.8% and aged 40-65 declined by 3.7% during the period 2007-2016
- Tertiary education attainment for 20-59 year old males lags by 5 percentage points behind the average of the Nordic countries and by 3 percentage points for females in that age group
- Life expectancy at birth in the Nordic BIN area is higher by 13.6 years for males and 7.6 years for females than in the Russian BIN area, disposable income is lower in all BIN regions (except Murmansk region) when compared to the national average
- Employment development in the Nordic BIN area lagged behind the national average during 2011-2014, but had started to catch up during the period 2015-2016
- Employment in the BIN area is affected by the loss of jobs in mining, quarrying and manufacturing, agriculture, forestry and fishing and job creation in the human health and social services, real estate, professional, scientific activities, accommodation and food service and construction

### Business Activities, Innovations and Value creation

- BIN area business has already developed a significant innovation potential in terms of clusters, brands, successful companies – an issue often overlooked when the region is viewed on the basis of natural resources; many innovative businesses and brands build upon identity with Northern life style and values
- The most successful companies in the BIN area are those with higher growth opportunities, sound value performance, yet a less aggressive approach to innovative competitiveness. They serve as a shining example of companies able to grow despite limited access to financing and human resources compared to companies in the capital areas.
- BIN area's business turnover grew by 87 % from 2008 to 2016 and 18 % from 2012 to 2016. Turnover exceeds 90 billion Euro in 10 BIN regions.
- Most successful businesses are North Norwegian aquaculture firms, Real estate developers in Norway, business activities related to the mining industry in Arkhangelsk Region, and Manufacturing based on electric energy.
- Nordland has the largest economy of the BIN area, sharing high growth with now merged Troms and Finnmark region.
- Gross Value creation in the BIN area reached 71,4 billion Euro, growing 12,2 % between 2011 and 2015.
- Again, Nordland has the largest value creation, while Murmansk and Arkhangelsk (without NAO) regions constitute the highest proportion of value creation in the national territory.
- High growth in value creation can be found in aquaculture, finance and construction.

### Maritime transportation

- Altogether 129 shipping companies were operating on the Northern Sea Route (NSR) in 2016; 75 were Russian companies and 54 non-Russian. The majority of non-Russian shipping companies operating on the NSR in 2017 were Norwegian, with 11 vessels making 92 separate voyages.
- Internal Russian traffic (cabotage) and destination traffic between Russian ports and non-Russian ports are the most common means of transport on the NSR. The total volume of cargo transported along the NSR in 2016 was 7.5 million tons and 10.5 million tons in 2017. The south-western part of the Kara Sea had the highest traffic density on the NSR in the period 2016-2017.
- The main driver of increased shipping on the NSR will continue to be exploitation and transport of natural resources out of the Arctic to markets in Europe and NE Asia.

### Connectivity

- Basic fixed broadband is available to 95% of households in the Nordic BIN regions and to 75% of households in the Russian BIN regions
- The regions of Troms, Nordland (Norway) and Norrbotten (Sweden) lag behind their country averages in 100 Mbps fixed broadband availability by 8 percentage points and 7 percentage points respectively, while the Finnish regions of Northern Ostrobothnia, Kainuu and Lapland outperform Finland's average by 8 percentage points.
- Mobile broadband coverage (3-4G) is good over all populated places in the BIN area. In terms of territorial coverage in 2016 the BIN regions in Norway had the best coverage lagging behind the national average by only 3 percentage points, Swedish BIN regions lagged behind by 14 percentage points and the Russian BIN regions lagged 21 percentage points behind their respective national averages.
- The BIN area has no direct connection to Europe and North America via subsea data cables. A number of landing points of data cables to Europe are on the coast of South Norway, South Sweden and South Finland. North-West Russia has one subsea data cable to Finland. Direct trans-Atlantic data traffic between Europe and North America proceeds through 12 submarine data cable systems landing in Denmark, UK, The Netherlands, Germany, France, Spain and Portugal.

### Recommendations:

- Depopulation in the BIN area, especially of young people, is to be addressed by interlinked policies in education, work, living conditions, quality of life and infrastructure including transport and digital infrastructure in the North
- Policies should address how to reduce the tertiary education and disposable income gap in the BIN area
- High economic potential but at the same time loss of jobs in traditional BIN industries such as mining, quarrying and manufacturing, agriculture, forestry and fishing requires policies on the role of automation and digitalization
- Education needs and business opportunities in the growth sectors of health, tourism and construction are to be examined further
- Reconsider the innovative potential of the BIN area, create awareness of the BIN area clusters, firms and brands
- Provide the required regional and national support to BIN firms including access to finance
- Business opportunities brought by the Northern Sea Route are to be addressed in the perspective of the whole transport infrastructure development in the BIN area, including Finnish railway project and digital infrastructure projects.
- While basic broadband accessibility is good in the BIN area, access to high-speed speed Internet (100 Mbps) is to be improved in the BIN area
- Increased business opportunities in the BIN area require improved mobile broadband coverage in unpopulated areas
- The roles of the governments and strong consortia are to be addressed in fibre cable projects affecting the BIN area

3. Norway, Sweden and Finland

4. BIN area (excl.Russia)

## How to use this report

Index numbers are a statistician's way of expressing the difference between two measurements by designating one number as the base, giving it the value 100 and then expressing the second number as a percentage of the first.

Indexes allow us to compare trends across different metrics, such as population, employment, the population of active enterprises over a period of time. We select year as the base period and given the value 100, e.g. year 2011=100. The change in the index is used to demonstrate the change in the variable of interest over a period of time. For example, the population of the city increased from 500 in 2011 to 900 in 2014, the population in 2014 was 180% of the population in 2011. The population index was 180 in 2014. Each index number in a series reflects the percentage change from the base period.

- The BIN area as a whole is compared to the national averages of Norway, Sweden, Finland and to the Northwestern Federal District in Russia
- BIN regions within the BIN area are compared to each other
- Each BIN region is compared to its corresponding country's index [6]

***We truly hope that all our readers will find the Business Index North Report interesting and relevant for their work. The report can be a useful tool for those who wish to***

- give inspiration to people involved in the development of the territories of the High North
- identify opportunities and challenges for socio-economic development in the regions within the BIN area
- get a quick but comprehensive update of how the BIN area has developed as a macro-region
- promote BIN regions outside the BIN area
- set strategic goals for the development of their own businesses.

Each chapter includes a presentation of the key findings in terms of bullet points and infographics, and presents implications for practitioners such as policy-makers, investors, businesses in a brief and focused way. Details behind the key findings and implications for practitioners are are included in the chapters.



Contents

## Introduction

The overall goal of Business Index North (BIN) is to contribute to the economic, social and environmental sustainability of Arctic communities through increased global awareness of business opportunities in the Arctic and High North Economic Region. The BIN report is an annually recurring source of comparable indicators and indices that reflect wider social processes and economic change in the BIN area. For the first time, the BIN report now includes the Arkhangelsk and Murmansk regions in northwest Russia along with regions in northern Norway, Sweden and Finland.

The BIN area is sparsely populated and characterized by long distances between cities and towns. It is also a location with a wealth of resources stemming from fishery, forestry, minerals, oil and gas, energy and wilderness. In this second issue of the BIN Report, the contributors have selected people and the North as the main topic. As in any geographical area, people determine which opportunities that will be recognized and realized, and, accordingly, how attractive the area becomes for others as a location for life?? living??, investment and for a sustainable future. Although this issue of the BIN Report includes a broad palette of distinct and perceptive analyses covering life, work, innovations, connectivity and transport in the North, the people dimension takes centre stage.

The BIN area is geographically peripheral to many of the globe's leading metropolises, yet at the same time the centre of gravity for much of the geopolitical debate concerning the Arctic. Irrespective of this apparent paradox, this second issue will highlight that the BIN area is far from isolated in the contemporary globalized world. Indeed, this issue of the BIN report will reveal many developmental tendencies and characteristics that the Arctic shares with other territories.

The first chapter of the report, **People and the North**, highlights that the global trends of urbanization and ageing population are conspicuous in the BIN area. Simultaneously, a comparison shows diverging demographic trends among the four countries. The population in Finland is ageing rapidly, and includes a growing share of baby-boomers in the population structure. The Russian population is declining and suffering from a comparatively low life expectancy at birth. Sweden and Norway have low birth rates, low death rates and comparatively long life expectancy, in combination with higher immigration. It would seem that the current demographic situation requires systemic re-thinking of the BIN area policy-making, while at the same time paying attention to regional and municipality-level disparities.

In the second chapter, **Life and the North**, secondary data obtained from national statistics bureaus, including education, life expectancy and the financial situation, form the basis of an analysis of certain facets of the quality of life in the BIN area. Unsurprisingly, the results show many similarities between the Norwegian, Swedish and Finnish BIN regions because of the historically strong welfare systems of the Nordic countries, low levels of income distribution inequality and universal access to education. Life in the Russian BIN regions suffers from an unfavourable development towards poverty and inequality in combination with challenges in social welfare due to the post 1990 transition economy.

In Chapter 3, **Work in the North**, the analyses reveal that the BIN area employment rate exhibits a moderate development, and that it is decreasing in the Russian BIN region. During the time period studied, the BIN area experienced near-zero growth of 0.2%, compared to 1.6% for Norway, Sweden and Finland in total. When including the BIN regions of Russia in the analysis, the employment level declines to a decrease of 1.6 %. The most significant job losses in the BIN area have occurred in mining, quarrying and manufacturing, agriculture, forestry and fishing, whereas the major contributors to job creation are the health and social work sectors, real estate, professional, the scientific and technical sector, accommodation and food service activities, construction and other services. The results suggest that the international trend towards service business as a main driver of economic development is also present in the BIN area and that work in the North is an urgent source of concern for policy-makers.

The fourth chapter of the report, **Business in the North**, provides an overview of key business development trends measured in regional and industry turnover analysis. Based on the overview, division into regions and industries is done, identifying growth in turnover and relative importance of different industries for progress in a region. This chapter also presents the analysis of the level of Gross Value Creation across BIN regions and industries and across time. The chapter identifies large differences in growth levels with successful North Norwegian regions, and less successful Russian and Finish and Swedish regions. One important finding is that under the right condition, large growing industries as fish farming, advanced metal products, information technology and health technology emerges from Northern areas, modifying the picture of northern areas as pure resource extractors. The BIN area constitutes about 7 % of national Gross Value Creation, but the impact is underestimated. Products from the BIN area create substantial additional value after leaving the region. Hence, imposing measures for increased value creation can be very effective for national economies and the BIN area's growth. With the side effect, that more of the value chain takes place in the North, and therefore strengthening companies and job creation.

The fifth chapter of the report, **Innovations from the North**, provides an overview of key business clusters, corporate brands and companies in the BIN region. This chapter also presents key performance indicators (KPI) related to perceived regional support, competition, growth opportunities, innovativeness, innovative competitiveness, organizational performance, exports and newness. Based on the overview provided and the KPIs, the chapter concludes with implications for policy-makers, investors and businesses with an interest in the development of the BIN area. The results highlight how, contrary to the view of the BIN area as primarily a supplier of natural resources, the area has become a significant source of innovation. Many of the innovative businesses and brands originating in the BIN area exploit their Northern heritage in their identity. Interestingly, the most successful companies from the BIN area exhibit high growth opportunities paired with solid performance and a moderately competitive stance. One important conclusion of this chapter is the necessity for existing and prospective stakeholders of the North to change their point of view and begin to look at the BIN area as one with significant innovation capabilities and potential already in place.

In Chapter 6, **Maritime Transport in the North**, the focus is on the maritime activity on the Northern Sea Route (NSR), the water area off the north coast of Russia - an area extending from Novaya Zemlya in the west to the Bering Strait in the east and outwards to the limits of Russia's Exclusive Economic Zone (EEZ). The NSR is part of the Northeast Passage, a shortcut between NW Europe and NE Asia through the Arctic Ocean, the traffic through which is regulated by Russia. Chapter 7 examines shipping activity to and from the NSR, and within the NSR Water Area. The chapter reports that in the past decade the NSR has developed as a route for the export of natural resources from Arctic Russia and the development of the project related territories of this region. The most active traffic during the years 2016-2017 was on the South-West Kara Sea. Transit sailings (sailing through both the western and eastern borders of the NSR) increased between 2010 and 2013 from 0.1 million to 1.35 million cargo tons but fell sharply in 2014 to 0.24 million tons followed by further decline in 2015-2017. The analyses provided here suggest that the NSR will is developing as a regional route rather than a global one. Increased commercial traffic on the NSR could boost regional socio-economic development in the BIN area due to the geographic proximity of the BIN regions and companies.

Chapter 7 addresses **Connectivity in the North**. This chapter covers the living conditions of people in the BIN area and business infrastructure in terms of access to fixed and mobile broadband. The results reveal common needs for broadband statistic information and make recommendations and highlight implications for policy-makers and investors. This chapter reveals that basic fixed broadband is available to 95% of households in the Nordic BIN regions and to 75% of households in the Russian BIN regions. The BIN regions in Norway and Sweden exhibit higher levels of fixed broadband availability than do the BIN regions in Finland, although the levels in these regions differ with respect to performance in comparison to the respective national levels in each case. Fixed broadband is affordable, with costs ranging from 1.6 to 3% of annual disposable income. When it comes to mobile broadband, 4G coverage with reliable backup of 3G is provided everywhere people live in all the BIN regions. Territory coverage is significantly lower than average for the BIN countries. Further, the BIN area has no direct connection to Europe, North America or Asia via subsea data cables. There are cable project initiatives, including Havfrue, Midgårdsormen and Arctic Connect, which may directly affect the BIN area and play an enabling role in its development.

Each chapter concludes with key statements where the dilemmas, challenges and opportunities of the Arctic and the High North are presented for the consideration of policy-makers, investors and other stakeholders. We encourage all interested parties to build on our work, to contribute to developing and disseminating knowledge about the Arctic, and to take other actions for the creation of a sustainable and prosperous future in the North.

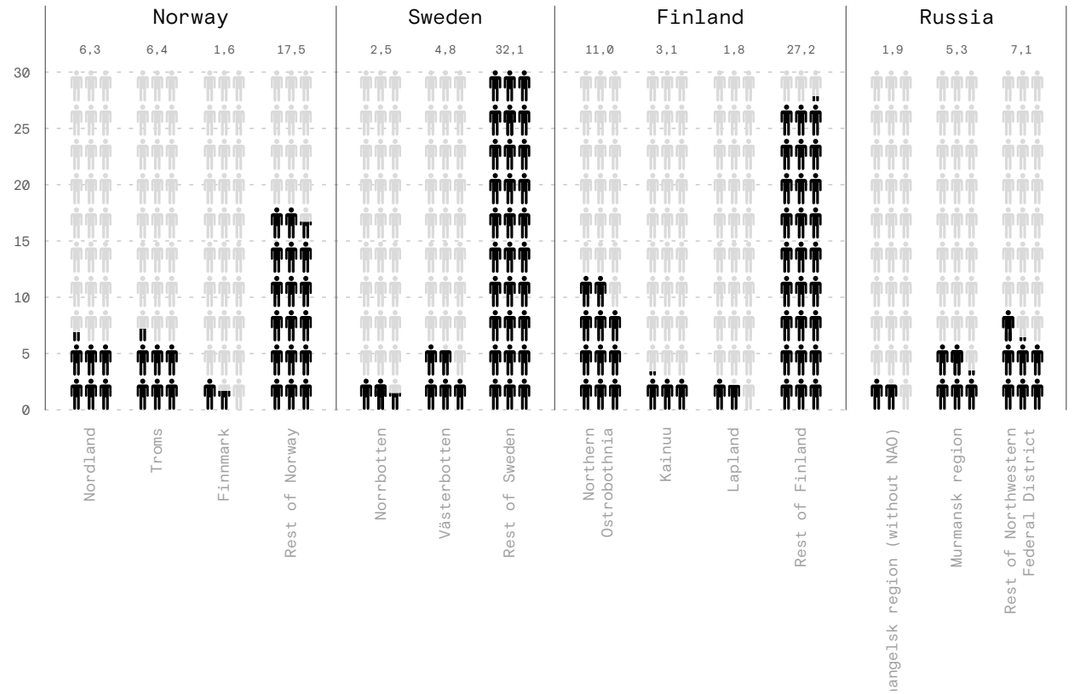
# Shaping the future of the Business Index North area.

(01)

*People and the North*

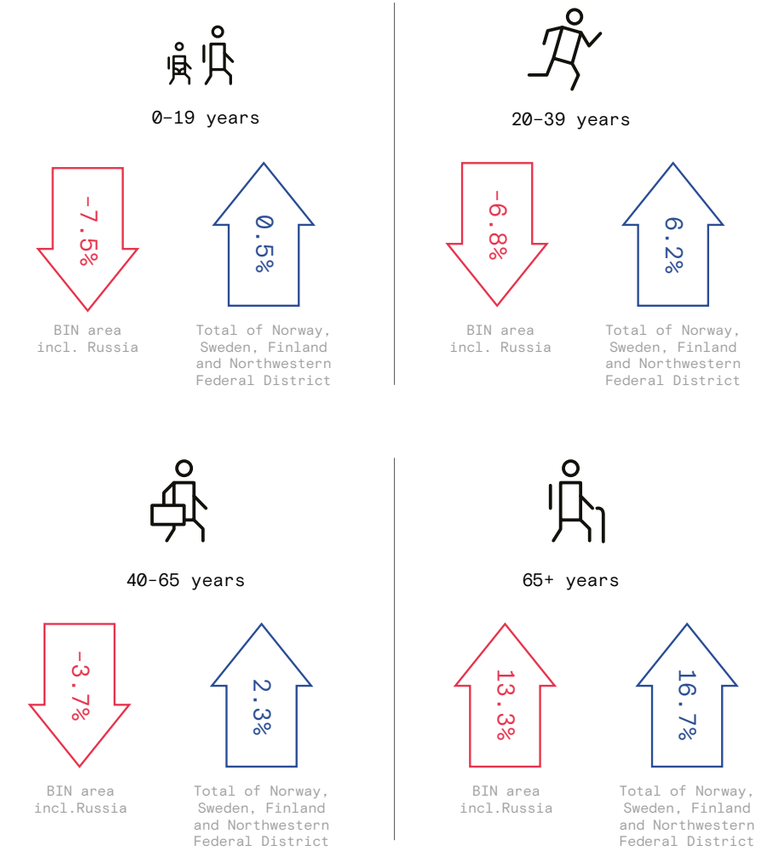
## Density of population in the BIN area, 2016

Number of citizens per 1 km²



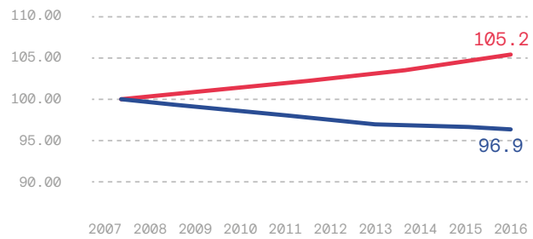

## BIN area population development

Index=2006, 2006 - 2015




## Population development in the BIN area incl. Russia

Index 2007=100, 2007 - 2016

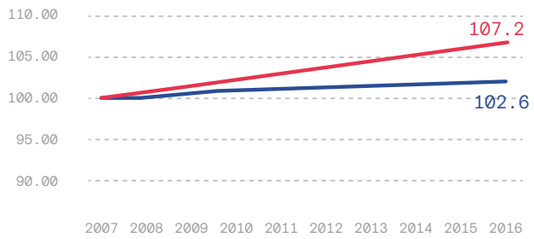



BIN area incl. Russia

Norway, Sweden, Finland and the Northwestern Federal District in total

## Population development in the BIN area excl. Russia

Index 2007=100, 2007 - 2016

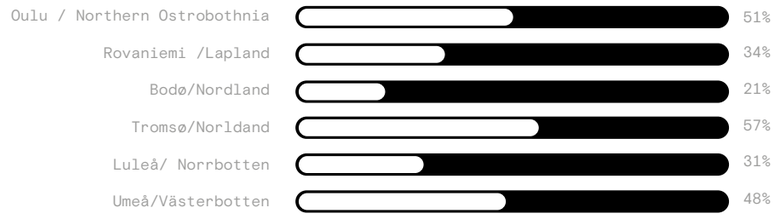



BIN area excl. Russia

Norway, Sweden and Finland in total

## Urbanization in the North

2016



Section (01)

# People and the North

People in the north shape the future development of the BIN area. For the first time this report includes the Arkhangelsk [1] and Murmansk regions in northwest Russia and regions in northern Norway, Sweden and Finland. In 2016, the BIN area was home to 3.6 million people, of whom 1.9 million lived in the Arkhangelsk and Murmansk regions.

Scientist Igor Melnikov;
photo: Valery Vasilevsky

Global trends of *urbanization* and *population ageing* affect the Arctic and the BIN area. Demographic trends are highly diverse in all four countries. Finland has one of the fastest ageing populations in Europe with an expanding share of baby-boomers (people born 1945-1950) in population structure. Russia has a declining population due to post 1990s socioeconomic transformations with high mortality rates. Life expectancy at birth in Russia is also lower than in the rest of the BIN area. The populations of Sweden and Norway have both low birth rates and low death rates and long life expectancy, combined with higher immigration. Including Russia in this BIN report affects the results and this should be kept in mind when interpreting the findings. Analyses at the levels of region and municipality serve to reveal differences within each country.

The BIN area including Russia experienced a population decline of 3.1% from 2007-2016. At the same time in Norway, Sweden, Finland and the Northwestern Federal District in Russia population continued to grow 5.2% in the period 2007-2016. The biggest decrease in population is observed in the Russian BIN regions, Nordic part of BIN experienced population growth below corresponding countries' average. We use total dependency ratio [2] as an indication of the potential social support requirements resulting from changes in population age structure. In the BIN area, the total dependency ratio rose by 7 percentage points during the period 2007-2016.

The current demographic situation requires systemic re-thinking of BIN area policymaking, but at the same time attention needs to be paid to disparities at the regional and municipal levels. Historical changes in the life of society due to having fewer children, postponing the birth of the first child and the demographic profiles and policies of each individual country affect the present demographic situation in the BIN area. The findings provide implications for policy-makers and business.

## Findings for 2007-2016:

### TRENDS

- Simultaneous population ageing and population decline in the BIN area including Russia, with significant differences across countries.
- BIN area population decrease due to negative net migration with significant differences between countries.
- Growth occurred in only one third of all municipalities (excl. Russia).
- Population decline in the BIN area due to negative domestic migration.
- Population growth in the Norwegian BIN regions and Swedish Västerbotten due to increased migration from abroad.

### URBANISATION

- Growth in population occurs in the cities and their urban areas.
- In 2016, 35% of all BIN area population excluding Russia live in six major cities (Tromsø, Bodø, Luleå, Umeå, Oulu and Rovaniemi), an increase of 2% during the period 2007-2016.

### AGEING

- Dependency ratio grew on average by 7 percentage points.
- The share of young people aged 15-19 decreased by 4.1 percentage points.

1. Without Nenets Autonomous Okrug (NAO), later in the text Arkhangelsk region (without NAO).

2. Total dependency ratio is the ratio of dependents--people younger than 15 or older than 64--to the working-age population-(15- 64).

Figure 1 — BIN area — Norway, Sweden, Finland and the Northwestern Federal District in total

## Population development in the BIN area incl. Russia

Index 2006=100, 2007-2016

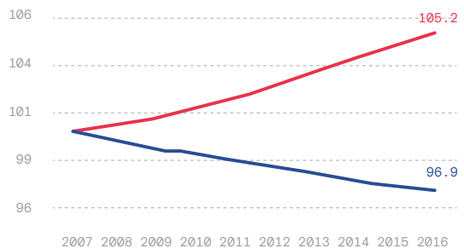



Figure 1 shows the population development in the BIN area including the Russian regions of Arkhangelsk and Murmansk. On the Federal level, these two regions are the part of the Northwestern Federal District (NWFD) in Russia, which includes Saint Petersburg and had a population of 13.8 million in 2016. In 2016, the respective populations of the Russian regions of Arkhangelsk and Murmansk were 1.13 million and 762 thousand.

The population of the BIN area including the Russian regions decreased by 3.1% (144,379 people) in the period 2007-2016. The total population of Norway, Sweden, Finland and the NWFD increased by 5.2% during the period 2007-2016. The trend indicates that collectively the most northern regions of Norway, Sweden, Finland and Russia have a declining population. The population of northern Norway, Sweden and Finland grew from 1.6 million to 1.67 million during the period 2007-2016. The demographic situation in the Arkhangelsk and Murmansk regions is alarming. The population in the Murmansk region declined from 820 thousand in 2007 to 760 thousand in 2016, and in the Arkhangelsk region (without NAO) from 1.22 million to 1.13 million.

Figure 2 — BIN area — Norway, Sweden, Finland in total

## Population development in the BIN area excl. Russia

Index 2007=100, 2007-2016

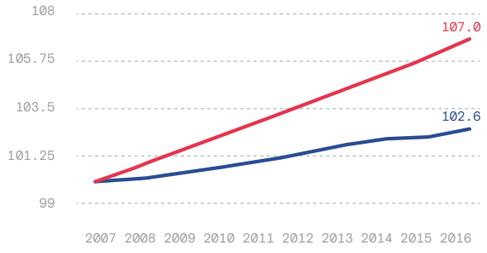



Figure 2 shows population development excluding Russian regions. Population in the BIN area grew by 2.6% from 2007 to 2016. The growth rate in the BIN area, however, is much lower than the average population growth of 7% in Finland, Norway, and Sweden in the period 2007-2016.



Figure 3 — Change per year — Accumulated change

## Population change by year and accumulated population change in the BIN area incl. Russia

2007-2016

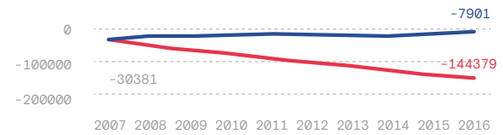
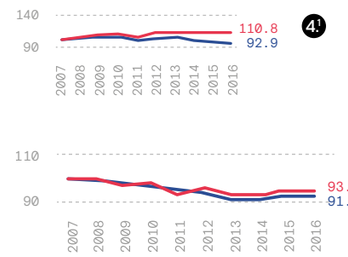



Figure 3 shows population change in absolute numbers. In total, the population of the BIN area decreased by 144,379. The negative trend continued in the period 2007-2016, the sharpest decline being in 2007 (30,381 people). In order to understand the forces driving population decline, we consider the trends in live births, deaths and migration flows.

Figure 4.1 4.2 — Bin area — Norway, Sweden, Finland and the Northwestern Federal District in total

## Figure 4.1 and 4.2 Live births and deaths indices

Index 2007 = 100, 2007-2016




Expressed as indices both live births (7.1 points) and deaths (8.2 points) fell in the BIN area during 2007-2016 (Figure 4.1, 4.2). To see what caused negative population growth in the BIN area we decompose it to excess of births over deaths and the balance of migration. The BIN area had an excess of births of 3,484 during the period 2007-2016, while collectively in Norway, Sweden, Finland and Northwestern Federal District births outnumbered deaths by over 30,000 in 2016.

Figure 5

## Accumulated net migration

2007-2016

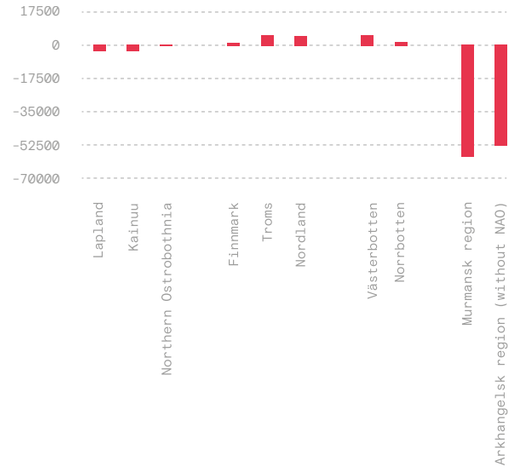



Figure 5 shows the change in population due to net migration that includes both immigration from abroad, emigration abroad and domestic migration flows [3]. Population loss due to negative net migration affected the Murmansk and Arkhangelsk ( without NAO) regions most of all during the period 2006-2017, followed by Lapland and Kainuu regions.

[3] No data on domestic migration flows is available for Russia.

Figure 6.1 6.2

## 6.1 Immigration from abroad per 1,000 population

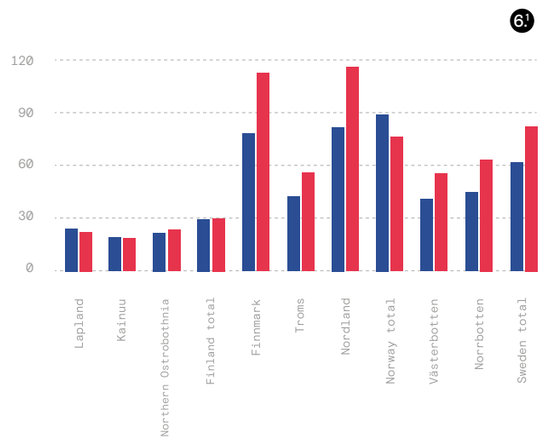
2007-2016

Figure 6.1 shows that the pattern of immigration from abroad is very diverse across countries and BIN regions with the highest immigration in the Norwegian BIN regions, followed by Sweden and low levels of immigration per 1,000 population in Finland. The Norwegian regions of Nordland and Finnmark saw increased immigration from abroad reaching 120 per 1,000 population in 2016, while the Swedish regions of Västerbotten and Norrbotten have higher immigration rates per 1,000 population than the Finnish BIN regions that saw no growth in immigration from abroad.

## 6.2 Net domestic migration per 1,000 population

2007-2016

Figure 6.2 illustrates how many people per 1,000 are leaving BIN regions for other domestic regions. All BIN regions have experienced population decline due to country internal migration. In Norway, Troms and Nordland reduced negative domestic migration by one third from 2007 to 2014. Swedish Västerbotten saw a decline in net domestic migration from 54 in 2007 to 8 in 2016 people per 1000 population. In the further analysis, it would be of interest to track migration flows within the BIN regions of Norway, Sweden, Finland and Russia.



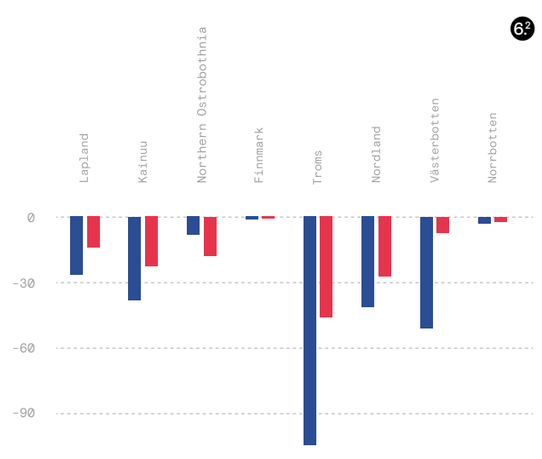



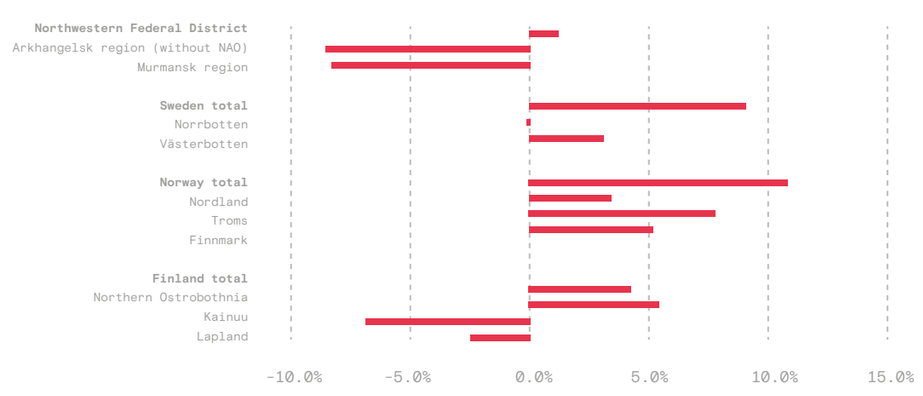



Figure 7

## Population development at the BIN regional level, %

2007-2016

Population development on the county regional level varied across countries (see Figure 7). The highest population loss is observed in the Arkhangelsk (-7.7%) and Murmansk (-7.5%) regions, while the Northwest Federal District in Russia had a growth of 1.4%. Population decline in these regions started from 1990 and the negative trend continues to date. Factors affecting population loss are migration outflows. In the absence of Soviet state subsidies, people have less monetary advantage of moving to the Murmansk and Arkhangelsk regions. The heritage in the Murmansk and Arkhangelsk regions of single-industry towns [4] explains population decline and fewer employment opportunities. In Sweden, the Norrbotten and Västerbotten regions both lagged behind Sweden's 8.8% growth. Västerbotten saw a growth of 3.2% and the Norrbotten population remained the same during the period 2007-2016. The population growth is concentrated around the cities of Umeå and Luleå. In Norway, Troms region saw a population growth of 7.1%, followed by Finnmark 5.2% and Norland 3.3%. Positive net migration that includes both domestic migration and migration from broad (Figure 5) explains population growth in northern Norwegian counties. Still, all three northernmost regions lag behind Norway's total growth of 11.0%. The population growth in Troms region is due to its attractive university and hospital, its fishery sector and favourable housing market. In Finland, Kainuu saw a decrease in population of 6.8% during the period 2007-2016, followed by Lapland with a decline in population of 2.3%. Northern Ostrobothnia experienced a population growth of 5.4%, compared to the national average of 3.8%. Population growth in Northern Ostrobothnia is due to a large university and a fertility rate above the national average (1.91) in 2016.




[4] A single-industry town is a town whose economy is dominated by a single industry or company. The Murmansk and Arkhanglesk regions had seven single-industry towns each in 2017.

## Positive and negative population growth in municipalities (excl. Russia), %

2007 -2016

Out of 173 municipalities, only 62 (35%) had positive population growth. Cumulative negative population growth during the period 2007-2016 is apparent in 29 municipalities. Cities have continued to attract people. Out of the total population of the Norwegian, Swedish and Finnish BIN area 33% lived in the major cities [5], in 2016 this number grew to 35%. The highest growth occurred in the municipalities surrounding Oulu urban area, e.g., Liminka, Kempele (growth more than 10% in the period2007-2016). In Norway, the cities of Tromsø and Bodø and the towns of Alta, Nesseby and Hammerfest all experienced a growth exceeding 10%. In Sweden, population growth in the major cities of Luleå and Umeå was in the range 5-10% (an annual growth rate higher than 0.5%). These findings confirm that population growth concentrated around major cities providing education, job opportunities, quality housing and cultural experiences. High quality health care is a pull factor attracting migration to urban areas. The importance of cities and urban planning will be a primary concern for the future development of the BIN area. Equally important will be strategies for the development of municipalities with decreasing population, which is two thirds of all municipalities in the BIN area in Norway, Sweden and Finland.

People live ever closer together and therefore prefer living in the cities (and their urban areas) without commuting. In Northern Ostrobothnia 45% of population was concentrated in Oulu, in 2016 this number rose to 51%. Cities provide economies of scale, efficient infrastructure and services through density and concentration in transportation, communications, power, human interactions, water and sanitation services. They attract highly skilled workforce that enable specialization in knowledge, skills, and management capabilities[6]. See table on bottom right.

**1 Lapland**

| | |
|---|---|
| ↑ 5-10% | Kittilä, Rovaniemi |
| ↑ 0-5% | Kolari |
| ↓ -10% | Pelkosenniemi, Ranua, Simo, Tervola, Kemijärvi, Ylitornio, Pello, Savukoski, Posio, Salla |

**2 Kainuu**

| | |
|---|---|
| ↓ -10% | Kuhmo, Paltamo, Ristijärvi, Suomussalmi, Puolanka, Hyrynsalmi |

**3 Northern Ostrobothnia**

| | |
|---|---|
| ↑ +10% | Liminka, Kempele, Oulu, Ylivieska, Lumijoki, Tyrnävä |
| ↑ 0-5% | Hailuoto, Kalajoki, Muhos |
| ↓ -10% | Pyhäntä, Pudasjärvi, Taivalkoski, Pyhäjärvi, Kärsämäki, Siikalatva, Vaala |

**4 Finnmark**

| | |
|---|---|
| ↑ +10% | Hammerfest, Alta, Nesseby |
| ↑ 5-10% | Gamvik, Båtsfjord, Sør-Varanger |
| ↑ 0-5% | Hasvik, Nordkapp, Lebesby, Vadsø |
| ↓ -10% | Loppa |

**5 Troms**

| | |
|---|---|
| ↑ +10% | Tromsø |
| ↑ 5-10% | Nordreisa, Sørreisa, Skånland, Lavangen |
| ↑ 0-5% | Bardu, Salagen, Målselv, Balsfjord, Lenvik |
| ↓ -10% | Lyngen |

**6 Nordland**

| | |
|---|---|
| ↑ +10% | Bodø |
| ↑ 5-10% | Vestvågøy, Brønnøy, Vågan, Herøy, Sortland, Vevelstad, Leirfjord |
| ↑ 0-5% | Værøy, Vefsn, Hadsel, Hemnes, Lurøy, Narvik, Nesna, Fauske, Hamarøy, Alstahaug, Træna, Evenes. Øksnes, Rana |
| ↓ -10% | Røst |

**7 Västerbotten**

| | |
|---|---|
| ↑ 5-10% | Umeå |
| ↑ 0-5% | Vännäs, Skellefteå |
| ↓ -10% | Åsele |

**8 Norrbotten**

| | |
|---|---|
| ↑ 5-10% | Luleå |
| ↑ 0-5% | Piteå, Boden, Kiruna |
| ↓ -10% | Övertorneå, Överkalix |


| City | 2007 | 2016 |
|---|---|---|
| Oulu / Northern Ostrobothnia | 45% | 51% |
| Rovaniemi/Lapland | 32% | 34% |
| Bodø/Nordland | 20% | 21% |
| Tromsø/Norldand | 50% | 57% |
| Luleå/ Norrbotten | 29% | 31% |
| Umeå/Västerbotten | 43% | 48% |

(cities that meet 50,000 thresholds).

[5] Oulu,, Rovaniemi and Kajaani in Finland, Tromsø and Bodø in Norway and Luleå and Umeå in Sweden (meeting OECD criteria with population larger than 50,000 inhabitants).

[6] The Economic Role of Cities, UN-HABITAT.

Figure 8

Children (0–14 years) Young people (15 - 19 years)

## Share of young and children in the BIN area

2007-2016

Figure 8 shows the changing age structure of the population in the BIN area. The share of children grew by 1.1 percentage points from 16.1% in 2007 to 17.2%. The share of young people aged 15-19 declined by 4.1 percentage points, reaching 18.3% in 2016. The shrinking cohort of 15 to19-year-olds means fewer entrants to education institutions, fewer young families and fewer active working age people in the future population structure.

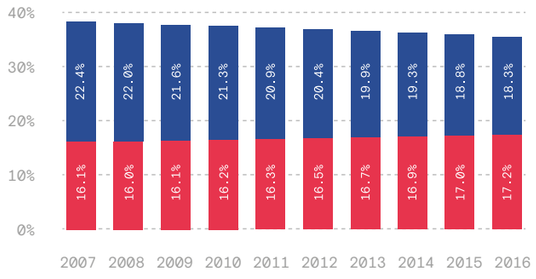



Figure 9

BIN area incl Russia Norway, Sweden, Finland and the Northwestern Federal District in total

## Population development in age group 0-19 (BIN area incl. Russia)

Index 2007=100, 2007-2016

A steady loss of population in the age group 0-19, including children (0-14) and young people (15-19) continued during the period 2007-2016, see Figure 9. Altogether population in the age group 0-19 shrank by 7.5% (114,000 people) in the BIN area including Russia, while in the total of Norway, Sweden, Finland and the NWFD there was a small growth of 0.5%

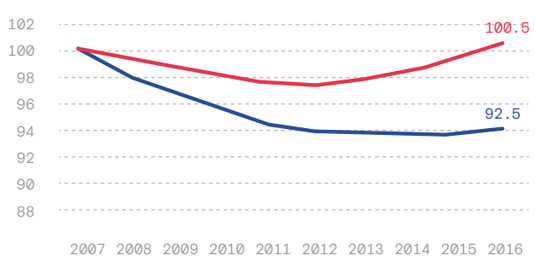





Figure 10

## Population development in age group 0-19 at the BIN regional level, %

2007-2016

Figure 10 illustrates population development in the age group 0-19 at the BIN regional level. All BIN regions apart from Northern Ostrobothnia saw a decline in the population aged 0-19. Kainuu (-6.9%) and Lapland (-12.0%) were among the biggest losers of children and young people in the north. Negative population growth in the age group 0-19 was observed in the Arkhangelsk and Murmansk regions, -9.9% and -8.35 respectively. In Sweden, Norrbotten saw a decline of 9.1% in the age group 0-19.

In Norway Nordland and Finnmark both approached the 8% mark in the loss of children and young people. The only positive trends were in Sweden (5.1%) and Norway (3.3%) with increases in the young population on a regional level. We observe that the rate of decline in the young population is more marked in the north. The trend is elated to the decreasing share of 15 to 19-year-olds (see Figure 9). The changing demographic composition of the BIN area with declining young population and a growing older generation will have long-lasting effects on the economy of the BIN area.

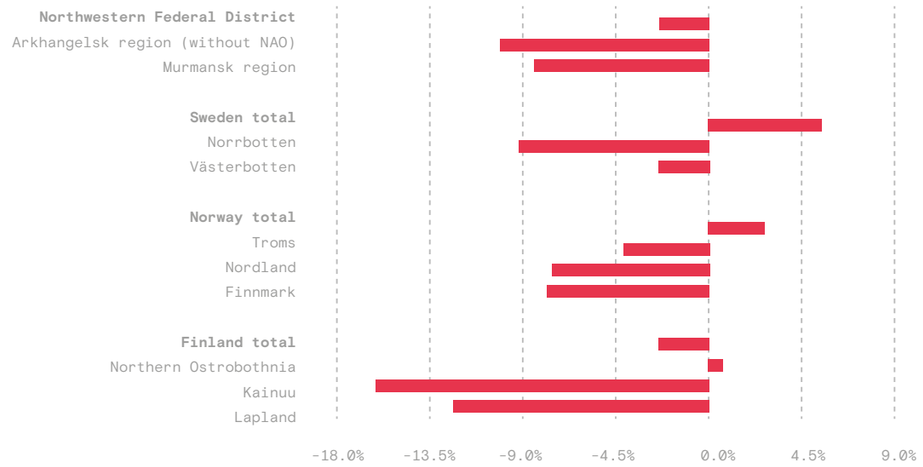


Figure 11

## Population development in age groups 20-39 and 40-64 years (BIN area incl. Russia)

Index 2007=100, 2007-2016

Figure 11 demonstrates population development in age groups 20-39 and 40-64 years. Population in age group 20-39 is classified as early adulthood when people complete their education and make the transition into work and parenthood. The BIN area saw a 6.8% population decline in age group 20-39 from 2007 to 2016, while Norway, Sweden, Finland and NWFD saw a growth of 6.2%. Population in age group 40-64 is known as middle adulthood, during which people achieve personal and economic independence. The decline in this age group was 3.7% in the BIN area as opposed to a growth of 2.3% in Norway, Sweden, Finland and NWFD. Overall, the BIN area is losing population in both age groups 20-39 and 40-64 years and the decline in the age group 20-39 is more pronounced.

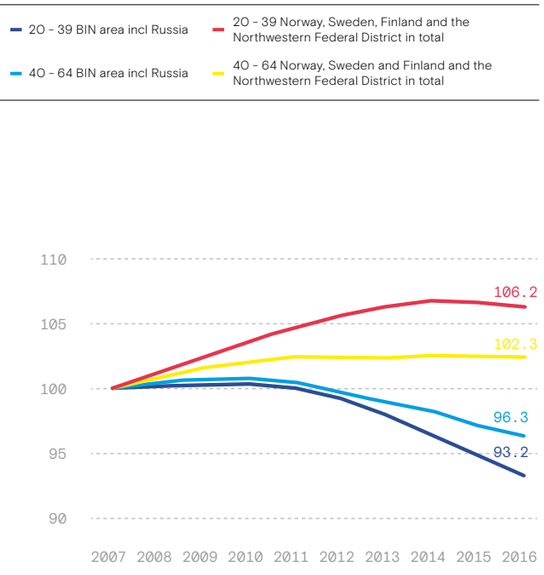





Figure 12

## Population development in age group 20-39 and 40-64 years at the BIN regional level, %

2007-2016

Figure 12 breaks down population development in age groups 20-39 years and 40-64 at the BIN regional level. Population in age group 20-39 years grew in Swedish and Norwegian BIN regions but at a rate much lower than the country average. In Kainuu population aged 20-39 declined by 4.4%. The sharpest decrease in population aged 20-39 happened in the Arkhangelsk (-14.1%) and Murmansk (-13.9%) regions. Weak employment opportunities, legacies of single-industry towns and living conditions contribute to shrinking 20-39 year-olds in Arkhangelsk (without NAO) and Murmansk regions. Overall, population in age group 40-65 increased only in Troms (4.7%), Nordland (1.1%) and Finnmark (5.9%), but was still below the national country's total of 9.9%. Swedish and Russian BIN regions saw a decrease in the range of 2.4-8.7%. In Finland, Kainuu (-16.2%) and Lapland (-13.2) were the net losers of population in age group 40-65 due to an increase in the share of baby-boomers (born 1945-50). In Finland, until the 1970s fertility rates decreased more rapidly than in Norway and Sweden, where the baby-boom generation was spread over a longer period of time, e.g. Norway (those born 1945-1955) and Sweden with a baby boom during the 1940s and the second peak in the 1960s.

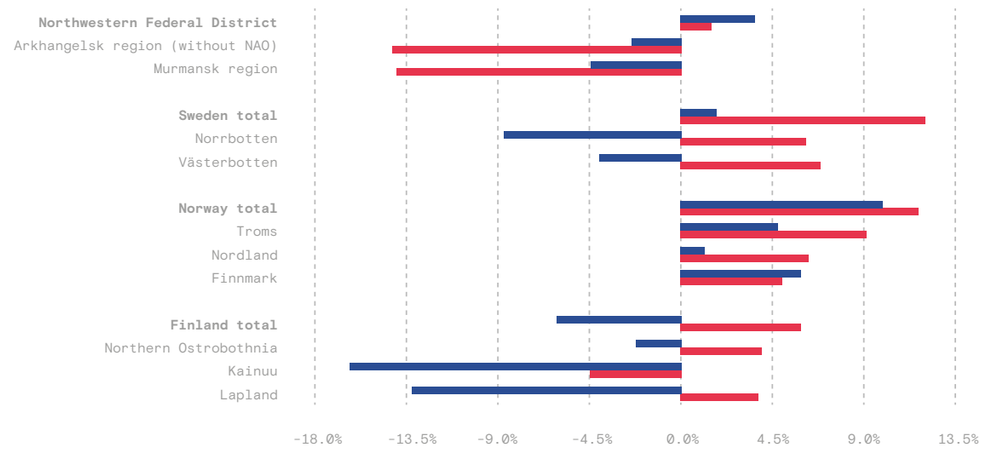


Figure 13

BIN area — Norway, Sweden, Finland and the Northwestern Federal District in total

## Population development in age group 65 + (incl.Russia)

Index 2007 = 100, 2007–2016

Figure 13 shows growth in age group 65+ during the period 2007-2016. The BIN area saw a growth in age group 65+ of 13.3%, while in Norway, Sweden, Finland and Northwestern Federal District (NWFD) age group 65+ grew by 16.7%. Increasing population in the age group 65+ reflects the demographic transition of the developed countries. In developed countries advanced public health care, high level of women participating in the workforce, with both mortality and fertility being low contribute to demographic transition. We observe that in the BIN area and in total of Norway, Sweden, Finland and Northwestern Federal District the age structure becomes old.

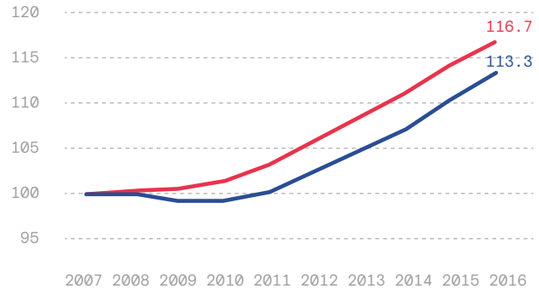



Figure 14

## Population development in age group 65+ years at the BIN regional level, %

Index 2007 = 100

Figure 14 shows differences in population development in population aged 65+ on the regional level. Norway, Sweden, Finland all have higher life expectancy than Russia. In Russia, lower life expectancy at birth than in the Scandinavian BIN explains the negative and low growth numbers. We observe that the Swedish BIN regions, Finnish Kainuu, and Lapland have a growth in population aged 65+ which is below the overall country levels.  These findings are linked to the loss of working population aged 40-64 in the BIN area.

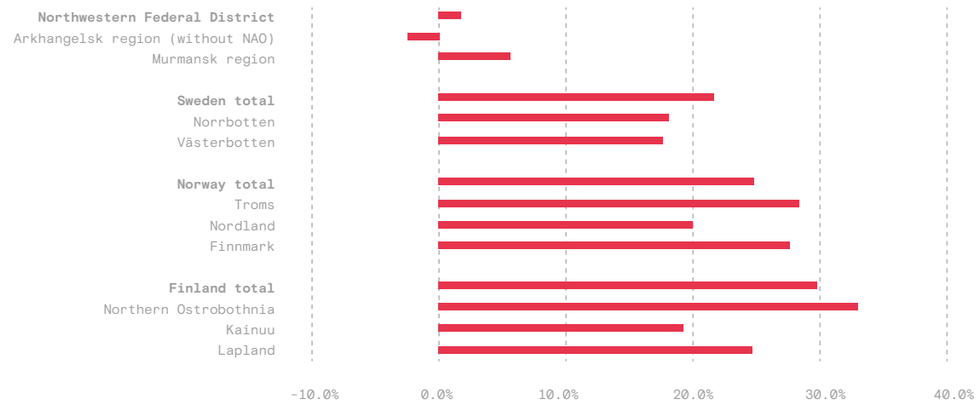





Figure 15

2007 — growth 2007-2016

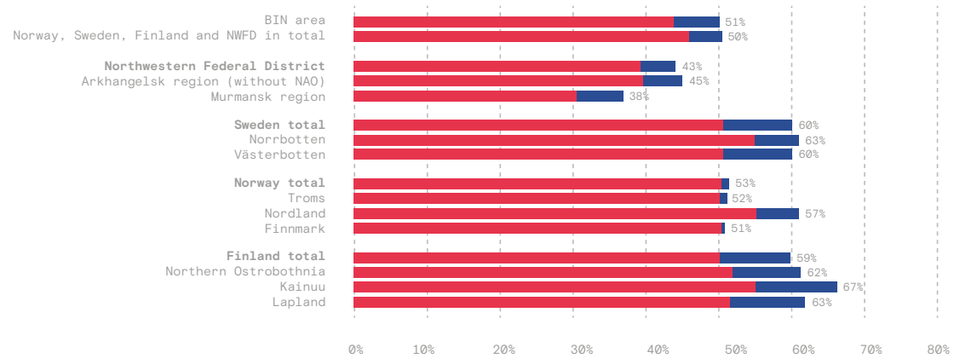
## Total age dependency, %

2007-2016

Figure 15 shows the change in total age dependency in the BIN area at the regional level during the period 2007-2016. Dependency ratios provide a gross estimate of the pressure on the productive population. It provides an indication of a society's caregiving burden by estimating the potential supply of caregivers and the potential demand for care (number of care recipients).

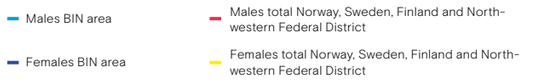
The total dependency ratio for the BIN area was 43 in 2007, indicating that every 100 people aged 15 to 64 were supporting 43 young people and older people combined. This number rose by 7 percentage points, reaching 50% in 2016. The average masks variations across countries and regions. For instance, in Finnish BIN regions, total age dependency rose at its highest in the range of 9-12 percentage points, reaching 67% in Kainuu in 2016, compare to the world average of 54 in 2016 [7]. Swedish Norrbotten and Västerbotten saw growth of 8-9%, with total age dependency equaling 60-63%. In six out of ten BIN regions total age dependency is higher than the national average.

Old age dependency increased by 4.5% from 19.7% in 2006 to 24.2%, young age dependency increased by 2.9% from 22.9% in 2006 to 25.8% in 2016. The composition of the dependency ratio with a more pronouonced shift towards old age dependency in the BIN area has implications for financing pension and health care systems tailored to elderly care.




7. World Bank estimate.

Figure 16




## Population development by gender

Index 2007=100, 2007–2016

Figure 16 shows that both female and male population decreased in the BIN area compared to that in Norway, Sweden, and Finland with a growth of 6.2% and 4.3% respectively. In the BIN area female population decreased by 1.6% more than male population.

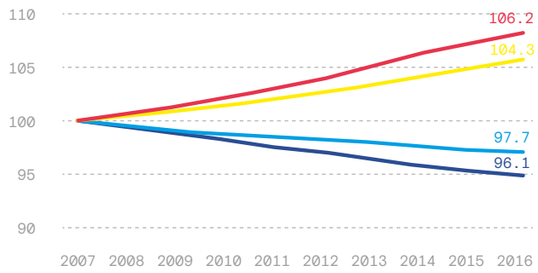
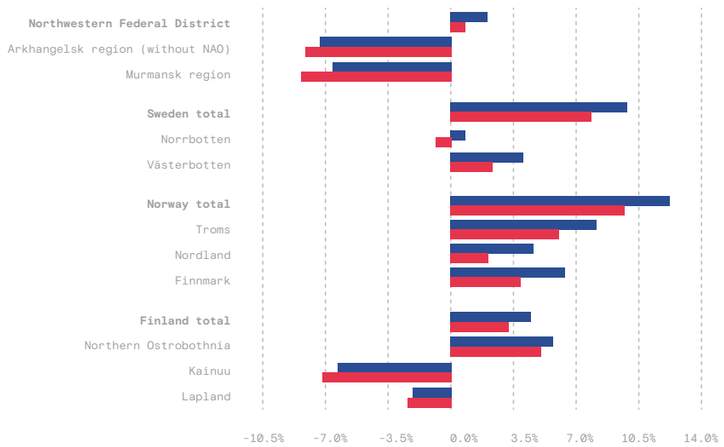



Figure 17


## Female and male population development at the BIN regional level, %

2007–2016

Figure 17 illustrates cross-border differences in female and male population development. The Arkhangelsk without NAO (-8.1%) and Murmansk (-8.3%) regions had the biggest decreases in female population during 2007-2016, followed by Kainuu (-7.1%). In the Norwegian and Swedish regions growth of female population lagged on average 2% behind the growth in male population. The most equal growth is seen in Northern Ostrobothnia, where female population grew by 5.1%, while male population grew by 5.7%.






# Challenges and findings

### Recommendations

**For Policy**

A. How to stop the decline in population in the BIN area?

B. How to address challenges of growing urbanization and abandonment of rural territories in the BIN area?

C. How to attract young families and females to the BIN area?

D. What shall be done to make BIN area attractive for people in the age group 20–39 and 40–64 years?

E. How to fund ever-growing demand for elderly care when the youth and the most active population 20–64 is declining so rapidly in the BIN area?

There are no straightforward answers to these questions. Challenges shall be addressed using a systemic and holistic approach. Education, work, living conditions, quality of life, earnings potential and infrastructure including transport and digital infrastructure are all pieces of the larger policy that shall be developed to address the issues of declining population in the BIN area. The Regions in the BIN area can learn from each and see what policies work.

**For businesses**

A. Participate in business and government dialogue on the role of the private sector in providing public services

B. Contribute to digital infrastructure development

C. Develop solutions for elderly care and telemedicine

D. Develop financial solutions for elderly care

E. Provide entry-level jobs for recent graduates

F. Provide cultural services in the cities

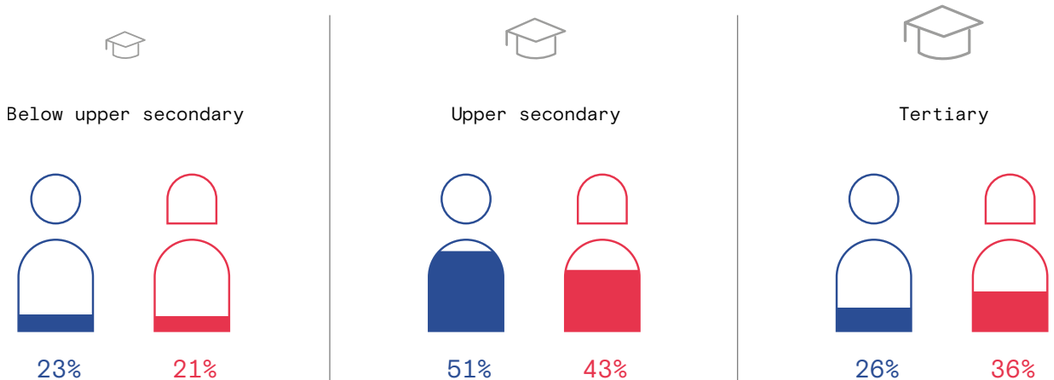
# Quality of life, Education and Arctic resilience.

(02)

*Life and the North*

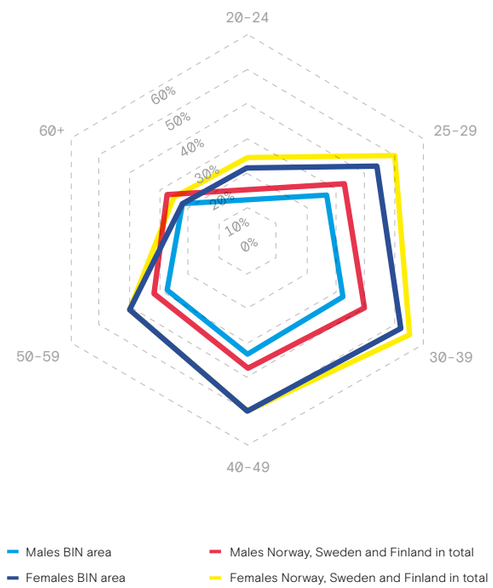
## Levels of education BIN area excl. Russia

2016




## Tertiary attainment of the population divided by age group

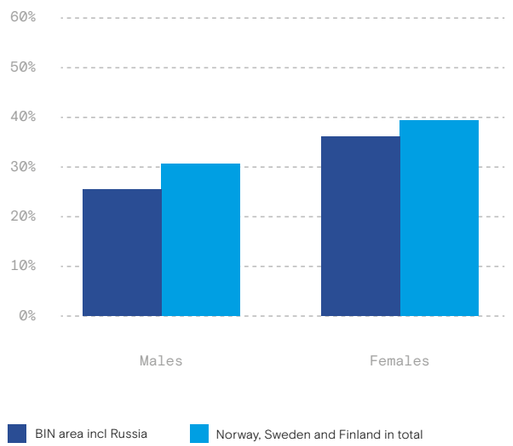
2016





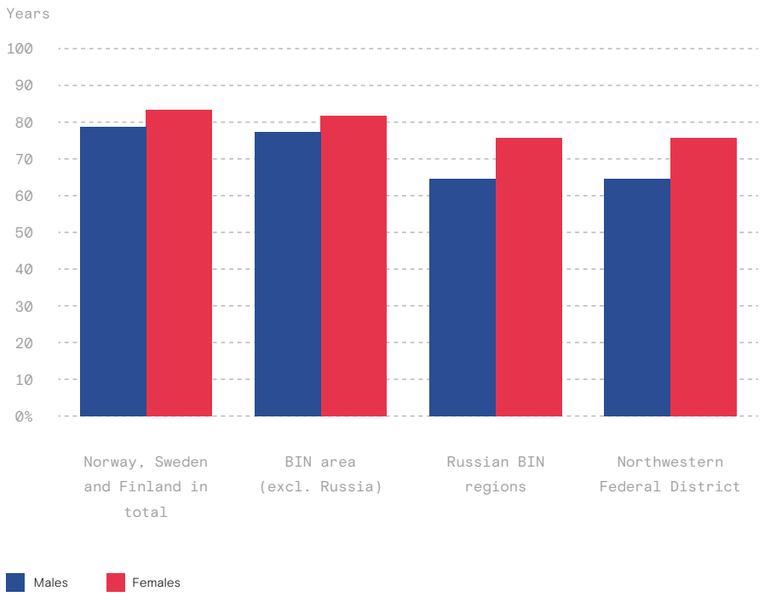

## Tertiary education attainment in the BIN area excl. Russia

2016




## Life expectancy at birth

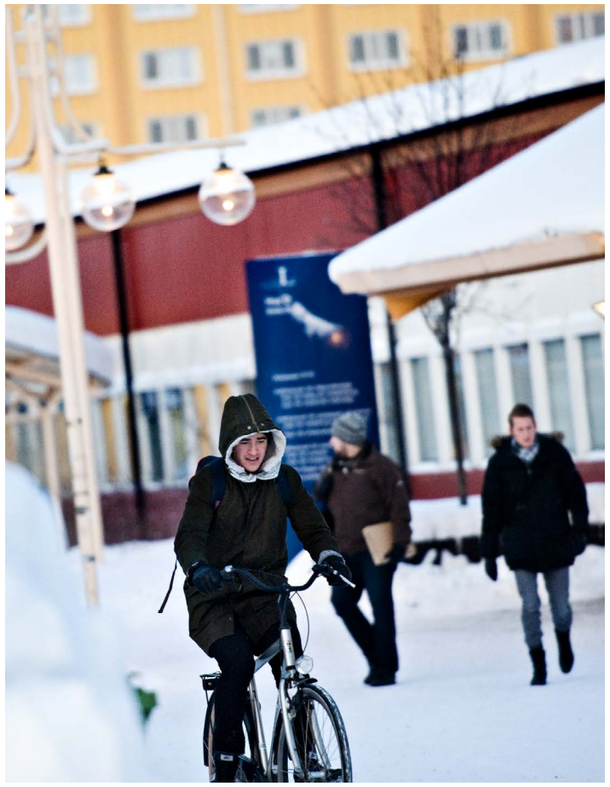
2015



Section (02)

# Life and the North

Quality of life depends on individuals' wellbeing in a society. The concept of quality of life includes a number of subjective and objective dimensions of human existence. Subjective dimensions of life in the North include proximity to nature, work-life balance and Arctic resilience [1].



Students at Regnbågsallén on Luleå University campus

Measurement of subjective dimensions requires further research on why people choose to live in the North. In this chapter, we employ objective indicators obtained from national statistics bureaus. Education, life expectancy and financial situation expressed as disposable income [2] are used as indicators affecting quality of life in the BIN area. These indicators are interdependent and the role of each is explained further. The Norwegian, Swedish and Finnish BIN regions share many similarities in quality of life indicators due to the historically strong welfare systems of the Nordic countries, low inequality measured by income distribution and universal access to education. The Russian BIN regions are affected by the Russian transition economy post 1990s with exacerbation of poverty and inequality expressed as income and mortality, combined by challenges in social welfare.

### EDUCATION

Education affects individuals' quality of life in many ways; it predicts employment opportunities, earnings potential and reduces the risk of poverty. The level of education is fundamental in predicting individuals' health and life expectancy. We use level of educational attainment incorporating gender and regional perspective to examine the trends in education in the BIN area. Education attainment levels in this chapter are divided into below upper secondary, upper secondary and tertiary education attainment in population [3].

### LIFE EXPECTANCY

Life expectancy is influenced by many factors such as socioeconomic status, including employment, income, education and economic wellbeing. We use life expectancy at birth to refer to the mean number of years a newborn child can expect to live if subjected throughout his or her life to the current mortality conditions. Improvements in the educational attainment levels of populations also contribute to further improvements in life expectancy.

### FINANCIAL SITUATION

The financial situation relates to the standard of living as expressed through income. Disposable income expresses the financial resources available for spending (or saving) and determines ownership of (or access to) material goods and services

## Findings for 2008–2016:

### TRENDS IN THE LEVEL OF EDUCATION

- The proportion of population with below upper secondary has declined in the BIN area (excl. Russia) by 4 percentage points for males and 6 percentage points for females, reaching 23% for males and 20% for females. This pattern is observed in all countries under investigation.
- Population with upper-secondary education forms the biggest group in the BIN area (excl. Russia) with 51% for males and 43% for females, the proportion of the male population with upper-secondary education has grown in the BIN area by 2 percentage points while it did not change for females.
- Population with tertiary education in the BIN area (excl. Russia) continued to grow at a rate of 6 percentage points for females and 3 percentage points for males.

### GAP IN TERTIARY EDUCATION

- In 2016 BIN area population with tertiary education is lower by 5 percentage points for males and 3 percentage points for females than the corresponding figures for Norway, Sweden and Finland.
- In 2016 in the BIN area the gap in tertiary education attainment between females and males was 9.5 percentage points (35.6% versus 26.1%) with significant differences on the regional level.

### LIFE EXPECTANCY

- Life expectancy differs across countries and regions and the Russian BIN regions had the lowest life expectancy.
- Life expectancy correlates with tertiary education attainment for male population.

### FINANCIAL SITUATION

- All BIN Nordic regions had lower disposable (ranging from 4 to 10 percentage points) income per inhabitant than the corresponding country averages. In Russia, Murmansk region outperformed the Northwestern Federal District by 14 percentage points in disposable income per inhabitant due to the economic growth of the last few years.

1. Capacity for navigating change by adapting or reorganizing in response to stress and shocks in ways that maintain essential identity, function and structures. (Arctic Resilience Report 2016).

2. Similar indicators have previously been used by Eurostat (2015) and Eurofound (2016) publications "Quality of life in Europe".

3. Below upper secondary includes primary and lower secondary education levels. Upper secondary includes upper secondary and post-secondary non-tertiary education. Tertiary education includes all three levels of tertiary education Bachelor's, Master's and doctoral and equivalent (OECD classification).

Figure 1

Males BIN area
Females BIN area
Males Norway, Sweden and Finland in total
Females Norway, Sweden and Finland in total

## Proportion of BIN area population aged 20+ with below upper secondary education (excl. Russia), %

2008 – 2016

Figure 1 illustrates the proportion of population with below upper secondary education in 2008 – 2016. Educational attainment below upper secondary is considered a low level of education and has been proved to be associated with fewer economic resources and additional health risks. Male population with below upper seconadry education decreased in the BIN area from 27% in 2008 to 23% in 2016. Female population in the BIN area with below upper secondary education decreased by 6 percentage points from 27% in 2008 to 21% in 2016. Both female and male population lagged behind the totals for Norway, Finland and Sweden by 1 percentage point. The trend is that the number of people with below upper secondary education is decreasing.

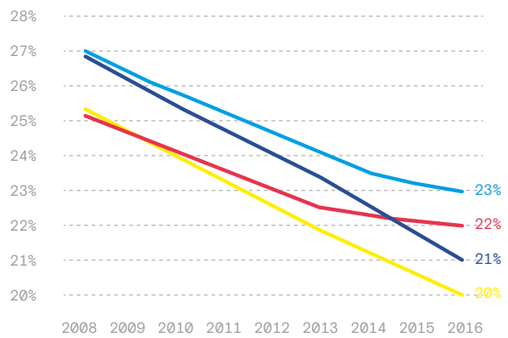



Figure 2

Males BIN area
Females BIN area
Males Norway, Sweden and Finland in total
Females Norway, Sweden and Finland in total

## Proportion of population aged 20+ with upper secondary education as their highest educational attainment in the BIN area (excl. Russia), %

2008 – 2016

Figure 2 shows that population with upper secondary education as their highest educational attainment was the biggest group in the period 2008-2016, cf. Figures 1 and 3. The indicator aims to measure the share of population likely to have the minimum necessary qualifications to actively participate in social and economic life. It should be noted that completion of upper secondary education could be achieved in European countries after varying lengths of study, according to different national educational systems. There are significant differences between males and females, with males' attainment in upper secondary education exceeding that of females by 6 percentage points in total in Norway, Finland and Sweden. The BIN area has significantly more males with upper secondary education as the highest qualification. Cf. 51% in 2016 for the BIN area and 46% total for Norway, Sweden and Finland.

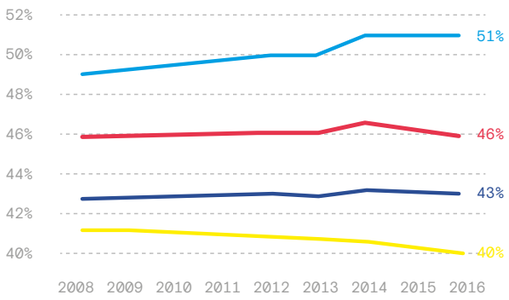





Figure 3

Males BIN area
Females BIN area
Males Norway, Sweden and Finland in total
Females Norway, Sweden and Finland in total

## Proportion of population aged 20+ with tertiary education as the highest educational attainment in the BIN area (excl. Russia), %

2008 – 2016

When looking at male and female tertiary educational attainment in 2016 in Norway, Sweden and Finland in total (Figure 3), women perform better than men in terms of tertiary education by 7.6 percentage points (38.7% versus 31.1%). In the BIN area, the gap in tertiary education attainment between females and males is much greater - 9.5 percentage points (35.6% versus 26.1%). Growth in male population with tertiary education in the BIN area was 3 percentage points during the period 2008-2016, while female population with tertiary education in the BIN area grew by 6 percentage points from 30% in 2008 to 36% in 2016. The values for both males and females in the BIN area are below the national values.

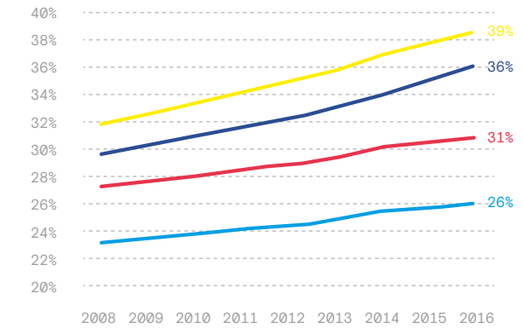



Figure 4

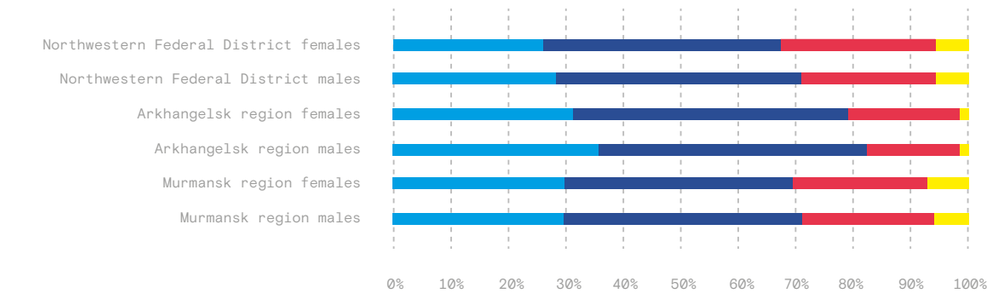
Below upper secondary
Upper secondary
Tertiary education
Unknown or not completed education

## Distribution of population aged 15 and older by highest educational attainment, %

2010

Figure 4 shows the educational attainment of the population in the Russian regions of Murmansk and Arkhangelsk (including Nenets Autonomous Okrug) and the Northwestern Federal District. Classification of educational level differs in the Russian and Nordic BIN due to reasons of comparability; all educational levels in Russia were classified into three major groups[4]. The data is only available for r 2010 when a population census took place.

The biggest group was upper secondary education holders at 47% of males and females in Arkhangelsk, in Murmansk 41% of females and 44% of males. Murmansk and Arkhangelsk regions lagged behind the Northwestern Federal District average in tertiary education attaintment. In Arkhangelsk, 19% of female and 16% of males had tertiary education, in Murmansk 23% of females and 19% of males had tertiary education as their highest qualification.




*Source: Data from Russian population census of 2010*

4. According to our classification in Russia less than upper secondary includes primary general, basic general and secondary (complete) general education. Upper secondary education includes basic vocational education, secondary vocational education and incomplete tertiary education (two years). Tertiary education includes university education (including Bachelor's, Master's, specialist and doctoral degrees) and post-university education.

Figure 5

## Population aged 20+ with tertiary education, by gender 2008 - 2016, Norway, %

2008-2016

Figure 5 shows differences for males and females in tertiary education attainment for the Norwegian regions. Males have fewer tertiary education qualifications in all the Norwegian BIN regions, compare on average 20.5% in 2008 and 24.3% in 2016, while females had 28.0% and 35.5% for the same years. The regions of Nordland (23%) and Finnmark (22%) had the lowest proportion of male population with tertiary education as their highest qualification. Of the Norwegian BIN regions, Troms had the highest percentages of female (39%) and male (28%) population with tertiary education. The higher urbanization level in Troms Region with more jobs available for highly skilled workers can explain this. The growth in percentage points is very similar in the BIN regions and in Norway overall.


Figure 6

## Population aged 20+ with tertiary education, by gender 2008 - 2016, Sweden, %

2008-2016

Figure 6 shows differences between males and females in tertiary education attainment in the Swedish regions. There are substantial difference across regions. In Norrbotten, 25% of the male population had tertiary education as also had 35% of the female population in 2016, while in Västerbotten the corresponding figures were 32% and 42%. The Västerbotten education attainment profile is similar to that of Sweden as a whole, while Norrbotten is lagging behind by 8 percentage points for males and 5 percentage points for females. Umeå University located in Västerbotten has a longer history and a wider range of programmes than Luleå Technical University in Norrbotten. This may explain the differences in tertiary education attainment in Västerbotten and Norrbotten.

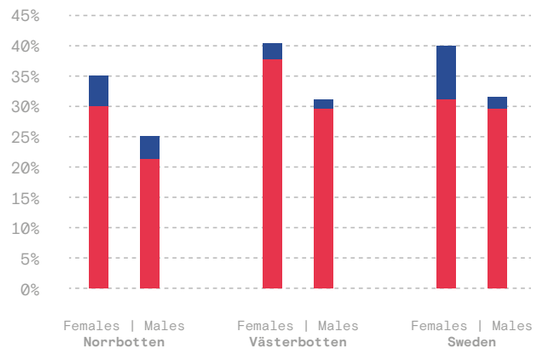





Figure 7

## Population aged 20+ with tertiary education, by gender 2008 - 2016, Finland, %

2008-2016

Of the Finnish BIN regions Northern Ostrobothnia measured up against the country's average of 36% for females and 28% of males with tertiary education (Figure 7). The regions of Kainuu and Lapland lagged behind the total for Finland by an average 5 percentage points for females and 6 percentage points for males. Ageing population structure in these regions explains the gap in tertiary education.


Figure 8

## Tertiary attainment of the population divided by age group

2016

Figure 8 shows that tertiary education among the younger generations in 2016 was more common than among the older ones, with the highest numbers in groups aged 30-39 and 40-49. The proportion of women aged 30-39 with tertiary education in Norway, Sweden and Finland together amounted to 55.1%, with the BIN area lagging behind by 3 percentage points (55.2% in 2016). Males aged 25-29 (26.9%) and 30-39 (32.9%) with tertiary education lagged behind in Norway, Sweden and Finland in total by 6 percentage points. The lowest tertiary education attainment is observed in the age groups 20-24 and 60+.

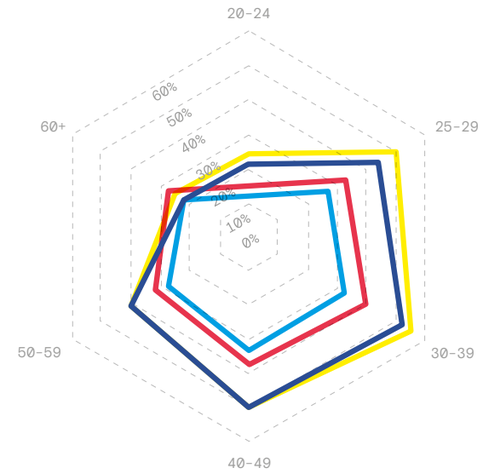


Figure 9

## Life expectancy at birth, boys/ girls

2015

Figure 9 shows that life expectancy is not equal between the two genders. On average girls born in 2015 in Norway, Sweden and Finland are expected to live 83.8 years, i.e. 4.5 years longer than boys born in 2015. In the BIN area, excluding Russia, women are expected to live till 83.4 years and men till 78.3 years, amounting to a discrepancy of 5.1 years in life expectancy. In Russia the life expectancy pattern is different from that in the Nordic BIN, with women's life expectancy in the Northwestern Federal District 76.8 years and men's 66.3 years (a discrepancy of 10.5 years in life expectancy). In the Murmansk (64.5) and Arkhangelsk (64.8) regions men are expected to live 2 years shorter than in the Northwestern Federal District (66.3).

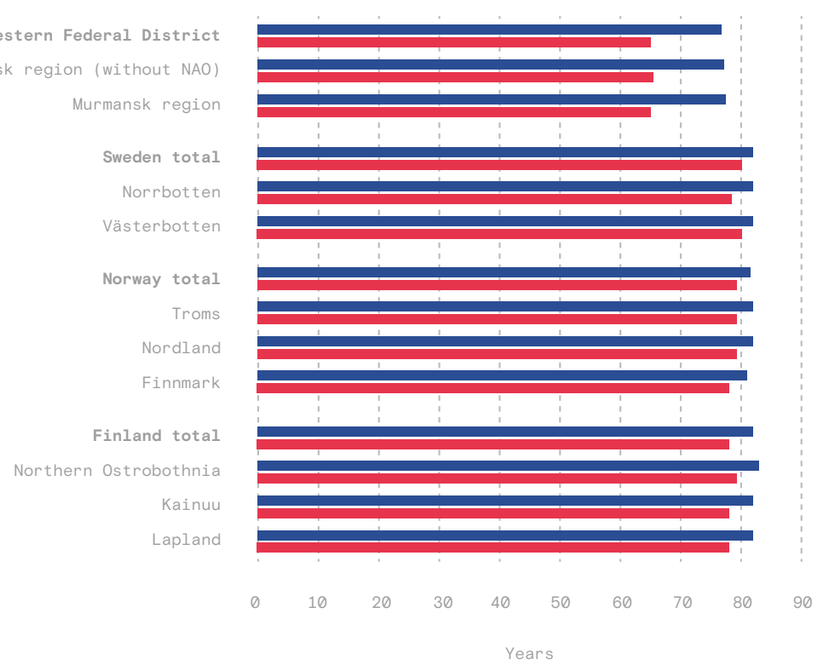





Figure 10

## Change in life expectancy at birth, boys/girls

2005-2015

Figure 10 shows that the life expectancy of BIN residents at birth has increased improved in all BIN regions during the period 2005 to 2015. Life expectancy for men rose faster, increasing by as much as 9 years in Russia. In Norway, Sweden and Finland overall life expectancy for men rose by 2.6 years on average. Increases in life expectancy among men in the Nordic BIN regions can be can be attributed to improvements in levels of educational attainment. The slowest increase was observed in North Sweden with 0.8 years for females and 1.5 for males. In developed societies, improvements in life expectancy associated with higher levels of educational attainment are counteracted by health problems due to lifestyle diseases (e.g. atherosclerosis, heart disease, obesity and type 2 diabetes; and diseases associated with alcohol and drug abuse). The effect of lifestyle diseases on life expectancy in the BIN area deserves further investigation. The Russian BIN regions continue to lag behind the Nordic BIN regions in terms of life expectancy. In Russia, life expectancy has improved since 2003. However, this is a compensatory process; in 2013 life expectancy for the first time reached 70.8 years, the point it was at when the Soviet Union collapsed. The Russian government aims to raise national life expectancy to 76 years across the country by 2025.

*Source: Eurostat statistics/NUTS2 level, Russian Federal State Statistics Service*

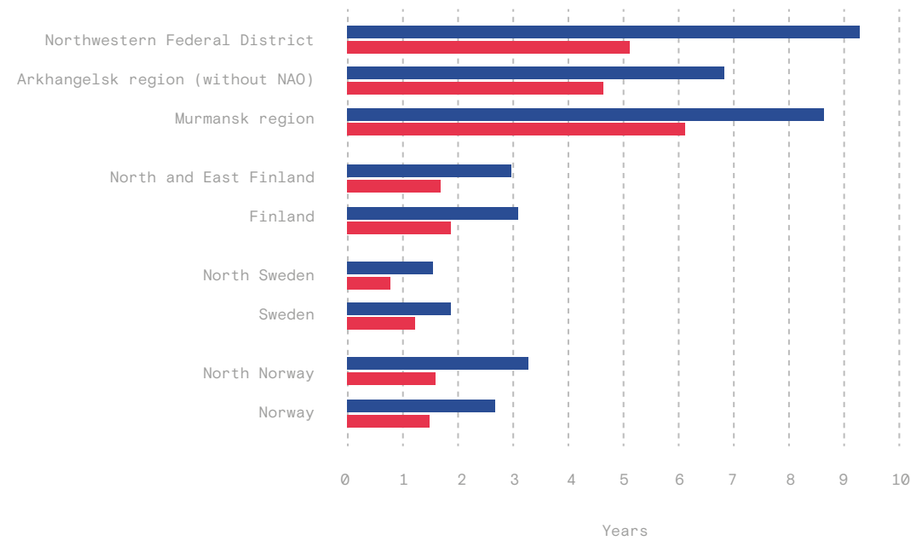


Figure 11

## Life expectancy at birth vs. tertiary education attainment, males

2016

Figure 11 illustrates potential correlations between tertiary education attainment and life expectancy for male population. It shows that the BIN regions can be broadly divided into three groups. Underperformers are those with lower life expectancy and less tertiary education attainment (Kainuu, Finnmark, Lapland). Moderate performers are those with longer life expectancy and moderate tertiary education attainment (Norrbotten, Northern Ostrobothnia). High performers are those with the longest life expectancy and highest tertiary education attainment (Västerbotten). The gap between underperformers and high performers is in the range of 3.5 life years and 11.2 percentage points in tertiary education attainment for males. At the same time, we observe that in Norwegian Nordland and Troms relatively low levels of tertiary education attainment do not result in decreased life expectancy at birth. This needs further attention to ascertain what other objective and subjective factors contribute to longer life expectancy in these regions.

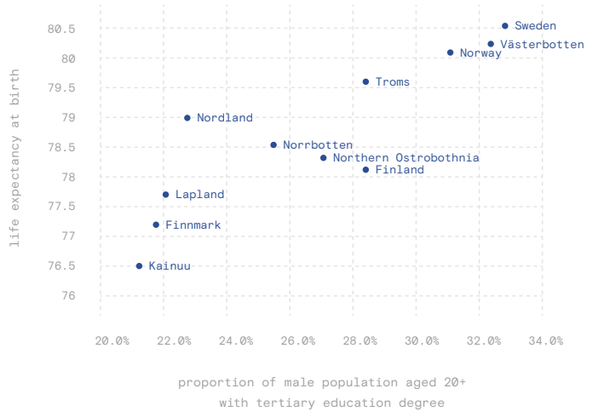



Figure 12.1

## Annual disposable income per inhabitant, euro

2015

Figure 12.1 depicts annual disposable income per inhabitant corresponding to the sum of wages and salaries, mixed income, net property income, net current transfers and social benefits other than social transfers in kind, less taxes on income and wealth and social security contributions paid by employees, the self-employed and the unemployed. Disposable income, as a concept, is closer to the idea of income as generally understood in economics, than is either national income or gross domestic product (GDP). In 2015, Norway had the largest annual disposable income of 29,098 euros per inhabitant, followed by Sweden (21,797) and Finland (21,797). In Russia, disposable income per inhabitant in Northwestern Federal District amounted to 5,699 euros.

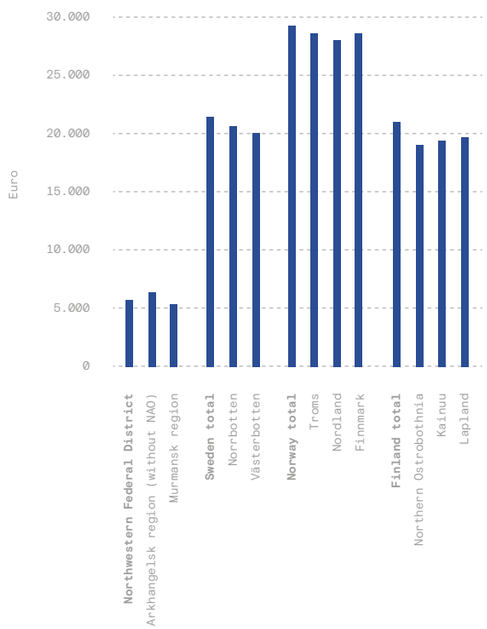





Figure 12.2

## Disposable income per inhabitant relative to country average

2015

Figure 12.2 illustrates disposable income per inhabitant relative to the country's average in 2015. All BIN Nordic regions had lower disposable income per inhabitant (ranging from 4 to 10 percentage points) than their corresponding country averages. In Russia, the Murmansk Region outperformed the Northwestern Federal District by 14 percentage points in disposable income per inhabitant. This is explained by the economic growth in the Murmansk Region fueled by the metal industry and the industrial production of apatite concentrate used as a raw material for phosphate fertilizers. It is worth noting that these differences do not represent the full picture since the cost of living differs in the northern, southern and metropolitan regions. Comparison that is more meaningful requires calculation of discretionary income that accounts for paying for personal necessities, such as food, housing and clothing. There is currently no data on the national statistic level for all BIN area allowing enabling us to present discretionary income.

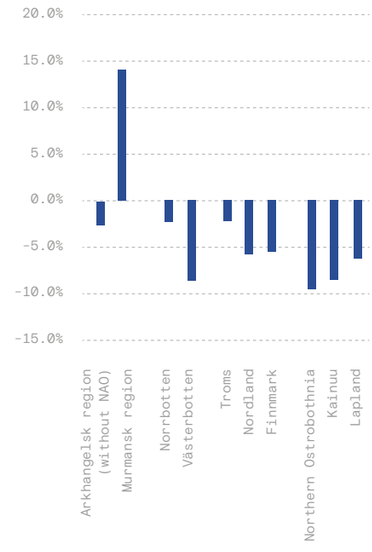



Figure 13

## Disposable income vs life expectancy, males

2015

Figure 13 seeks a possible correlation between disposable income and life expectancy for males in 2015. The differences in life expectancy values are not too big - maximum three years. Lower disposable income is associated with shorter life expectancy, e.g. in Kainuu, life expectancy in 2015 for males was 76.5 years and annual disposable income was 19,000 euros. Disposable income over 27,000 euros is associated with longer life expectancy at birth in Nordland and Troms. However, disposable income of 27,000 does not correspond to higher life expectancy in Finnmark and likewise lower disposable income in Västerbotten (less than 20,000) correlates with longer life expectancy in males. Therefore, it is important to take account of such factors as education, health and life-style of the population.

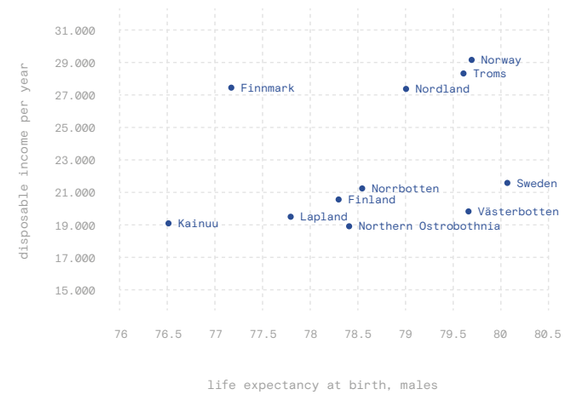
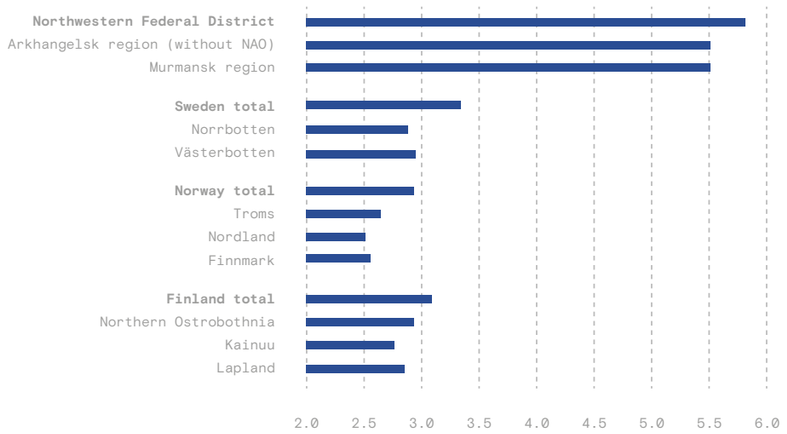


Figure 14

## Income inequality - ratio of income level of 10% of the richest and 10% of the poorest

2016

Figure 14 illustrates the ratio of disposable incomes at the top (90th percentile) versus the bottom (10th percentile) of the population. The higher the ratio the greater the inequality. The greatest income inequality is observed in Russian BIN regions, 5.5 in the Murmansk and Arkhangelsk regions. Historically, the Nordic countries have performed well in income inequality, the ratio being top in the OECD countries, with the highest ratios only 3.31 in Sweden while the USA, for example had a ratio of 6.1 in 2015. Of the BIN area, Norway and its BIN regions appear to be the best performers. Overall, the BIN regions perform better in income inequality ratio than its subsequent countries. This can be explained by lower tertiary education attainment in the male population men and lower disposable income in these regions. The trends in the inequality ratio would be a good indicator of how situation changes regarding poverty and inequality.






# Challenges and findings

## Recommendations

### For Policy

- A Improve the quality, diversity and accessibility of tertiary education in the BIN region
- B Increase the number of young men with tertiary education
- C Create conditions for young women to move back home after getting tertiary education
- D Increase disposable income to make it attractive to move to the North
- E Address the link between life expectancy and education
- F Measure both objective and subjective quality of life on the regional level
- G Implement policies based on the European Pillar of Social Rights [5] that includes among others public support /social protection and inclusion
- H Provide affordable housing that decisively influences material living conditions

The population of the BIN area lags behind the respective national averages in tertiary education attainment, life expectancy and disposable income. Policy-makers should consider how to increase number of young men completing tertiary education and create attractive living conditions for highly educated women in the BIN area. Further increasing automation of basic manual work would require skilled workers.

### For businesses

- A Develop services supporting quality of life, inclusion
- B Harness the potential of the educated female population

5. https://ec.europa.eu/commission/priorities deeper-and-fairer-economic-and-monetary-union/european-pillar-social-rights_en

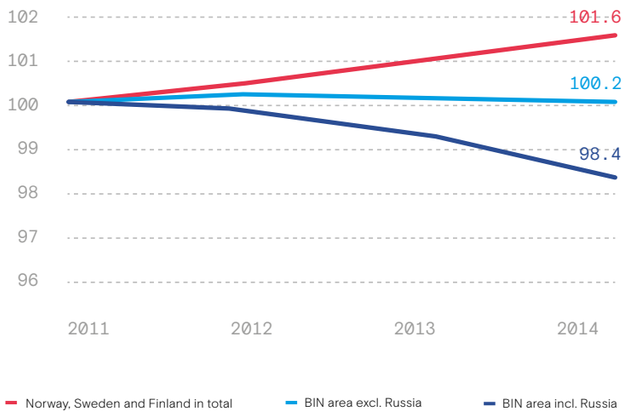
# Work creates purpose and financial security.

(03)

*Work in the North*

## Employment development all industries

Index 2011=100, 2011 – 2014




## Job creation and losses in the BIN area (excl. Russia)

2012 – 2016

| | | | | |
|---|---|---|---|---|
| -4.981 | -3.509 | -19.34 | -1.221 | -673 |
| Mining, quarrying, manufacturing | Agriculture, forestry and fishing | Unspecified | Information and communication | Financial and insurance activities |
| 2.537 | 2.648 | 2.754 | 5.012 | 7.771 |
| Other services | Construction | Accommodation and food service activities | Real estate, professional, scientific and technical companies; administrative and support service companies | Human health and social work activities |

## Job creation and losses in the Russian BIN regions

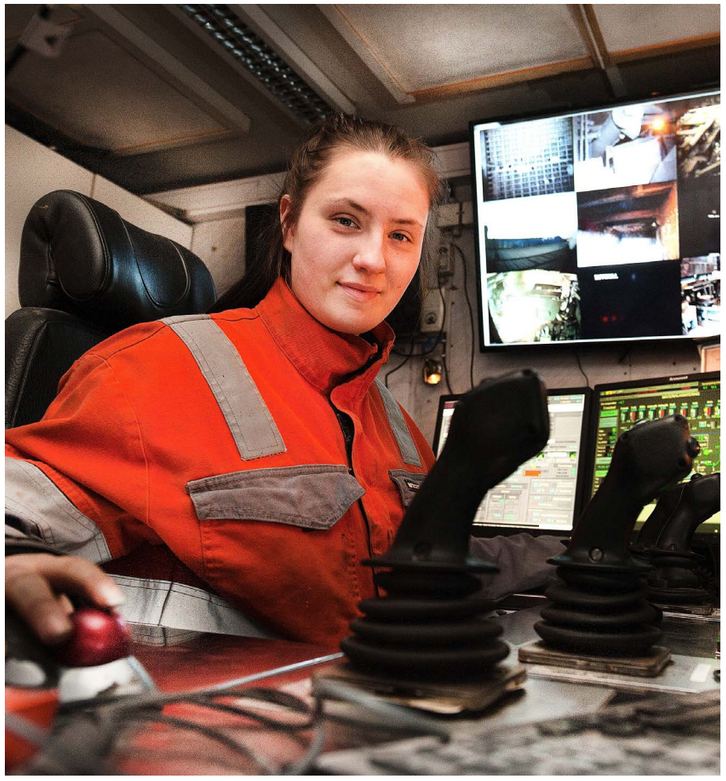
2012 – 2014

| | | | | |
|---|---|---|---|---|
| 2.131 | 1.698 | 1.261 | 596 | -3.650 |
| Real estate, professional, scientific and technical companies; administrative and support service companies | Other services | Accommodation and food service activities | Electricity, water supply, sewerage, waste management | Education |
| -4.645 | -6.170 | -6.224 | -7.260 | |
| Wholesale and retail trade: repair of motor vehicles and motorcycles | Transportation and storage | Public adm., defence, soc. security | Mining, quarrying, manufacturing | |

Section (03)

# Work in the North

Work brings purpose to human life and creates financial security. On a country level, employment contributes to economic growth. In order to understand the structure of work in the north it is important to address both employment and unemployment.



Trainee Trine Kvannli, Mo Industripark
photo: Mye i media AS



The BIN area was home to approximately a total of 1,709,000* employees in 2016. In analyzing the prevailing situation in the BIN area, one must keep in mind the historically strong agriculture, forestry and fishing and mining, quarrying and manufacturing sectors providing employment in the BIN area. The nature of work is changing all over the world with the proliferation of digitalization and automation. Furthermore, it is a globally recognized fact that the service business has become a main driver of economic development in Western countries. The BIN area has been the supplier of raw materials and a provider of associated jobs. We need to understand where the future of jobs in the BIN area lies. Is the BIN area able to create new jobs related to the raw materials and what is the role of automation and digitalization in this? The future of employment in the BIN area demands policy measures to address the changing fabric of work.

## In this chapter we answer the following questions:

- What are the trends in employment development in the BIN area?
- What are the industries that provide most and least employment in the BIN area?
- What is the situation regarding employment and unemployment rates in the BIN area?
- Are there any differences in female and male participation in the job market?
- What are the industries that create most jobs and what industries are losing most jobs?

## Findings:

### TRENDS

- Growth in employment has been modest in the BIN area excluding Russia with a growth of 0.2% in 2011-2014, while employment in the Russian BIN regions has decreased by 1.6% during 2011-2014.
- Human health and social work activities, wholesale and retail sectors, real estate, professional, scientific and technical companies, education, mining and quarrying and manufacturing are the principal employment sectors in the BIN area excluding Russia; the principal employment sectors in the Russian BIN regions are mining and quarrying, manufacturing, wholesale and retail trade.

### EMPLOYMENT LEADERS

- Human health and social work activities sector, agriculture, forestry and fishing as well as public administration and defence and social security employs more people in the BIN area excluding Russia than the respective shares at the respective national levels.

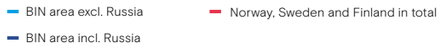
### FEMALE PARTICIPATION

- The development of female employment has been stable in the BIN area since 2012, but has underperformed compared to Norway, Sweden and Finland as a whole.
- Women underperform in labour force participation in all BIN regions, but especially in the Russian BIN regions.

### JOB LOSSES AND JOB CREATION

- The biggest job losses have been in mining, quarrying and manufacturing, agriculture, forestry and fishing. The biggest contributors to job creation have been human health and social work activities, real estate, the professional, scientific and technical sector, accommodation and food service activities, construction and other services professional, scientific and technical sector.

**Figure 1**




## Employment development (all industries)

Index 2011 = 100, 2011-2014

Figure 1 illustrates employment development expressed as an index (all industries). The BIN area experienced near-zero growth of 0.2% in 2011-2014 [1], compared to 1.6% for Norway, Sweden and Finland in total. However, when we include the BIN regions of Russia in the analysis, employment decreased by 1.6 %.

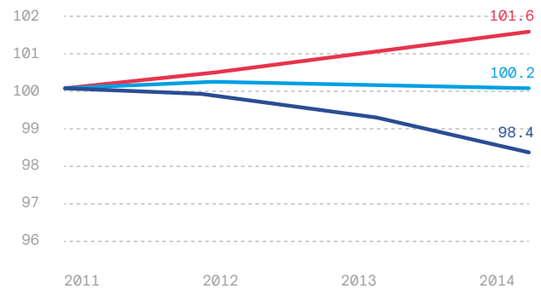


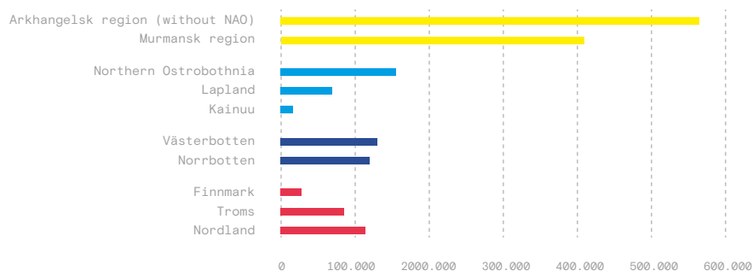

**Figure 2**




## Total number of people employed in the BIN area

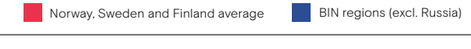
2016

The BIN area was home to approximately 1,709,000 employees in 2016. This refers to people aged 16+ who are currently employed in the labour market. Figure 2 shows a breakdown of employees by place of work on the regional level. These are the people who actually work in the BIN area. Clearly, the largest number of employees is in the Arkhangelsk (without NAO) and Murmansk regions, and the smallest in the regions of Kainuu and Finnmark. The figures are directly proportional to the respective populations of the regions.




[1] The period of investigation ends in 2014 due to major changes in a way of counting employment in Sweden (2011) and Norway (2014).

**Figure 3.1**




## Employment by industry in the BIN area (excl. Russia) and in Norway, Sweden and Finland in total

2016

Figure 3.1 illustrates how the BIN area (excl. Russia) measures up against Norway, Sweden and Finland in total employment by industry. In the BIN area employment in human health and social work activities is 3.3 percentage points higher than the 18.8% total for Norway, Sweden and Finland. Employment in the education sector in the BIN area is 0.8 percentage points higher and in public administration, defence and social security 1.6 percentage points higher than the corresponding overall average in Norway, Sweden and Finland. The sparsely populated areas of the northern BIN regions lack economies of scale and hence have more employment in human health and social work activities and education. Moreover, the rapidly ageing population in the BIN area requires more people to be employed in human health and social work activities. The BIN area also employs 2.2 percentage points more people in agriculture, forestry and fishing, which is attributable to the traditionally strong position of this industry cluster. The BIN area employs fewer people in real estate, professional, scientific and technical companies (-2.7 percentage points), wholesale and retail trade, repair of motor vehicles and motorcycles (-1.9 percentage points), which are more prevalent activities in densely populated metropolitan areas. Furthermore, the BIN area lags behind national averages in employment in mining, quarrying and manufacturing by 1.3-percentage points, which is attributable to the loss of jobs in corresponding industries prior to 2016. Information and communication (-1.9 percentage points) and financial and insurance activities (-0.9 percentage points) likewise employ fewer people in the BIN area than in Norway, Sweden and Finland in total.

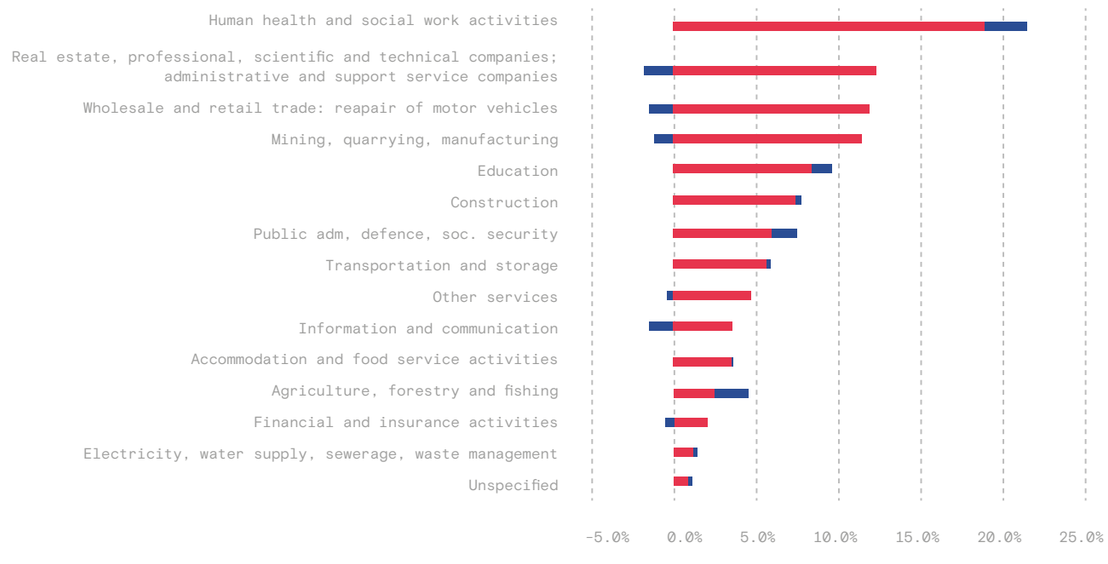
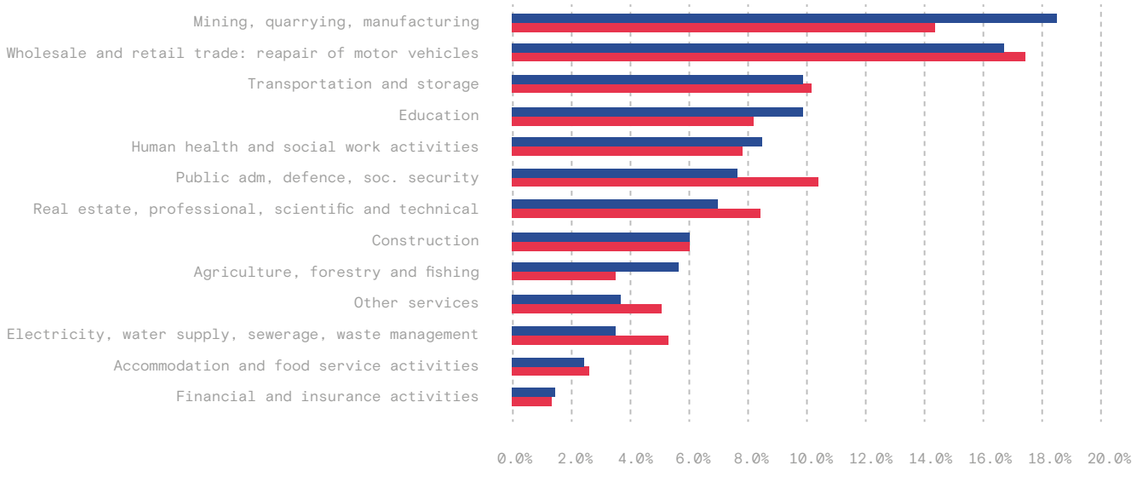


Figure 3.2


## Employment by industry in the Russian BIN regions

2016, In the Russian statistics employees working in information and communication are included in transportation and storage industry

Figure 3.2 illustrates employment composition by industry in the Russian BIN regions [2]. The industries employing most people include mining quarrying and manufacturing, wholesale and retail trade, repair of motor vehicles and motorcycles, transport and storage, education and human health and social work activities. The Arkhangelsk region without NAO outperforms the Murmansk region in mining, quarrying and manufacturing, while the Murmansk region had more people employed in public administration, defence and social security. The Nordic BIN and Russian BIN regions have different employment structures, with Nordic BIN dominated by human health and social work activities, while the Russian BIN regions have more employment in mining, quarrying and manufacturing.




[2] No data available for 2015 for the Northwestern Federal District.



Figure 4


## Employment development by gender (all industries)

Index 2011=100, 2011 – 2016

Figure 4 shows that employment development of both males and females in the BIN area (excluding Russia) has underperformed compared to Norway, Sweden and Finland overall by 1.5 percentage points for females and by 2.3 percentage points for males. The loss of jobs in the BIN area in traditionally male dominated sectors such as mining partially explains negative employment growth for males during the period 2011-2014.

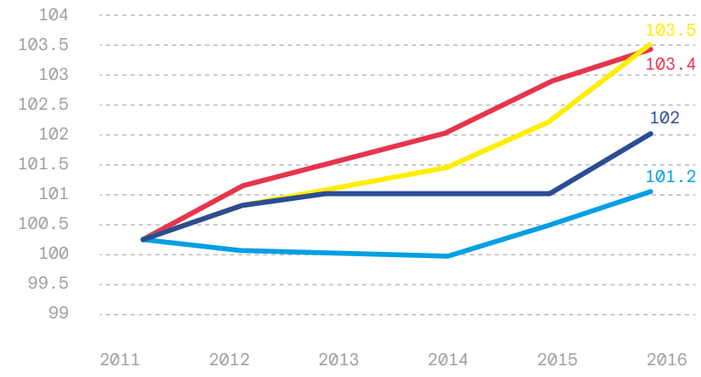
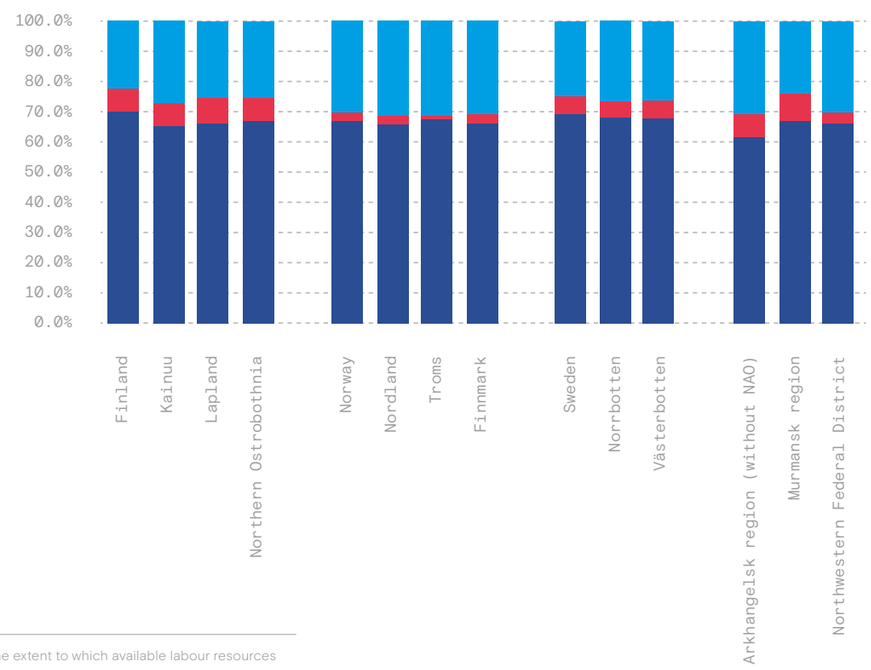


Figure 5


## Employment[3] and unemployment rates

2016

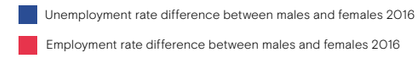
Figure 5 shows the employment rates in the BIN areas and also on regional level. Employment rates in BIN areas range  64 - 69%. In all the BIN regions in Finland employment rates were lower and unemployment rates higher than the corresponding national figures. Furthermore, unemployment rates in the Finnish BIN regions were much higher in  than in any BIN areas. Unemployment rates are decidedly low in Norway (3.0%) and in all its BIN areas (2.1-3.3%) compared to all other BIN countries. At the same time, the share of population (either in employment or unemployed) in Norway is significantly higher, in the range of 31-33%. These people participate in employment programmes or receive disability benefits.  In the Arkhangelsk region (without NAO) the employment rate is significantly lower than in any other BIN regions. Challenges for the labour market in the Arkhangelsk region (without NAO) include ageing population, gender imbalance and unattractiveness of the region to migrants. In Sweden both employment and unemployment rates of the BIN areas are almost the same as the national values.




[3] Employment rate is a measure of the extent to which available labour resources (people available for work aged 15-65) are actually used. It is calculated as the ratio of the employed to the working age population. The unemployment rate is the number of unemployed people as a percentage of the labour force, where the latter consists of the unemployed plus those in paid or self-employment. (OECD definition).



Figure 6




## Differences in employment and unemployment rates by gender

2016

Figure 6 illustrates differences in employment and unemployment rates in the BIN area. In all the BIN regions employment rates for males and females are largely the same, except in the BIN regions of Russia. The employment rates of males are significantly higher in the range of 10 percentage points in the Murmansk and Archangelsk regions (without NAO). The high employment share of the mining, quarrying and manufacturing sector probably explains at least part of this. Women's participation in the care of children and the elderly is also traditionally higher.  Overall, males have higher employment and unemployment rates in the BIN area and in the corresponding BIN countries.

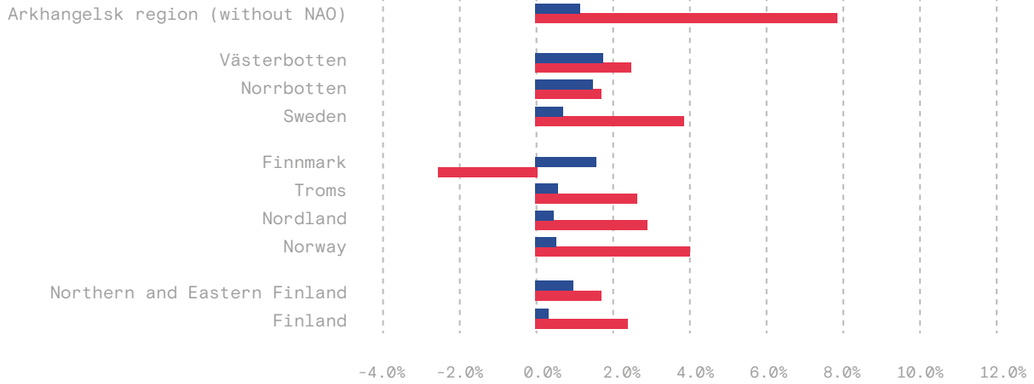


Figure 7

## Employment development (all industries), BIN Area, %

2011 – 2014

Differences in employment development (all industries) in the BIN area are shown in Figure 6. During the period 2011-2014 employment decreased overall in Finland (-3.4%) and in all its BIN area regions, especially in Kainuu (-8.7%). This reflects job losses in the forestry sector in the Kainuu area. In Norway and Sweden employment grew by around 3%. The Troms region in Norway showed growth in employment of 3.1%, while Nordland (0.8%) and Finnmark (1.2%) experienced growth well below the national average of 3.4%. In Sweden the Västerbotten region saw a growth 2.8%, while Norrbotten region with its growth of 3.7% outperformed the national average of 3.1%.

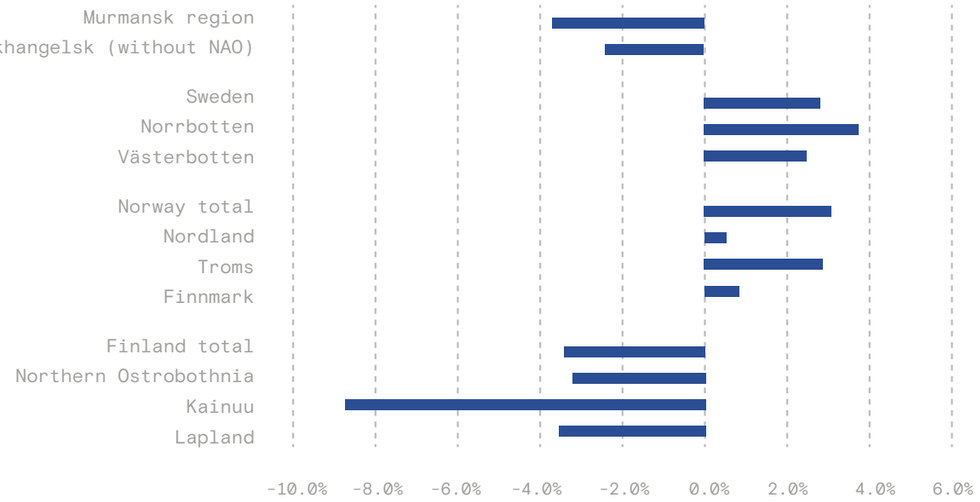


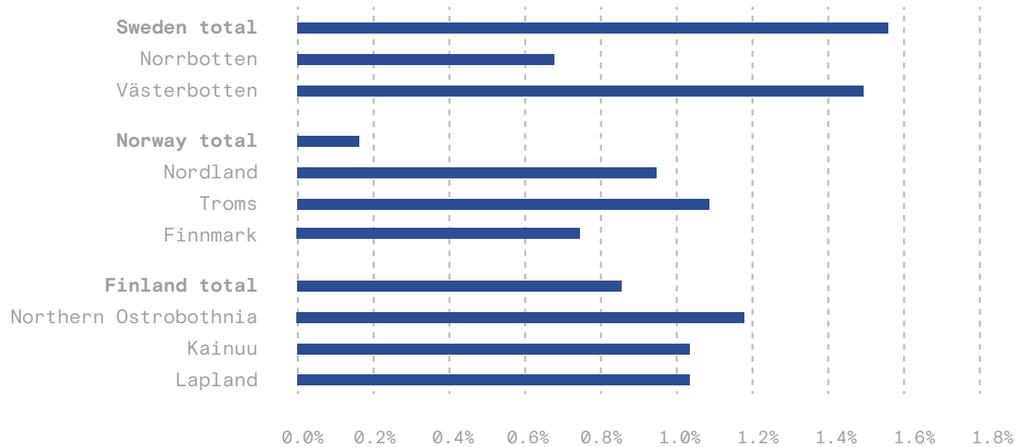



Figure 8

## Employment growth (all industries), BIN area excl. Russia, %

2015-2016

Figure 8 shows that employment growth in all BIN regions of Norway (0.7 – 1.1 %) was on average 0.7 percentage points higher than the national level of 0.2% for Norway. Employment growth in northern Norway is higher than in the rest of the country because the economy in the North has been less affected by the oil crisis and the associated job losses in other parts of Norway. There have also been major investments in northern Norway that provide employment growth in the construction sector. In the Finnish BIN regions the growth was just slightly higher, in the range 1-1.2%, compared to the national average of 0.9%. In Sweden the growth of employment in Västerbotten was the same as the national average (1.5 %), but in Norrbotten growth (0.7. %) was clearly behind this. We observe that during the period 2015-2016 the growth was slower than during the period 2011-2014 in the Swedish and Norwegian BIN regions, while at the same time the trend in the Finnish BIN regions turned to growth. According to Danske Bank forecast, the economy in Finland will grow faster than in any other of the Nordic countries [4].




4. Danske Bank, 5/2018. Nordic Outlook – Economic and Financial trends. http://danskeanalyse.danskebank.dk/abo/NordicOutlook050118/$file/NordicOutlook_050118.pdf

Figure 9

## Job creation and job losses in the BIN area (excl. Russia)

2012-2016

Figure 9 provides an industry breakdown analysis of the total job creation in the BIN area, during the period 2012-2016. The greatest job loss is observed in mining, quarrying and manufacturing (-4,981 jobs), agriculture, forestry and fishing (- 3,509), unspecified (-1,934), information and communication (-1,221). The main contributors to job creation were human health and social work activities (7,771 jobs), the real estate, professional, scientific and technical sectors (5,012 jobs), accommodation and food service activities (2,754 jobs), construction (2,648) and other services (2,537). Overall employment in the BIN area (Excl. Russia) increased by 11,767 jobs during the period 2012-2016. These figures are indicative of labour market demand for social and health care professionals. These statistics are relevant for planning education in the BIN area.

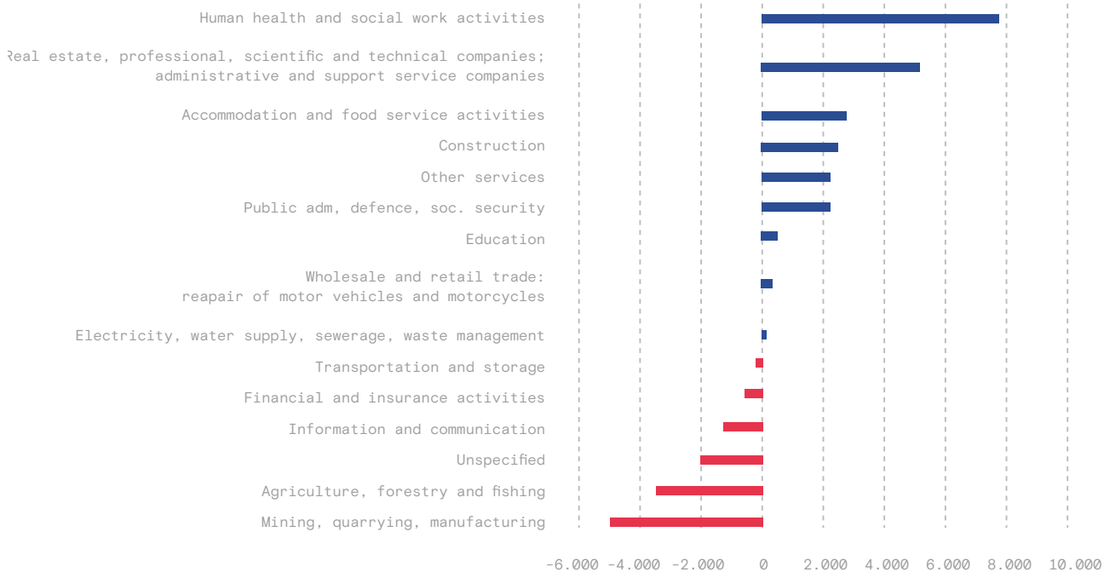



Figure 10

## Job creation and losses in the Russian BIN regions

2012-2014

Due to availability of data we present job creation and losses in the Russian BIN regions during the period 2012-2014 separately from the BIN area (Figure 10). In the Russian BIN regions of Murmansk and Arkhangelsk (without NAO) there was also a significant drop in employment in mining, quarrying and manufacturing (7,260 jobs). Transportation and storage as well as public administration, defence, social security lost both over 6,000 employees. At the same time, real estate, professional, scientific and technical companies (2,131 jobs), other services (1,698) and accommodation and food service activities (1,261) provided more jobs. Overall, employment decreased by almost 30,000 in the BIN regions of Russia.

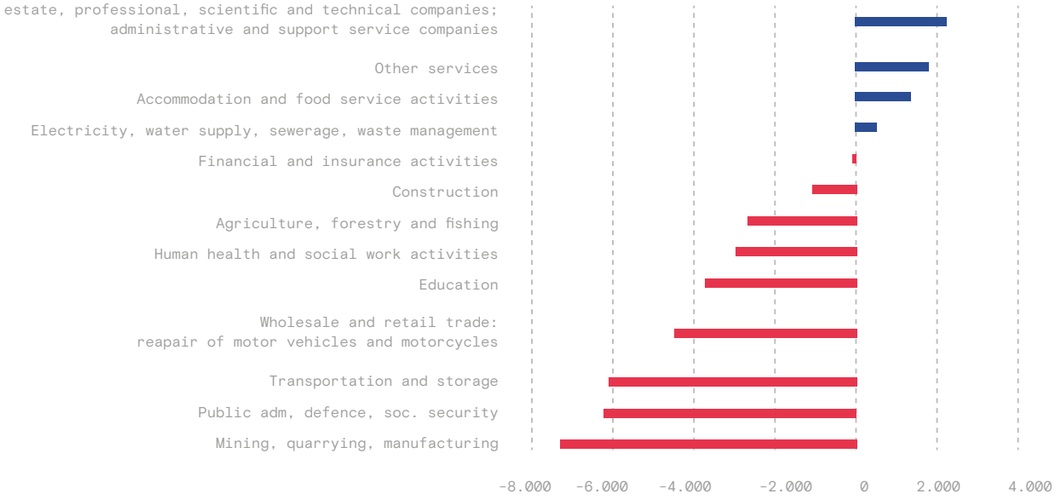
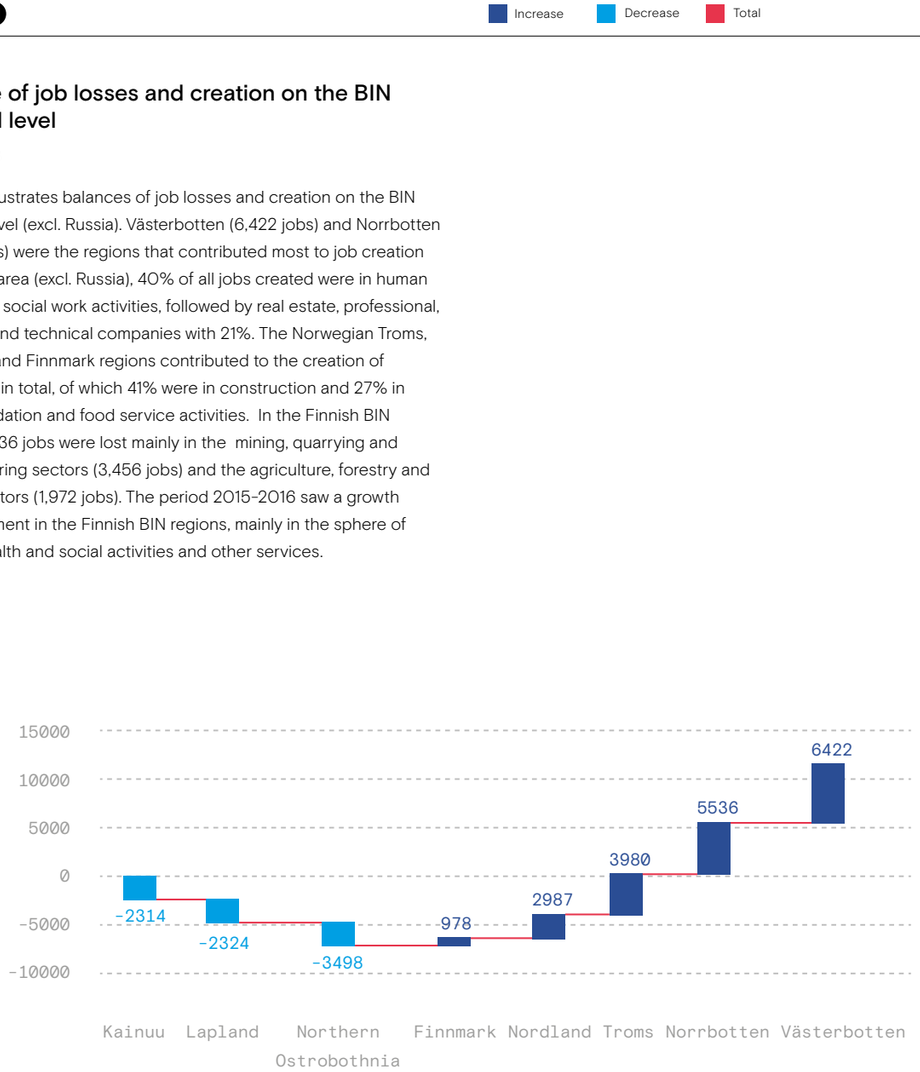


**Figure 11**




## Balance of job losses and creation on the BIN regional level

2012-2016

Figure 11 illustrates balances of job losses and creation on the BIN regional level (excl. Russia). Västerbotten (6,422 jobs) and Norrbotten (5,536 jobs) were the regions that contributed most to job creation in the BIN area (excl. Russia), 40% of all jobs created were in human health and social work activities, followed by real estate, professional, scientific and technical companies with 21%. The Norwegian Troms, Nordland and Finnmark regions contributed to the creation of 7,945 jobs in total, of which 41% were in construction and 27% in accommodation and food service activities. In the Finnish BIN regions 8,136 jobs were lost mainly in the mining, quarrying and manufacturing sectors (3,456 jobs) and the agriculture, forestry and fishing sectors (1,972 jobs). The period 2015-2016 saw a growth in employment in the Finnish BIN regions, mainly in the sphere of human health and social activities and other services.



# Challenges and findings

**Recommendations**

The future of work in the North depends on the people who live in the BIN area and on those who relocate there. People living in the BIN area have an important role in its economic development. On the other hand, as also elsewhere, global trends shape the development of the economy and affect job opportunities in BIN regions, too. Therefore, it is important to address policy measures appropriately taking account of the needs of future working life. Through lifelong learning we can, at partially respond to changes in the job markets of the BIN regions. The economic development of BIN regions is highly dependent on whether these regions are capable of creating high-quality jobs in the future. Integrated solutions include taking into consideration people, education, connectivity and work in the North. That would also prevent or at least delay the continuing depopulation.

**For Policy**

- A The development in the BIN regions follows the global trend, i.e. the service business has become a main driver of economic development
- B The employment growth in all BIN regions in Norway and Finland was higher than the respective national development in the period 2015-2016, which may indicate the increasing role of the Arctic regions in economic growth
- C Increasing tourism provides new jobs, which is reflected in the growing number of jobs in accommodation and food service activities
- D In the future population ageing will further increase employment in social and health care in all BIN regions. Human health and social work activities is already the main employment sector
- E Mining, quarrying and traditional manufacturing industries as well as agriculture, forestry and fishing are losing jobs in the BIN regions. In the future automation and robotics will probably further decrease employment in these sectors.
- F Real estate, professional, scientific and technical companies sector contribute to job creation both in the Nordic and Russian BIN regions
- G Females are participating less in employment, this can be addressed by offering gender-balanced family related leaves, day-care solutions and flexible working arrangements

**For businesses**

- A The growing sector of human health and social work activities offers new business opportunities e.g. by requiring new digital solutions
- B Increasing economic activity in sectors such as tourism, health and social work can provide new jobs in the construction sector

# A substantial economy with obvious expansion opportunities

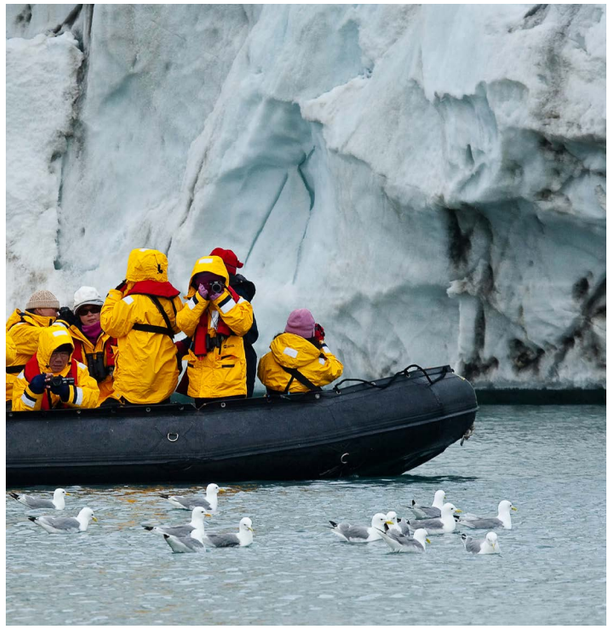
(04)

*Business in the North*

Section (04)

# Business in the North

Without growing businesses and high-value creation, arctic regions will fail to attract investments and innovation activities. Knowledge about trends, the scope of activity and spatial variation between regions in the BIN area and industries, gives insight into both progressive areas and challenges we need to address for further development.



Chinese tourists in the Arctic;
photo: Valery Vasilevsky



Scope of business grows rapidly in the BIN area. Companies with headquarter in the BIN area generated 90 billion Euro in 2016. In total, 5 percent of gross turnover at country or territory level, where reported from the BIN regions. Gross Value Added including public services reached 71.4 billion Euro including Russia or 7 percent of national gross value creation. Given the large land areas and spread population, a surprisingly large economy is present in the north with obvious expansion opportunities if more people and capital were mobilized.

Companies with headquarters in the BIN area generated 90 billion Euro in 2016, which is about 5% of total gross turnover for Norway, Sweden, Finland and The North-West Russia. Gross Value added including public services reached 71,4 billion Euro including Russian BIN regions which is 7 percent of total Gross Value Creation for Norway, Sweden, Finland and The North-West Russia. Given the large land areas and spread population, a substantial economy is present in the north with obvious expansion opportunities if more people and resources were mobilized.

When measuring turnover, companies providing headquarter, holding services, oil and gas companies, banks, and subsidiaries in BIN regions where excluded before comparing and all currencies converted to Euro and current prices per year. Activity in subsidiaries will from experience, add about 20 to 25 percent additional turnover to BIN regions, but exact allocation data were not available for this BIN issue. When measuring volumes of Gross Value Added and Turnover, current process in Euro were used. To measure development in terms of index, current prices in national currencies were used with adjustments to devaluation of Russian ruble.

Turnover at 17,4 billion Euro positions Nordland as the largest region, in front of Northern Ostrobothnia (12,8 billion) in Finland. Third in size is Norrbotten in Sweden with (12,4 billion). In Russia, Murmansk region reach 5,9 billion in turnover in 2016, followed by Arkhangelsk region with 4,1 billion, for both it is significantly less than in the period before 2011. North Norway also outperforms other BIN regions in growth, reaching 232 percent since 2008, trailed by Finland at 169 percent and Sweden at 160 percent. Challenging deflations of the Ruble, causes negative growth after 2014 in a number of industries of the Russian BIN regions. However, we have registered high growth in such industries as Fisheries and Aquaculture in Murmansk region and Mining industry of Arkhangelsk region (without NAO).

The BIN area's growth companies number one are from the sector of Aquaculture surpassing 374 % driven by Norwegian companies. Health and education services follows, with 369 percent growth, driven by larger elderly population demanding private health care services in all the BIN regions except Russia where fewer reach high age. Real estate related businesses grows driven by improved housing prices and high construction activity creates 305 percent growth since 2008 in current prices. Especially in Norway one sees favorable times for this industry.

## Findings:

- BIN area business has already developed a significant innovation potential in terms of clusters, brands, successful companies – an issue often overlooked when the region is viewed on the basis of natural resources; many innovative businesses and brands build upon identity with Northern life style and values
- The most successful companies in the BIN area are those with higher growth opportunities, sound value performance, yet a less aggressive approach to innovative competitiveness. They serve as a shining example of companies able to grow despite limited access to financing and human resources compared to companies in the capital areas.
- BIN area's business turnover grew by 87 % from 2008 to 2016 and 18 % from 2012 to 2016. Turnover exceeds 90 billion Euro in 10 BIN regions.
- Most successful businesses are North Norwegian aquaculture firms, Real estate developers in Norway, business activities related to the mining industry in Arkhangelsk Region, and Manufacturing based on electric energy.
- Nordland has the largest economy of the BIN area, sharing high growth with now merged Troms and Finnmark region.
- Gross Value creation in the BIN area reached 71,4 billion Euro, growing 12,2 % between 2011 and 2015.
- Again, Nordland has the largest value creation, while Murmansk and Arkhangelsk (without NAO) regions constitute the highest proportion of value creation in the national territory.
- High growth in value creation can be found in aquaculture, finance and construction.

Figure 1

## BIN area turnover distribution per country for companies with headquarter in the BIN area 2016 (Euro) (Holding companies and Banks excluded)

2016

Figure 1 BIN area turnover distribution per country for companies with headquarter in the BIN area, 2016 (Euro) (Holding companies excluded). Top 3 BIN regions are Nordland with 19 percent of turnover in Bin area, followed by Norrbotten and Northern Ostrobotnia both with 14 percent.

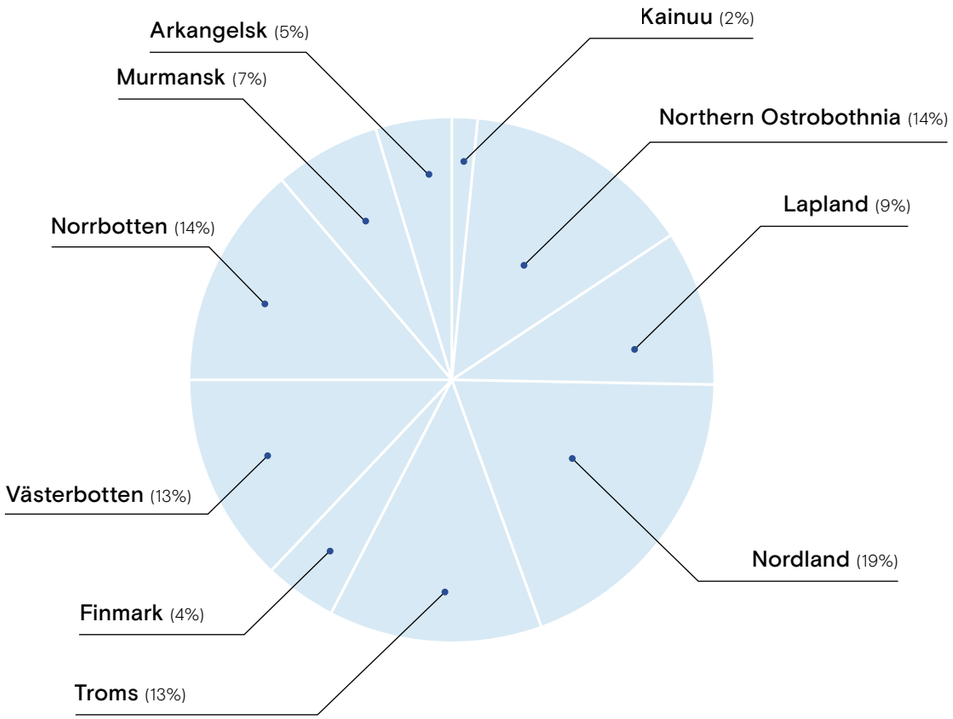





Figure 2

## Growth in Turnover in current prices BIN area excl Russia

Index 2008 =100, 2008-2017

Figure 2 Growth in Turnover as index of current prices in BIN area excl Russia, 2008 =100). Northern Norway continues to outperform others in the BIN area in turnover growth reaching 231 percent since 2008. Strong driving forces from aquaculture, construction and manufacturing based on green electric energy has been persistent for nearly 10 years creating this very strong growth. Second strongest growth is found in Northern Finland, where financial crises hit severly in 2008 and 9, now showing good progress reaching 169 percent since 2008, and stronger than North Sweden reaching 160 percent and significantly better than North Russia with a challenging Rubel situation resulting in negativ growth after 2011. For most BIN regions, we see stronger turnover growth than at respective country level.

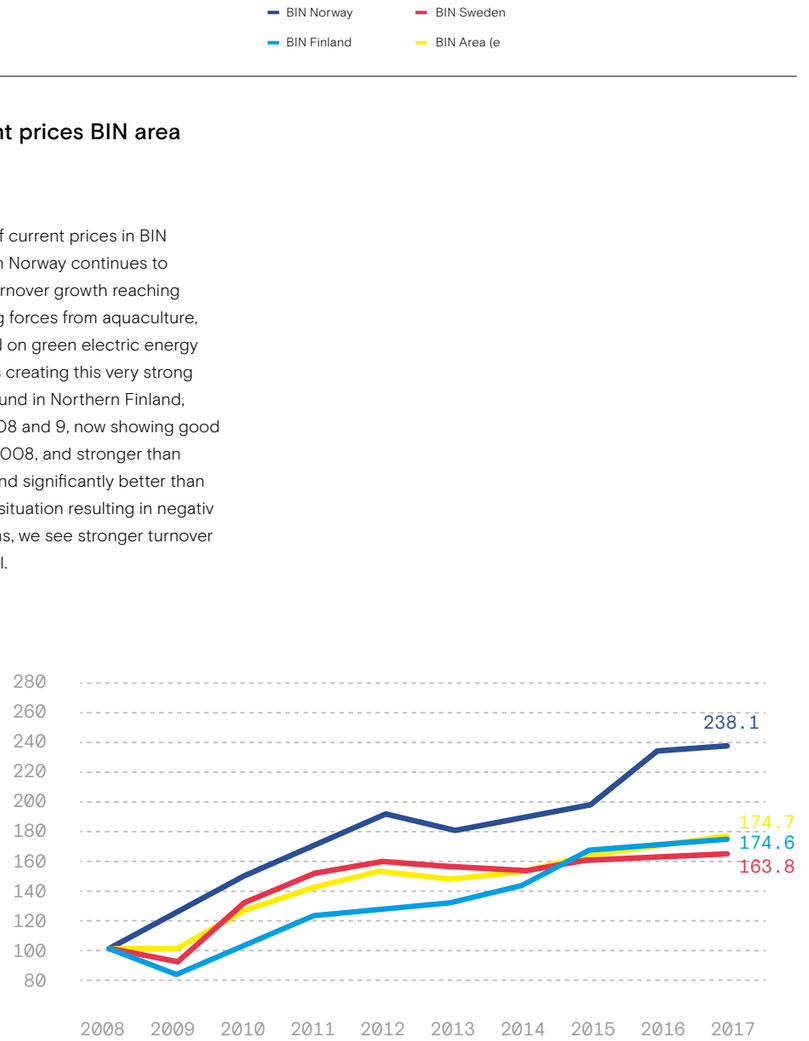


Figure 3

## Turnover distribution in the BIN area, percentage of total BIN area per main industy

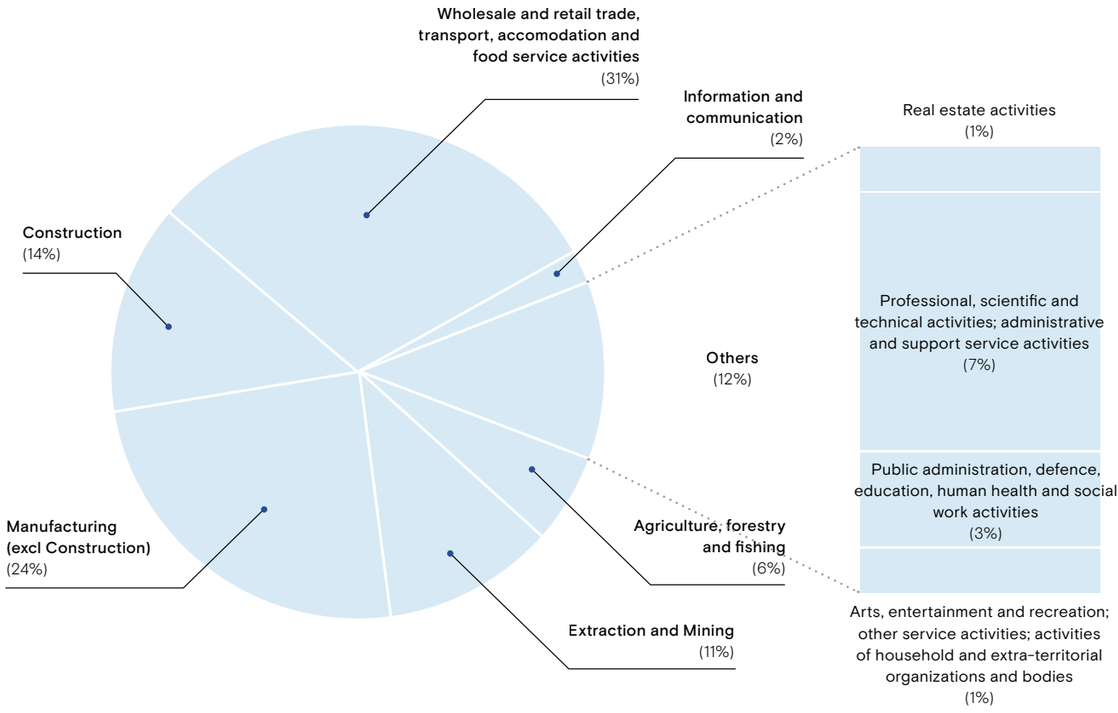





Figure 4

## Turnover growth per main industry in BIN area excl. Russia, in current prices

Index 2012 =100, 2012-2016

Figure 4 Turnover growth per main dusistry BIN area exclusive Russia 2012 to 2016 as index where 2012=100. In current prices. The most vibrant industries can be fund in aquaculture, private healthcare, real estate, constructin and manufacturing (incl metals). Growth is less apparent in important areas as information and communication, professional services and in retail and travel. Challenging world economy for mining and extraction gives negative growth from 2012 due to unfavorable market conditions.

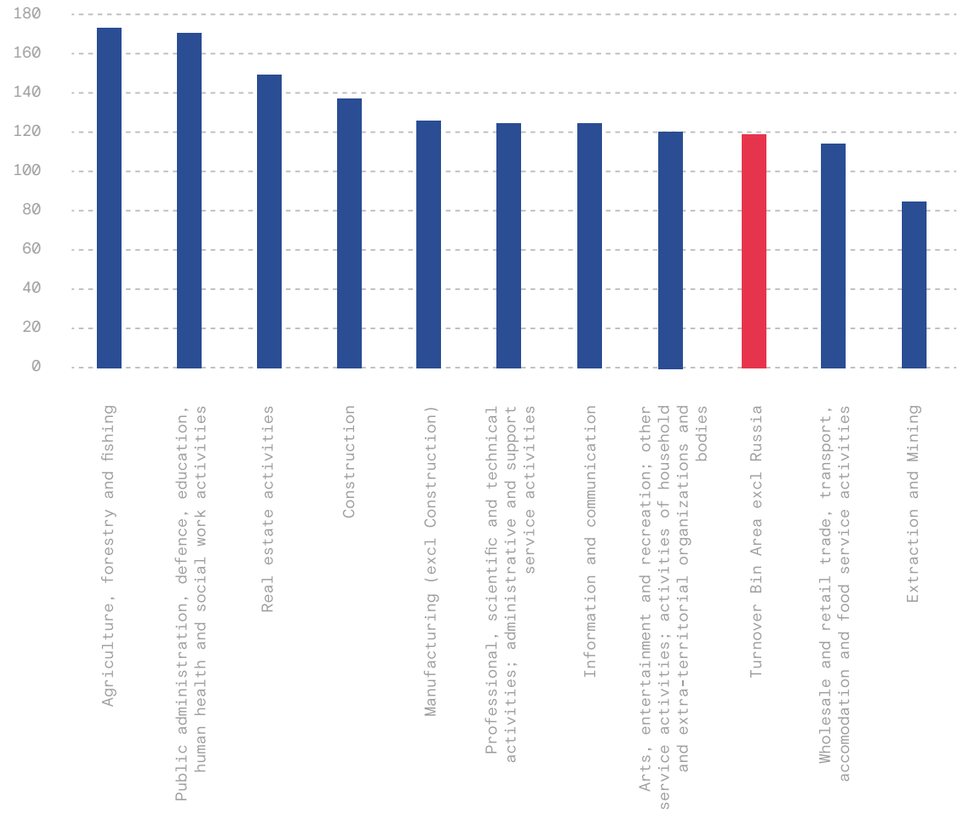


Figure 5¹

## Percent of national turnover per industry in BIN area, excl. Russia

Index 2008 =100

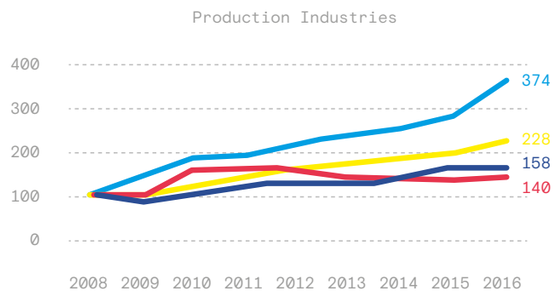



Figure 5²

## Percent of national turnover per industry in BIN area, excl. Russia

Index 2008 =100

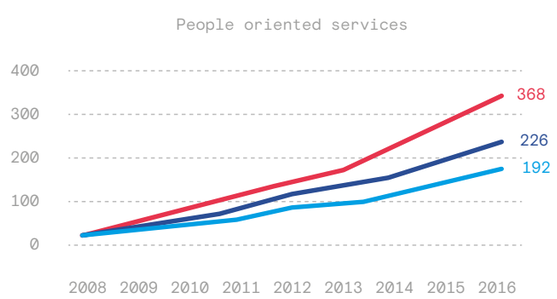



Figure 5³

## Percent of national turnover per industry in BIN area, excl. Russia

Index 2008 =100

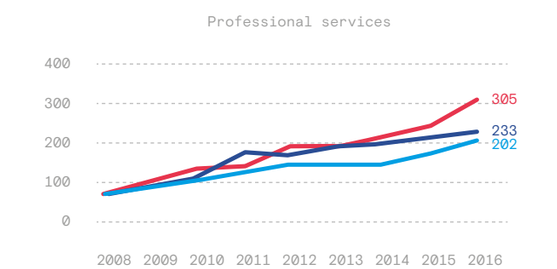



Figure 6

## Turnover distribution per industry Murmansk and Arkangelsk (without NAO) Regions together

2015

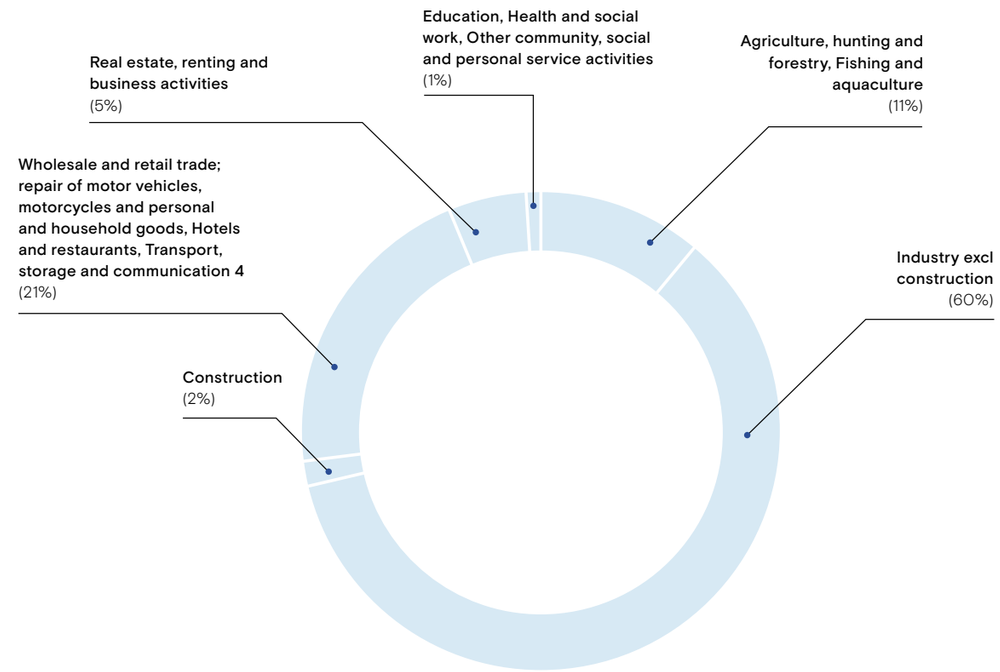
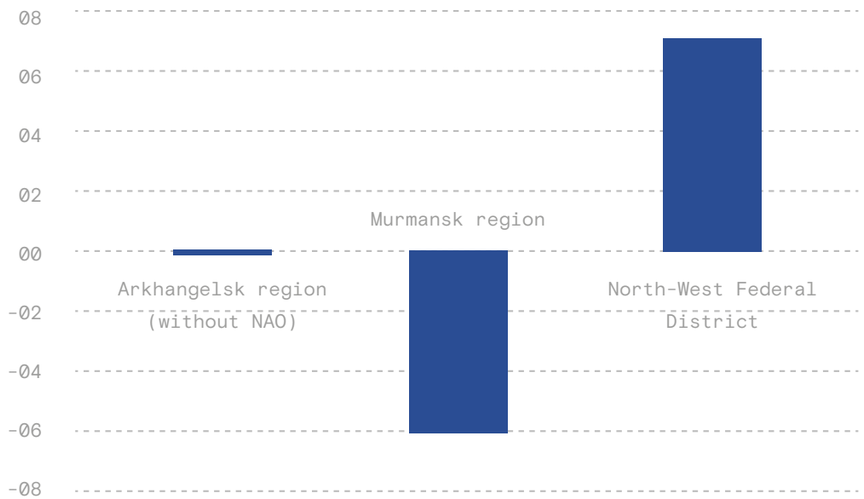


Figure 7

All industries excl Public administration and defence; compulsory social security and financial sector

## Turnover growth profile in the Russian BIN regions compared to North-West Russia, all industries

2011–2015




Total growth in companies turnover was close to zero in Arkahnaglesk Region, while Murmansk Region reported negative growth -6,4%, compared to positive overall growth for North-West Russia +7,1% in 2011–2015.

However Russian BIN regions have a diverse turnover growth profile, there are industries with high growth as well.

**High Growth in Murmansk (2014–16):**
Fisheries and Aquaculture for Murmansk (+20%) perhaps due to new domestic market opportunities for local producers in the time of ban for Norwegian fish import. Mining and quarrying (+37,1): this is traditional industry for the region with growth driver: Extraction of mineral raw materials for chemical production and fertilizer production.

**High Growth in Arkhangelsk:**
Mining and quarrying (+27% in 2014–15)
Real estate renting and business services (+70,4% in 2014–15) with main driver: geo services, geophysics and geochemics for exploration of natural resources. These two has to be seen in combination because production of gem stones has developed rapidly in the Region during the last 5 years.

Turnover for traditional forestry industry for Arkhangelsk has declined with -17,5% in 2014–2015, also in terms of jobs (see chapter Work in the North). In Murmansk agricultural industry continued to strongly decline ( - 54% in 2014–2016). Manufacturing industry declined in both regions: -14.4 % and -12,4% in Arkhangelsk (2014–15) and Murmansk (2014–16)
For North-West Russia as a whole turnover growth in 2014–16 was +6,5% , mostly in Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods (+21%), Hotels and restaurants (+14%).



## Value creation

There is no automatic connection between high turnover in businesses and growth in value creation in business and societal activities, if they don't perform at sustainable profit. Regions North Ostrobothnia in Finland, Nordland in Norway, and the Swedish regions of Norrbotten and Västerbotten are the largest value creators in the Bin area. However, growth in value creation supersedes national levels only in Norwegian counties, plus Lapland in Finland.

Norrland even experience overall decline in level of value creation between 2011 and 2015. North Ostrobothnia as well as BIN regions in Russia tend to have value creation growth lower than growth in their turnover. Plans for increased value creation in the North should be developed and deployed specifically aiming at increasing levels of value creation especially in regions with few large and dominating companies or industries.

Figure 8

## Gross value added at basic prices by NUTS 3 regions

Figure 8 Gross Value added per region in the Bin area million Euro.
The acumulated Gross value added (GVA) is 71,4 billion Euro in 2015 in the BIN Areas. Norway has the largest value creation in the north with 20,8 billion Euro, followed by Sweden with 18,7, Finland with 18,1 and Russia with 13,8 billion Euro. Gross value added is a measure of total output and income in the economy. It provides the value for the amount of goods and services produced in an economy after deducting the cost of inputs and raw materials that have gone into the production of those goods and services. The region of North Ostrobothnia had the highest value for GVA in 2015 with 10.8 billion Euros, followed by Nordland with 10,3 billion. The Swedish regions of Norrbotten and Västerbotten follows with respectively 9,6 and 9,1 billion Euros. Troms with 7,2 billion and Lapland 5,7 billion. Finnmark (Norway) and Kainuu (Finland) has the lowest values for GVA with 3,3 billion, and 1,8 billion Euros. Values for the Russian regions are current prices of 2015 in EURO.

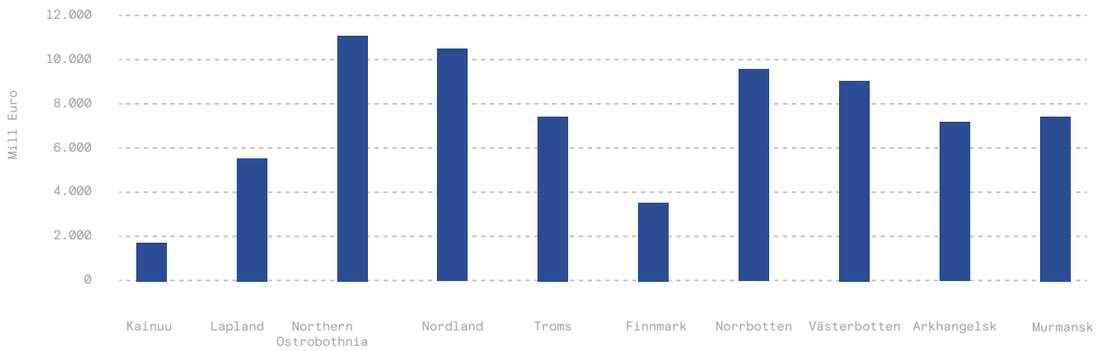


Figure 9

## Growth in Gross Value Added BIN regions compared to national growth

2011 - 2015

Figur 9 Growth in Gross value added 2011 to 2015 Bin Area and nation total. The Norwegian BIN regions outperform the Finnish and Swedish when it comes to growth in GVA in the period from 2011 to 2015, all exceeding 20 percent. The region of Troms had the highest growth with 23.4 percent, driven by high government activity, increased salmon price sand activity growth in the fisheries, and high activity in the construction sector. All BIN regions in Norway outperformed the national average of 11.2 percent. The Finnish BIN region of Lappi also had a growth in the period (15.1 percent) that was stronger than the national average for Finland (6.1 percent). In North-West Russia, Murmansk has the highest growth of 5 % followed by Arkangels with 1,5 %. Both below the average og 7 % in NW Russia. Two regions had a decline in GVA, Norbottens län and Kainuu, with respectively 3.1 and 3.3 percent. Norbottens län has had unchanged activity in most business sectors, but there has been a sharp decline in the GVE for the industry sector, that can be explained by the challenges in framework conditions for the mining sector. The fall in Kainuu came foremost for the industry and construction sector. The Russian BIN regions demonstrated economic growth despite of devaluation of ruble in 2014-15 in the time of Western sanctions, mostly due to the increasing oil and natural gas activity in Siberia. Due to severe shifts in inflations in NW Russia, GVA deflators differentiated by industry are used to calculte the real growth of GVA for the Russian regions (current prices of 2015 were converted to prices of 2011).

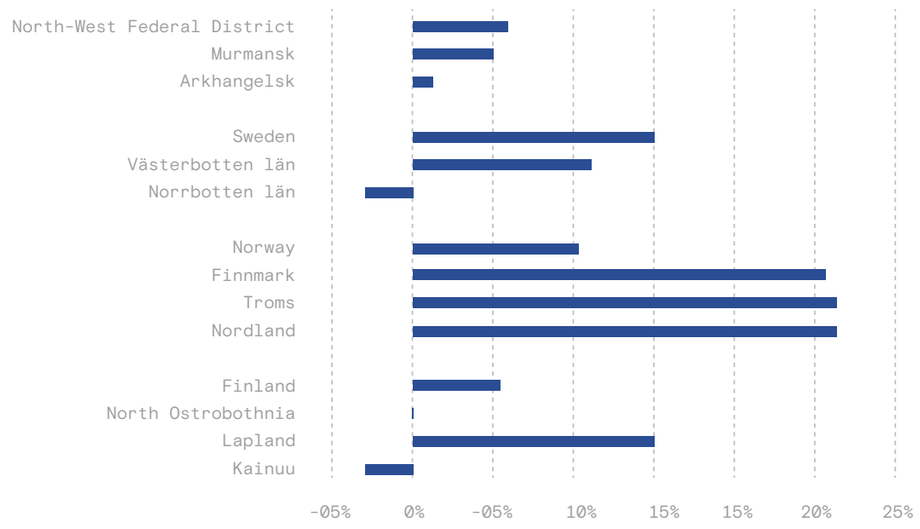
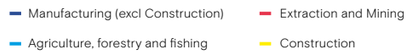





Figure 10




## Growth in Gross Value Added

2011-2015

Figure 10 Growth in Gross Value Added shown as Indexs where 2011 is 100. The BIN regions excluding Russia had a growth in GVA of 12.3 percent in the period from 2011 to 2015. The growth in value added for the BIN Area as a whole is slightly weaker than the national average. Weaker growth In Kainuu Norbotten and Murmansk/Arkangelsk explains this. The yearly growth rate for the BIN regions varied between 2 and 3.6 percent, with an average of 3.1 percent. The growth was strongest in 2014 and 2015. Russian statistics where adjusted for high devaluation.

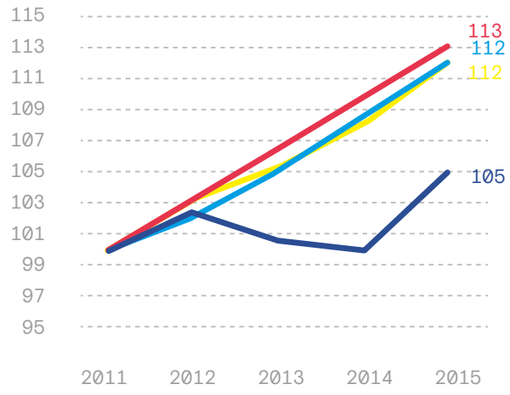


Figure 11


## Growth in Gross Value Added in BIN area industries excl Russia

2011 - 2015

Figure 11. Growth in Gross Value Creation per main industry in the Scandinavian BIN area (excluding Russia) compared with the representative country averages. BIN area enjoys large growth in value creation for Agriculture, forestry and fishing (24,4 percent above national average), manufacturing (20,6 persent above national average), and real estate with 5,6 percent above national average. The main explanation is higher international prices for aquaculture and fish products plus high activity in electric power transforming manufacturing. Bin areas lag severly behind in growth for Information and communication industries, financial and banking industries and experiences and culture. Companies and services in sectors are often centralized to capitals and major cities. Russian industri level deflation effect was not available, hence omitted from comparison.

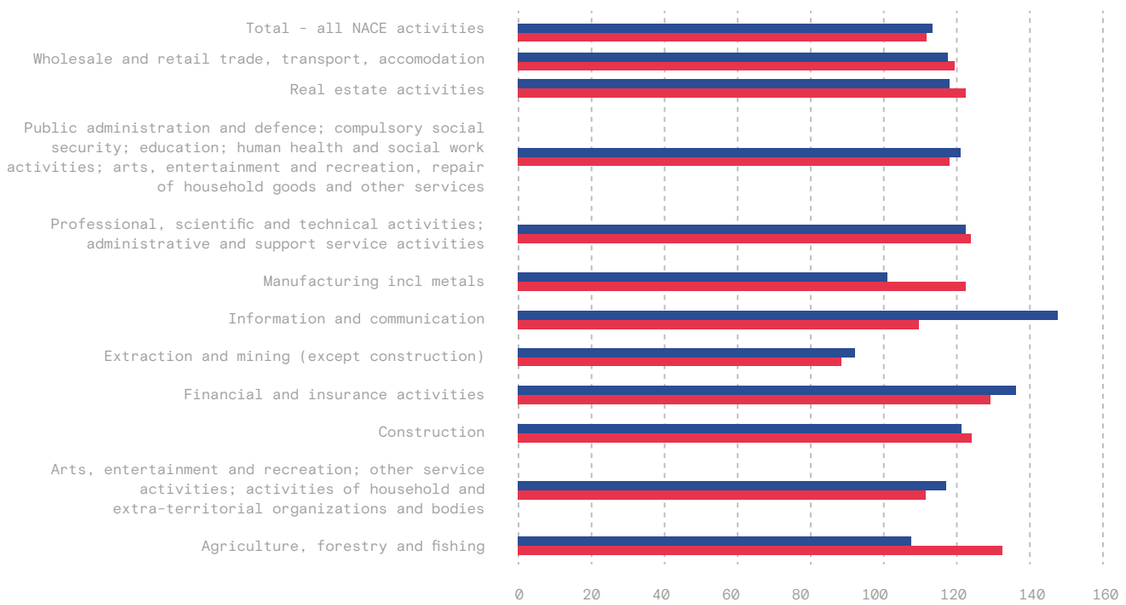



Figure 12

## Percentage of the total gross value

Figure 12 Bin area gross value creation as percent of national value creation. It is the Russian Northerns regions who have the higest proportion of national value creation (Sum of North West Russia) in the Bin area with 11,1 percent contributing with 13,8 billion. Northern Fnland has the second highest impact with 10 percent and 18,1 billion Euro in contribution. Norway then follows with an impact of 6,7 percent but the largest amount of 20,8 billion Euro and Sweden with the least impact with 4,7 percent and 18,8 billion Euro in contribution. Finland stands out with the fact that all industries are common in the high north including finance, professional services and informations services. Also Sweden has less variation in each industries proportion of national activity. Norway excels in aquaculture and fisheries togheter with Russia. Especially financial and information service industries tend to be more sentraliced in Norway and Russia.

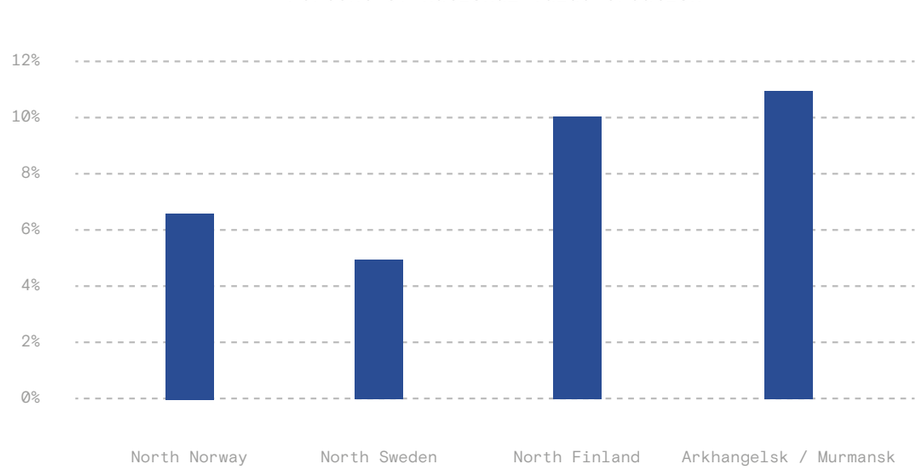
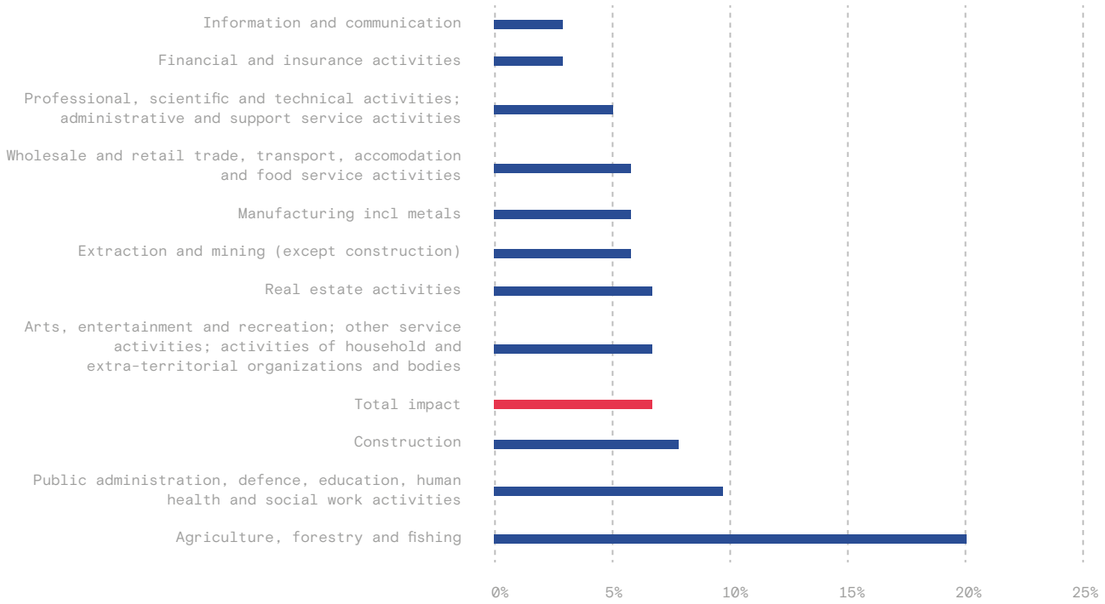


Figure 13

## Gross value creation as proportion of national vaule creation per industry in BIN area including Russia

Figure 13 Bin area gross vale creation as proportion of national value creation across industries and total BIN including Russia (North-West Russia is taken as reference). BIN areas constitutes 71,4 billion Euro in value creation and 7 percent of total national value creation (except oil and gas). The highest proportions are found for fishing, forestry and agriculture (incl aquaculture) with 20 percent of national value creation in this industry. Public administration with 9,4 percent, and construction with 8,3 percent are both above the average for all industries. On the other hand, little of national value creation in Information and comunication, financial services and professional services takes place in the high North. Since low density of services can influence growth and innovation in resource based industries negatively, such unbalances should be actively adressed.






# Challenges and findings

## Recommendations

### For Policy

A High turnover growth indicates that potential for larger income for the business is present and can be realized

B There is a substantial challenge creating attractive communities with relevant work. Rapid centralization in financial sectors, advice and law sector, and professional service sector moves important people for local development out of the BIN regions. Measures ensuring the presence of these important professional services in at least cities and close to larger companies in the High North should be investigated

C Given that 6 out of 10 BIN regions experienced less growth in value creation than the national average, and few new initiatives for increased value creation in a region have been tried lately. New thinking is necessary around effective measures making it attractive to create and grow a company in the north. Likewise, measures of higher potency than current ones making it attractive to employ people in the High North should be developed and implemented to harvest the BIN area's potential

D Policy makers face different challenges. Norway needs a broader business structure around growing industries. Sweden needs to gain speed in Norrbotten, Finland, observes recovering Northern Ostrobothnia, but less progress in Kainuu and Lapland, and in Russia, one should race to rebuild loss of activity from declining international trade by refining products for Russian markets to a lager extent

### For businesses

A Presence of strong growth histories and many examples of companies growing with headquarters in the High North, illustrates underlying potential and opportunity. Without people and capital, development is hard. Therefore companies should actively create jobs in order to build attractive societies for workers

B Norwegian aquaculture illustrates the power of combining knowledge, local favourable operational conditions (clean waters), and ability to bring the right product to the marketplace. More industries should actively exploit international business opportunities from innovation make at home opening new markets

# Significant innovation potential.

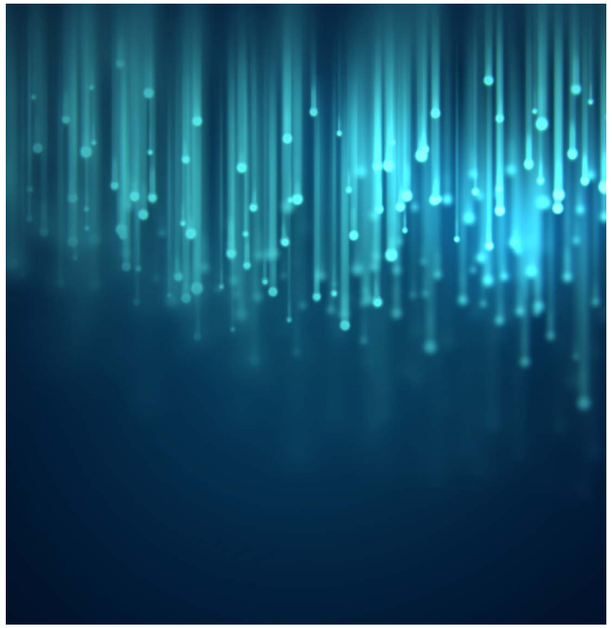
(05)

## *Innovations from the North*

Section (05)

# Innovations from the North

Core-and-periphery is a recurrent and ongoing debate in regional science. Much of the literature on business start-ups tends to focus on models in core areas. An assumption in this literature is that business activity at large can be explained by access to financial and human capital, and that peripheral growth is a consequence of growth in the core areas.





Our report has taken a first step to explain how companies with limited access to the aforementioned dimensions grow strongly domestically and globally. In so doing this chapter presents an overview of key clusters, brand names and companies in the BIN area. The underlying aim of this overview is to offer updated images of growing organizations beyond extraction industries and highlight known companies less known origin. Furthermore, the chapter reports on key performance indicators (KPI) for the entire BIN area and its Norwegian, Swedish, Finnish and Russian parts respectively. The latter is based on survey results.

## Findings:

- BIN area business has already developed a significant innovation potential – an issue often overlooked when the region is viewed on the basis of natural resources
- Many innovative businesses and brands build upon identity with Northern life style and values
- New emerging industry sectors, such as tourism, have served to develop related industries such as promoting food branding and symbolic values of the BIN area
- The most successful companies in the BIN area are those with higher growth opportunities, sound value performance, yet a less aggressive approach to innovative competitiveness
- Selected companies in the BIN area report strong organizational and value performance while exports and uniqueness KPI scores remain low.

## Overview of key clusters, brand names and companies

Clusters

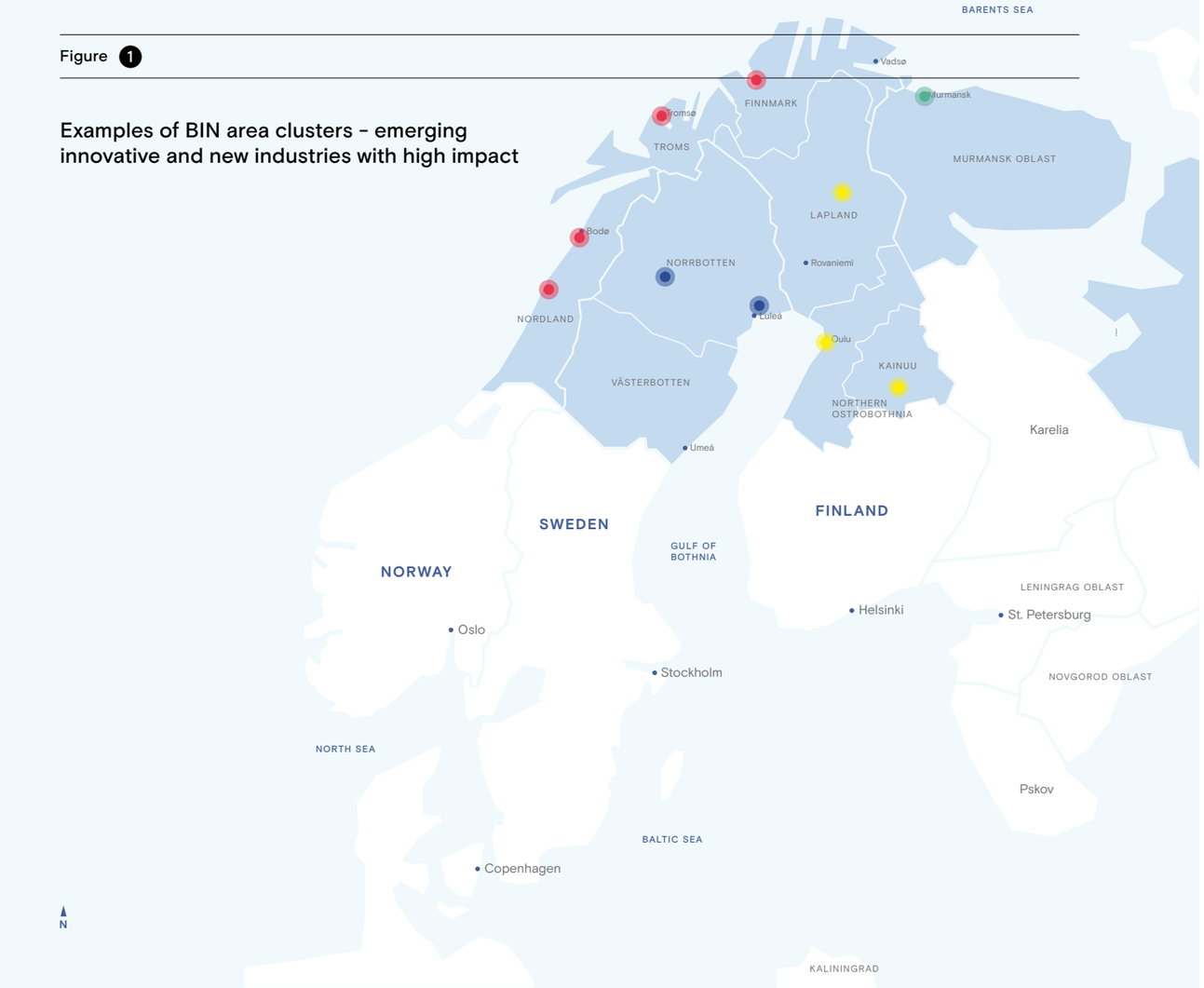
A cluster here refers to a number of organizations sharing similar aims, characteristics, goals and activities with a shared geographical belongingness. Due to this geographical sense of belonging they benefit from shared goals, strategies and operations that are mostly stronger and more specialized than if developed independently. A cluster is typically easy to observe as activities and goals hang together. A tourism cluster often has natural boundaries determined by a natural resource such as a mountain or an island. A manufacturing cluster may on the other hand have a strong locomotive company supported by a myriad of small specialized organizations that together build one or multiple products.

Clusters can likewise be identified due to cultural characteristics with experience or knowhow for building boats, manufacturing or making movies. In addition, we have small manufacturing clusters formed due to an entrepreneurial spirit, capital or some other property characteristic that stimulates business creation. Some of these clusters are formed spontaneously with initiatives from individual companies while others are related to a university or other politically motivated initiative. Many cities have clusters but these are often related to technology or capital because administration can easily be coordinated and competence guaranteed to a greater extent. Clusters are thus agglomerations of organizations of some sort. These clusters may be formed strategically or grow through attractiveness related to any of the characteristics mentioned above.

The BIN area is unique in many ways. It has a unique base of natural resources, culture and entrepreneurial spirit. In recent years a number of activities have been launched to an international audience when car testing companies came up to the Artic region to test cars. This activity attracted a significant amount of foreign direct investment (FDI) to a sparsely populated part of the BIN area. This and other clusters in the BIN area are presented on Map 1 below. We selected these clusters to illustrate emerging innovative and new industries with high impact.

Figure 1

## Examples of BIN area clusters – emerging innovative and new industries with high impact




**Sweden**

Blue dots represent an ***inland cluster of car testing activity*** and a ***coastal industry with server technology***.

**Norway**

Red dots represent ***NCE Aquaculture*** cluster with commercial production of farmed fish for the global market; ***Biotech North*** – a blue biotech industry cluster; Emerging ***Smart Construction Cluster*** and ***Mo Industrial Park***.

**Finland**

Yellow dots represent ***Kajaani cluster of data centres*** providing "green" power; ***tourism industry*** cluster and ***Oulu health technology cluster***.

**Russia**

Green dots represent an emerging ***Tourism and recreation cluster of the Murmansk region***.

On the map we also emphasized information technology server-farms around Luleå in Sweden as the location of Facebook servers in Luleå became known to an international audience. The rationale of cold weather for cooling servers, an ample supply of cooling water and a location close to a technical university became a winning concept. This concept attracted multiple similar organizations now forming a farm of server plants. The most famous foreign direct investment (FDI) is likely the establishment of Facebook servers in Luleå.

Finland was likewise successful in launching and developing around Santa Claus in Rovaniemi. Northern Finland also strategically developed a triangle of tourism around Rovaniemi, Levi and Ylläs. The design of hotels and services such as those of Holiday Club were also benchmarked and reproduced to other tourism clusters. The tourism industry operating in the area from Rovaniemi to Sääriselkä has seen a rapid growth. According to the Finnish public service broadcasting company YLE, there were about 2.6 million overnight stays by non-residents in Finnish Lapland in 2016. The greatest boost to tourism in the area stems from growth in the number of tourists from Asian countries: overnight stays by Asian tourists rose by close to 50 per cent and stays by tourists from China doubled in comparison to 2015.

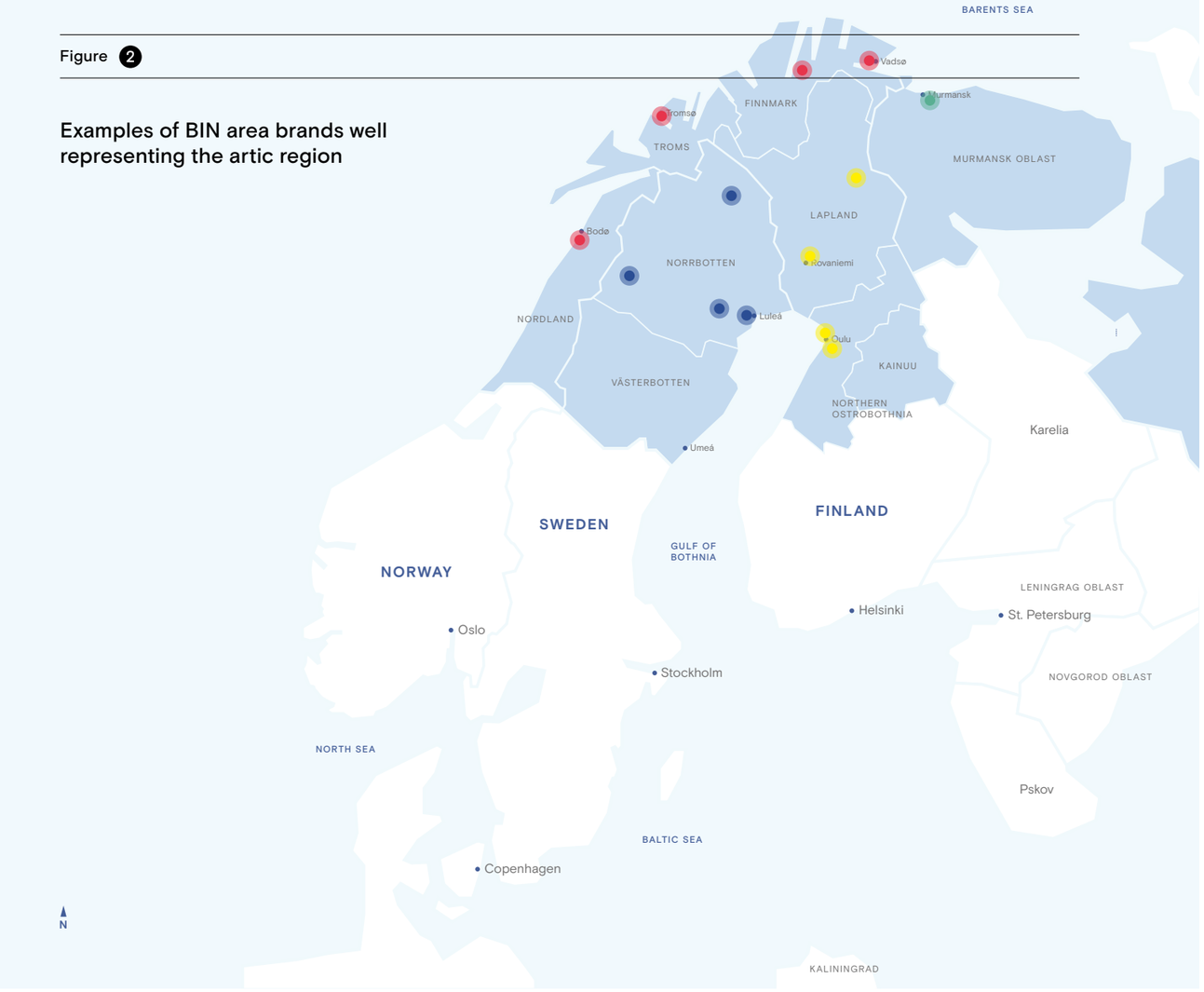
Other noteworthy Finnish examples include the Kajaani cluster of data centres with absolute readiness for business in terms of brownfield space, pre-zoned greenfield land and "green" power, and the "Oulu health technology cluster". The OuluHealth ecosystem comprises several stakeholders from academia, the public sector and the private sector. The ecosystem approach enables the combination of expertise from wireless information technologies and life sciences to introduce smart ICT solutions for delivering advanced, personalized, connected health service solutions.

In the Russian part of the BIN area, tourism is also gaining in popularity with growing numbers of tourists coming to the Murmansk Region from Asia. The tourism and recreation cluster of the Murmansk region has been formed on the basis of the tourist attractions and operators throughout in the whole area with 10 territorial sub-clusters. Using the official portal "Murman Tourism" (available in Russian, English, and Chinese) guests can plan and book their overall trip to the area. The tourism industry is one of the main growth industries in the Murmansk region. Among other things, there is a unique opportunity for cruising on board a nuclear-powered icebreaker from Murmansk via Franz Josef Land and further to the North Pole.

The following are examples of clusters in Northern Norway. "NCE Aquaculture" is a cluster focusing on value creation and innovation associated with the commercial production of farmed fish and seafood for the global market. The cluster consists in 2018 of 12 partners covering the entire supply chain within aquaculture. "Biotech North" is a blue biotech industry and innovation cluster. Biotech North members generally operate in the biomarine and biotechnology sectors with a broad focus on marine bioprospecting and marine rest raw materials. The "Smart Construction Cluster" is a cooperative owned by its members and aiming to develop the cluster into the leading Norwegian force in the implementation of the national "Digital Roadmap" for the building and construction industry. The cluster currently has 26 member companies from the ICT and building, construction and real estate industries. In addition to these three emerging clusters, we mention "The Mo Industrial Park", the leading industrial development zone in Northern Norway with 2,335 employees in 110 companies. The Mo Industrial Park is a world-class industrial park that creates value through a focus on environmentally friendly and energy-efficient services and solutions.

Figure 2

## Examples of BIN area brands well representing the artic region




**Sweden**

Blue dots are represented by ***Polarbröd; Icehotel; Max hamburger; Vinter, Leos Lekland, Kalix löjrom*** and ***Rapunzel.***

**Norway**

Red dots represent ***TIFF - Tromsø International Film Festival; Finnmarksløpet;. Nordland Musikkfestuke*** and ***The Arctic Race of Norway.***

**Finland**

Yellow dots represent ***Rovaniemi Lappset Group; Polar; Fingersoft*** and ***Igloo hotel.***

**Russia**

Green dot represents ***Biokontur.***

## Brand names

Brand name refers to the name that symbolizes a product or multiple products. Brand name is sometimes synonymous with a company name or is hard to distinguish from a company. Brand names are important in many ways as they symbolize something specific.

The BIN area hosts a number of brand names carried by a company or sometimes by the entire region. We have introduced a number of brand names in the sense of a symbol because many of these are also prominent because they strongly symbolize the entire country. We intentionally mention a number of brand names related to food and tourism which are visible on tables and images nationwide.

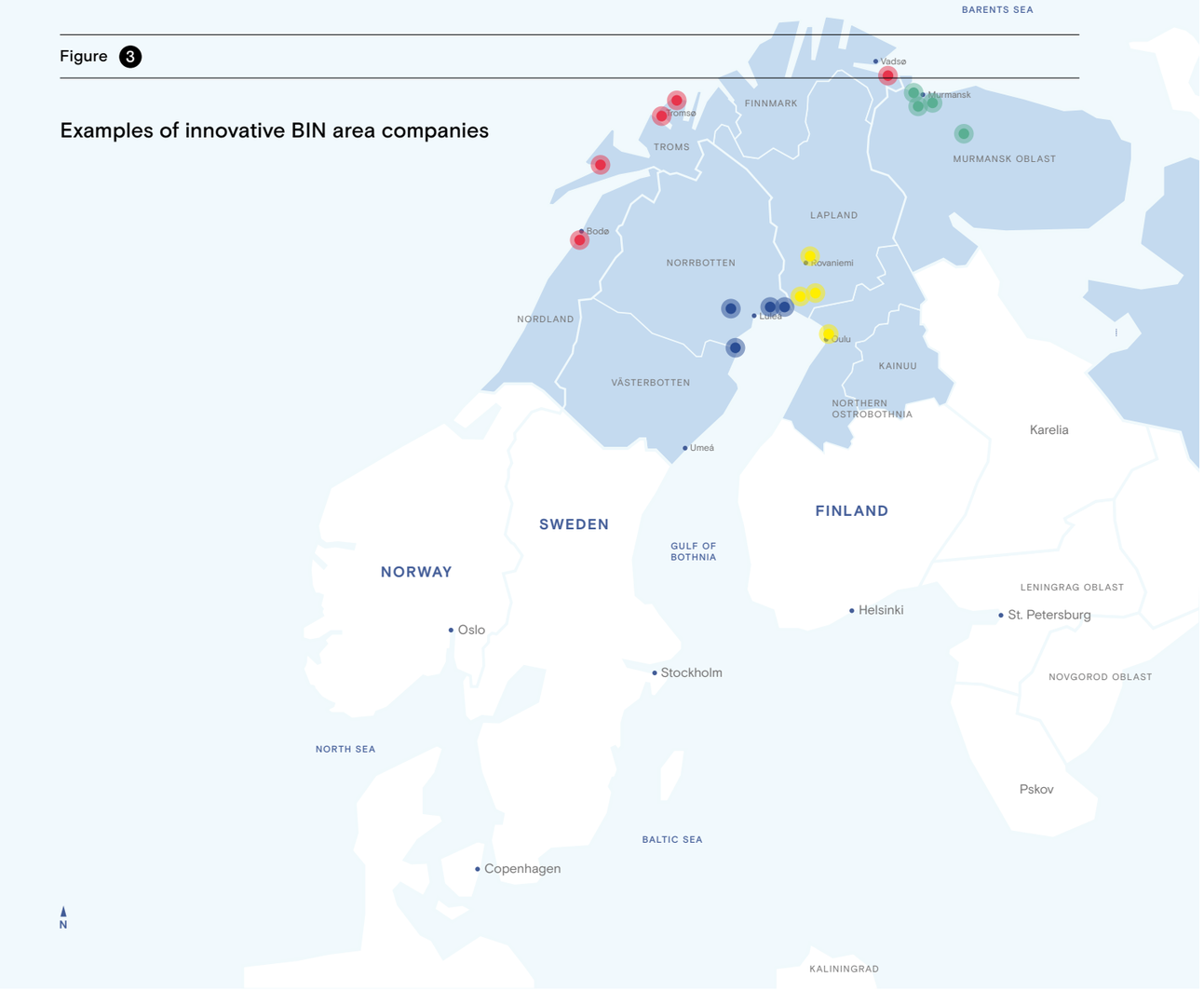
In the Swedish BIN region, for instance, we have Västerbotten cheese produced by Norrmejerier. Bread is often considered very local but Polarbröd is today among the biggest exporting companies in Sweden. In addition, the Swedish BIN region hosts Kalix löjrom, which is similar to Russian caviar and is often served in select restaurants to symbolize the very best that Sweden has to offer. The brand Kalix löjrom is offered by certain fisheries along the Swedish coast, which also process löjrom in a certain way. Icehotel is a company but also a strong brand name for the entire region. From the region brand names originate such as Max Hamburger and Leos lekland. These are growing fast and are recognized in Sweden and abroad. The underlined sentence is still doubtful and the words in italics may not be understood by some readers. Originating from the Finnish part of the BIN area there is Rovaniemi Lappset Group which is a leading designer, manufacturer and supplier of children's playground equipment and outdoor exercise solutions for people of all ages. The company was established in 1970. This family-owned company sells its products to over 50 countries. Moreover, Polar, the Oulu-based producer of heart rate monitors employs 1,200 people worldwide, has 26 subsidiaries globally and manages a distribution network supplying over 35,000 retail outlets in more than 80 countries. Oulu Fingersoft game development studio and a publisher located in Oulu, Finland, have published games like Hill Climb Racing 2, Make More!, Javelin Masters 3 and Fast Like a Fox.

Norway is represented with branded cultural and sport events with North-Norwegian identity, all held on an annual basis. The TIFF - Tromsø International Film Festival screens challenging quality films for a local, national and international audience and serves as a meeting point for representatives of the Norwegian and international film industries. The total number of admissions in 2017 was 60,135. Finnmarksløpet is the world's northernmost dogsled race running through amazing Arctic nature. The Finnmarksløpet webpage has about 1 million visitors during the race. In 2018 there were 126 contestants from 16 countries divided into 3 race classes with teams of 6, 8 and 14 dogs. Nordland Musikkfestuke is a music festival combining natural and cultural landscape. This is one of the most important venues for classical music in Norway. Around 25,000 people attend the event. The Arctic Race of Norway is a multiple stage bicycle race held since 2013. The race is an official UCI-sponsored event, and has been included as part of the Europe Tour. The race of 2017 was televised in 190 countries and got about 3 million online media views; it involved 1300 riders and a live audience of 150,000 people.

On the Russian side we would like to highlight Baikonur, which is a brand for fish oil products developed and produced by the Murmansk based company Polaris (a a member of the PolarFarm group). The company is one of the leaders in the Russian Federation in the production of dietary supplements based on fish oil and vegetable oils in soft gelatin capsules.

Figure 3

## Examples of innovative BIN area companies




**Sweden**

Blue dots represent *Älvsbyhus; Brokk robots, Lindbäcks bygg, Tree hotel* and *Polarica*.

**Norway**

Red dots represent *DIPS; Lofotprodukt; ArcticZymes; Kongsberg Satellite Services* and *Kimek* companies.

**Finland**

Yellow dots represent *Balmuir; Hätälä; Arctic Warriors* and *Tornion Panimo*.

**Russia**

Green dots represent *Tundra; BR Electornics; Systemy promyshlennoi bezopasnosti* and *Kolaland*.

## Companies

Companies constitute a unique for-profit formal unit. We selected a number of companies that differ from the conventional way of viewing the BIN area. In the Swedish BIN region, we note Polarica, offering local foodstuffs such as berries, fish and meat. To exemplify a growing number of high technology companies we mention Brokk offering robotics for industrial purposes. Among the new emerging companies  Rapunzel offers hair products and is prominent in Sweden and abroad. We also have Vinter on the map to symbolize a growing focus on services and creative industries.

In Norway we would like to exemplify innovative companies from various industries. DIPS is the leading supplier of eHealth systems to Norwegian hospitals. Lofotprodukt is a producer of fish food which achieved tremendous growth during the last decade, and now has its products on sale in stores in every municipality in Norway. ArcticZymes develops and markets recombinant enzymes derived from cold-water marine species for use in life science research and in the molecular diagnostics sector. Kongsberg Satellite Services is a world lead of ground station services for polar orbiting satellites. Barel develops and manufactures electronics within the global markets for the international lighting and heating industry. Strategically located in Kirkenes, the company Kimek has a network of partners in Russia and is one of the largest northernmost mechanical environments.

Examples of successful innovative companies from Northern Finland include Balmuir, a lifestyle brand offering interior decoration items and fashion accessories made from the finest natural materials while Oulu based Hätälä is a Nordic market leader in premium fish products. Rovaniemi Arctic Warriors is an arctic superfoods company and Tornion Panimo reopened a brewery with 140-year traditions manufacturing the beer known as Lapin Kulta. On the Russian side (Murmansk Region), we note numerous successful SMEs in various sectors. For example, Tundra is a reindeer herding enterprise dating from 1930 and the main business for the town of Lovozero populated by indigenous people – the Saami. High quality meat and food products are produced and marketed in the region and beyond. In 2015 the company won the all-Russia contest competition “Quality star”. BR Electronics is a Russian subsidiary of the Norwegian company Barel handling high volumes and work-intensive products in Murmansk. For more than a decade Barel companies we have been manufacturing world-class electronic, electromechanical and cable products. “Systemy promyshlennoi bezopasnosti” provides planning and design of environmental protection systems for the petroleum industry with clients in many regions of Russia. All the key experts of this entrepreneurial company are women and, according to the director general, this works well since most of the company’s clients and partners are “male-companies”. Kola Land is a young, modern and dynamic company dealing in the harvesting of northern wild-growing and garden cultivated berries. Their range of products includes cloudberry, blackberry, cowberry, cranberry, crowberry, black currant, red currant, buckthorn, raspberry and cherry. Since 2008 Kola Land has gradually branched out and has already taken its place among the primary packers with an average turnover of 300-400 tons per season and has expanded to a reliable client base in Murmansk Region, Arkhangelsk Region, Pskov Region, Vologda Region and other regions of Russia.

## Key performance indicators

This section introduces a number of self-reported key performance indicators (KPI) by BIN area companies. These KPIs are growth opportunities, innovativeness, innovation, performance, exports, newness and regional support. To identify a KPI on each dimension we worked with so-called composite measures. A composite measure is based on multiple indicators to form a broader perspective than only focusing on one single indicator. The indicators were collected from the BIN area companies by means of a survey.

The survey results are based on a sample of 263 observations collected from BIN area companies in Sweden (113), Norway (66), Finland (68) and Russia (16). We included companies with more than five employees and with a significant regional impact. As the region spans a large geographical area we made a stratification that should be representative of size, industry and location. We also listed through our expert panel a number of companies that have a specific impact in the region. Most of these companies participated in the survey. Here we present results of the survey.

Figure 4

**Business and innovation survey results**

### BIN – area

| | | |
|---|---|---|
| Competition | 3,40 | 🟡 |
| Regional support | 3,31 | 🟡 |
| Growth opportunities | 3,41 | 🟡 |
| Innovative competitiveness | 3,36 | 🟡 |
| Value performance | 3,60 | 🟢 |
| Organizational performance | 3,64 | 🟢 |
| Exports | 2,86 | 🔴 |
| Newness | 2,56 | 🔴 |

### Finnish part of BIN

| | | |
|---|---|---|
| Competition | 3,45 | 🟡 |
| Regional support | 3,29 | 🟡 |
| Growth opportunities | 3,33 | 🟡 |
| Innovative competitiveness | 3,43 | 🟡 |
| Value performance | 3,72 | 🟢 |
| Organizational performance | 3,75 | 🟢 |
| Exports | 3,26 | 🟡 |
| Newness | 2,48 | 🔴 |

### Swedish part of BIN

| | | |
|---|---|---|
| Competition | 3,41 | 🟡 |
| Regional support | 3,37 | 🟡 |
| Growth opportunities | 3,47 | 🟡 |
| Innovative competitiveness | 3,35 | 🟡 |
| Value performance | 3,57 | 🟢 |
| Organizational performance | 3,68 | 🟢 |
| Exports | 2,49 | 🔴 |
| Newness | 2,54 | 🔴 |

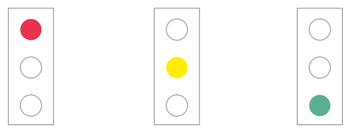
### Russian part of BIN*

| | | |
|---|---|---|
| Competition | 3,61 | 🟢 |
| Regional support | 3,06 | 🟡 |
| Growth opportunities | 3,11 | 🟡 |
| Innovative competitiveness | 3,62 | 🟢 |
| Value performance | 3,63 | 🟢 |
| Organizational performance | 3,60 | 🟢 |
| Exports | 3,27 | 🟡 |
| Newness | 3,30 | 🟡 |

*Murmansk Region only*

### Norwegian part of BIN

| | | |
|---|---|---|
| Competition | 3,28 | 🟡 |
| Regional support | 3,29 | 🟡 |
| Growth opportunities | 3,45 | 🟡 |
| Innovative competitiveness | 3,23 | 🟡 |
| Value performance | 3,51 | 🟢 |
| Organizational performance | 3,46 | 🟡 |
| Exports | 2,99 | 🔴 |
| Newness | 2,50 | 🔴 |



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# Challenges and findings

**Implications for the BIN area**

**For Policy:**

A This chapter endeavours to describe the BIN area holistically with a strong representation from the entire region. We have broadened the perspective to focus not only on the geographical aspect but also to illustrate the significance of companies, brand names and clusters. To do this we mapped the region by noting clusters, brand names and companies that may in part explain the key business activities in the region. This mapping passed through several stages with experts meeting and offering a representation of symbols that may explain innovative initiatives beyond known sectors such as the forest, fisheries and extraction industries. Policy-makers are therefore invited to address further development of significant innovative potential of the BIN area and its regions.

B This report moreover provides an overview of KPIs measuring perceived regional support, competition, growth opportunities, innovativeness, innovation competitiveness, organizational performance, exports and newness. This is a unique data set that describes key business activities in the BIN area. This set of KPIs is also an inventory of existing activities that can support policy-makers in targeting and stimulating certain activities.

C Our findings also suggest that there are minor differences in the values of KPIs of companies within the BIN area, which is an indication that the area is fairly homogeneous across all these aspects. This has to be taken into account by policy-makers in the BIN countries if they are to work together towards a common innovation policy for the area.

**For Investors:**

D Establishing a business in the BIN area offers vivid view of opportunities and innovative ideas. We claim that the many emerging clusters and innovative companies that not only present a unique idea but also become a globally growing profitable company offer a different view of a known extraction industries region. These companies find it difficult to grow organically because of lack of financing. In countries like Germany and Japan companies are supported to a greater extent by banks. Many banks in the BIN area, however, are reluctant and have fewer opportunities to support businesses. Investors are therefore crucial to support any business. We have shown that companies like Max, Polarbröd, Icehotel etc. have grown strong and over a long period of time even with limited access to investors. Therefore, more knowledge is needed to develop an awareness of companies which operate far from the known capital markets.

E We have therefore mapped entire clusters such as car testing in Arjeplog, server plants such as Facebook in Luleå, tourism in Levi and Rovaniemi and the way an entire fish industry exports significant quantities globally. Investors may therefore not only recognize individual companies but also clusters, brand names and industries in the BIN area.

F Our group was surprised as we developed this inventory of innovative companies. The rich variation in types of industries and companies with origins in the BIN area is likely not known at this point and much work still remains to be done. Therefore we invite investors to look at the BIN area as an area with significant, already developed innovative potential.

**For Investors:**

G Our report has taken a first step to explain how companies with limited access to financial and human capital resources grow and prosper globally. This is important as it may not only serve to change the investor perspective but also inspire confidence among young entrepreneurs in the artic regions. Examples of domestic and global companies developed in the BIN area may also stimulate a second generation of innovative companies.

H Initially developing a business means developing an idea. The first strategic choice of a company is to decide what products to make and the second where to operate. This report offers some basic information on the entire BIN area. In particular, it is shown that innovative and unique companies can only grow and prosper if their value performance is supported by sales and profits.

# Maritime activity on the Northern Sea Route.

(06)

## *Maritime Transportation in the North*

## Shipping lanes of vessels on the Northern Sea Route in 2016 mapped from satellite AIS data

2016

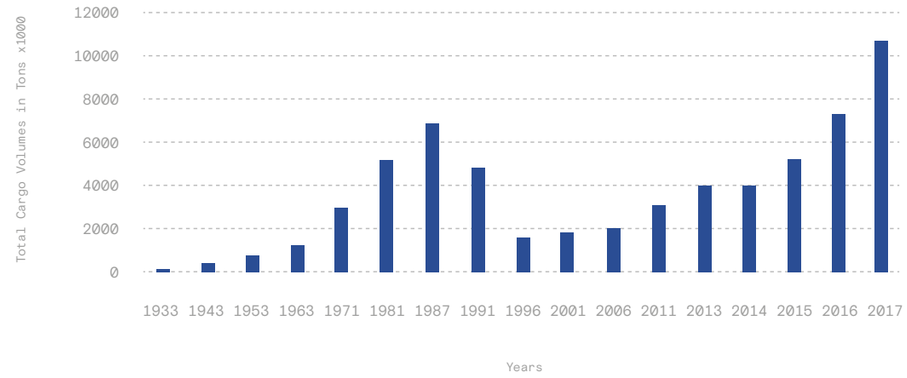

297 vessels
1705 separate voyages
7 379 000 tons total cargo
214 000 tons cargo in transit sailings

**The most active area:**
*traffic between ports of Murmansk and Arkhangelsk to Sabetta portm the Arctic Terminal at Cape Kamenniy and the Port of Dudinka.*



## Total Cargo Volumes on the Northern Sea Route

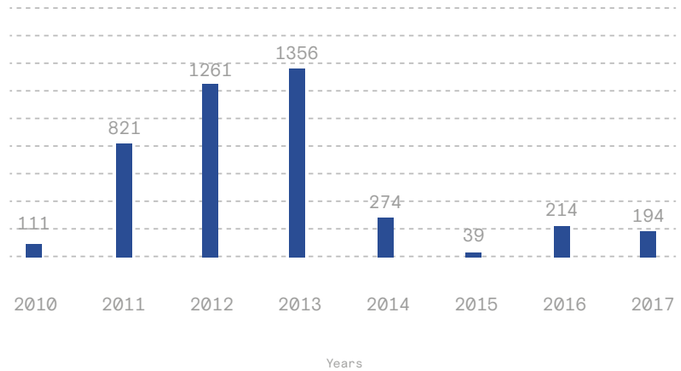
1933–2017




*Source: Northern Sea Route Administration*

## Transit cargo via the Northern Sea Route ×1000 tons

2010–2017




*Source: Northern Sea Route Administration and Rosatomflot*

Section (06)

# Maritime Transportation in the North

In this chapter, the focus is on maritime activity on the Northern Sea Route (NSR) the water area off the north coast of Russia - an area extending from Novaya Zemlya in the west to the Bering Strait in the east and outwards to the limits of Russia's Exclusive Economic Zone (EEZ).


Murmansk, base of Rosatomflot;
photo: Valery Vasilevsky



Russia regulates all traffic on the NSR, which is an integral part of the Northeast Passage, a shortcut between NW Europe and NE Asia through the Arctic Ocean. This chapter only addresses shipping traffic to and from the NSR, and within the NSR Water Area. We provide statistical data on current traffic development on the NSR relevant for the BIN area – for businesses, policy-makers and other stakeholders.

## Major findings:

- The numbers of vessels working within the borders of the NSR in 2016 and 2017 were 297 and 283, making a total of 1,705 voyages in 2016 and 1,908 in 2017.
- The south-western part of the Kara Sea had the highest traffic density on the NSR in the period 2016-2017.
- Altogether 129 shipping companies were operating on the NSR in 2016; 75 were Russian companies and 54 non-Russian. The largest number of non-Russian shipping companies operating on the NSR in 2017 were Norwegian, with 11 vessels making 92 separate voyages.
- In 2017, 83 vessels belonged to the general cargo category, followed by 51 tankers, 28 tugboats, 20 research vessels, and 19 heavy load carriers.
- Internal Russian traffic (cabotage) and destination traffic between Russian ports and non-Russian ports are the most common means of transport on the NSR. The total volume of cargo transported along the NSR in 2016 was 7.5 million tons and 10.5 million tons in 2017.
- The main driver of increased shipping on the NSR will continue to be exploitation and transport of natural resources out of the Arctic to markets in Europe and NE Asia.

## Background information on the Northern Sea Route

Future Arctic development will be dependent on efficient and innovative Arctic logistics – largely based on maritime transportation. This implies that Arctic development in general is heavily dependent on the development of the NSR as a reliable transport and trade route. In this capacity the NSR could act as a catalyst for value-creation and innovative industrial development throughout the Eurasian Arctic area.

Maritime transport via the NSR is also the only delivery route for natural resources originating in the remote Arctic regions with no pipelines, roadways or railway infrastructure. Cargoes for export from the Arctic will remain the driving force for the development of shipping on the NSR. In the future, oil, gas (LNG), coal, various ores and minerals, fish and timber products will continue to be the main cargos to be transported from the Russian Arctic. The transport of cargo and construction materials for large-scale Arctic port and energy projects (e.g. the Port of Sabetta and the Yamal LNG in the Ob Bay) is also significant, as is transport of goods and supplies between Arctic ports. Additionally, cruise tourism is likely to increase in the coming years in the Barents Sea, White Sea and Pechora Sea.

Due to the opening of the NSR, the Eurasian Arctic has changed from having a distance disadvantage to having a transport advantage to the fast growing markets in NE Asia. This development is now more realistic than before due to the reduction in sea-ice (in both areal extent and thickness), particularly during the 5 months of the summer-to-autumn navigating season (July-November), technological developments (high ice-class vessels and innovative icebreaking technologies) and interest from Russia and other Arctic States as well as from countries in NE Asia. However, several challenges still exist, not the least the presence of sea-ice cover along the entire route during the remaining months of the year and commonly difficult ice conditions in the eastern part of the NSR. Other factors include the need for ice-strengthened vessels, winterization of vessels during the winter months and the need for special crew training to operate vessels under harsh Arctic conditions, and the remoteness from developed areas.

In the past the development of the NSR as a transport route was linked to the industrialization of Siberia in the Soviet era. The NSR was an important part of the transport system that included inland waterways and the Trans-Siberian railway. Shipping volumes on the NSR increased and peaked in 1987 (6.6 million tons) but declined sharply with the dissolution of the Soviet Union (about 1.7 million in 1996). The route was opened to non-Russian flagged ships in 1991. Transport volumes on the NSR started to increase again in 2010 and reached a record high in 2016 with 7.5 million tons and 10.5 million tons in 2017. Russian officials predict cargo volumes on the NSR as high as 80 million tons per year by 2030 due to transport of natural resources, or an eight-fold increase over 2017.

Figure 1

## Shipping lanes of vessels on the Northern Sea Route in 2016 mapped from satellite AIS data

2016


*Source: Centre for High North Logistics (CHNL)*

Transit sailings (sailing through both the western and eastern borders of the NSR) on the NSR during the summer-autumn season increased between 2010 and 2013 from 0.1 million tons in 2010 to 1.35 million tons in 2013 but fell sharply in 2014 to 0.24 million tons. Subsequent transit cargo figures for 2015 were 0.04 million tons, 0.21 million tons in 2016 and 0.19 million tons in 2017. This decline in transits coincided with a sharp drop in the price of bunker fuel on the world market in 2014; a general economic downturn and unfavourable freight rates; geopolitical tensions and EU-USA sanctions against Russia (during the Ukrainian crisis and the situation with Crimea); and limited icebreaker assistance to escort transiting vessels. The last point was due to Russia's increased focus on the development of new port infrastructure at Sabetta Port on the Ob Bay and new energy projects at Yamal LNG and Arctic Gate Oil Terminal, requiring year-round assistance from Russia's own Arctic icebreakers. These events made transit shipping between NE Asia and NW Europe via the NSR less attractive as savings in the fuel costs compared to the Suez Route became insignificant due the large drop in the price of bunker fuel, exacerbated by reduced price differences for commodities between Asian and Western markets.

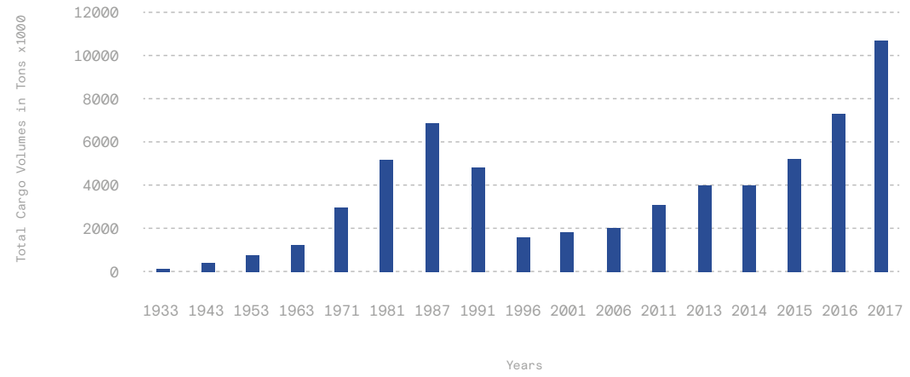
The main advantage of using the NSR as a transit route is the reduction in the transport distance (30-50%) and sailing time (14-20 days) between ports in Northern Scandinavia/NW Europe and NE Asia compared to the traditional southern route through the Suez Canal. This can lead to substantial cost savings during the summer-autumn season (July-November) when sea-ice conditions are most favourable on the NSR. This advantage depends on the location of the departure and receiving ports. The more ports are located to the north the greater the distance advantage of the NSR. Besides the reduction in sailing distance, the existence of an additional transport route is also important.



Figure 2

## Total Cargo Volumes on NSR

1933–2017




*Source: Northern Sea Route Administration*

However, the NSR is no alternative to the Suez Route and will not significantly affect the existing schemes of general cargo delivery via traditional routes, with 16,833 vessels passing through the Suez Canal in 2016 transporting 974 million tons of cargo. Rather, the NSR's future significance lies in its role as a transport corridor along the Eurasian Arctic Coast and between the Eurasian Arctic and port destinations and markets in the Atlantic and Pacific.

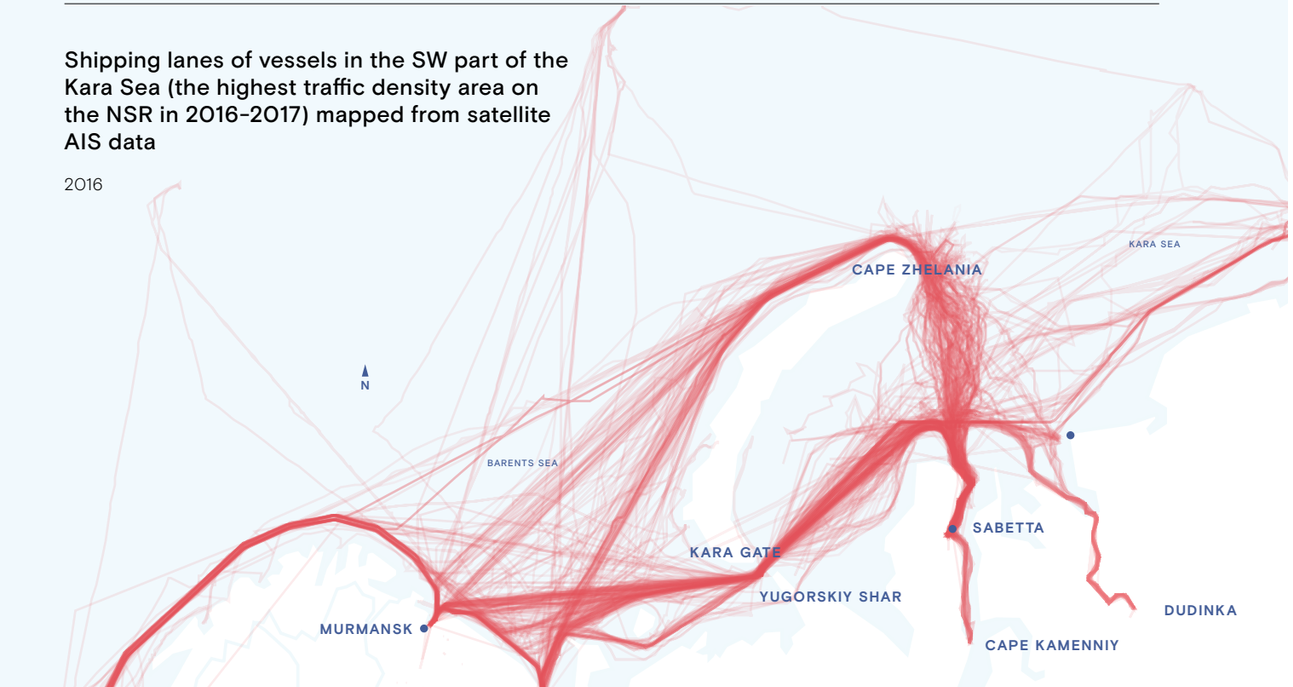
For the NSR to achieve its full potential, also as a transit route, a number of changes need to take place in the coming years and decades to improve the route's overall safety, reliability, services and attractiveness for ship owners and cargo owners. Further development of essential transportation and logistics infrastructure is needed, including more icebreakers for escorting vessels; a fleet of specialized high ice-class Arctic shuttles; improved search and rescue capacity; oil spill preparedness and response; environmental protection measures; communication systems, hydrographic surveying and navigational aids; and better forecasting of sea ice conditions. These measures together with modernization of Russian Arctic ports will take time and require large investments.

Continued development of Arctic resources through new Arctic energy and mining projects is seen as a prerequisite for future investments in the maritime transport and logistics infrastructure needed along the NSR, at least in the short to medium-term. Also important and requiring still further investments is the intermodal connectivity between the NSR and other modes of transport, namely river transport, railways, roadways and aviation facilities. China wants to secure its interests in future Eurasian Arctic economic development and diversify its transportation options to Europe by taking an active role in infrastructure development on the NSR through its Belt & Road Initiative. The same applies to South-Korea and Japan.

Figure 3

## Shipping lanes of vessels in the SW part of the Kara Sea (the highest traffic density area on the NSR in 2016-2017) mapped from satellite AIS data

2016




*Source: Centre for High North Logistics (CHNL)*

All together 1,705 separate voyages  took place on the NSR in 2016 by 297 vessels. This number increased to 1,908 voyages in 2017 by 283 vessels. The SW part of the Kara Sea had the highest traffic density on the NSR in 2016-2017.

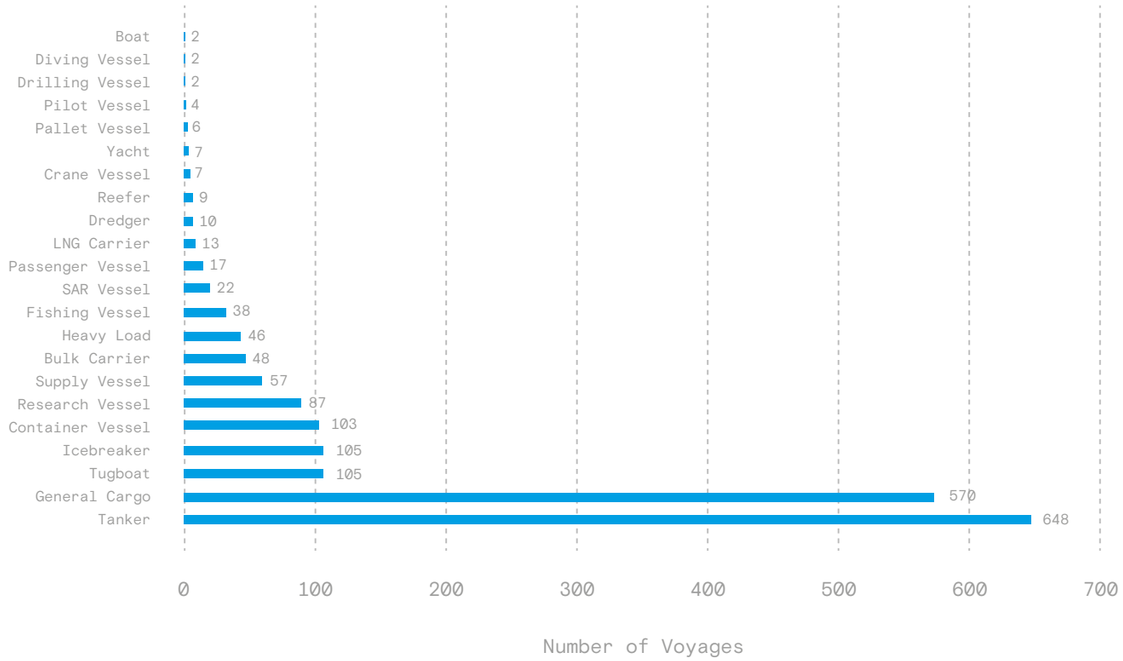
The three most active areas of navigation within the NSR in 2016 were Sabetta Port (33% of all voyages) and the Arctic Gate Terminal at Cape Kamenniy on the Ob Bay (16%), and the Port of Dudinka on the Yenisey River (11%). Shipping between these three locations and the ports of Murmansk and Archangelsk stood out as the main traffic routes. Altogether 596 separate voyages took place into the Kara Sea during 2016, compared to 89 into the Laptev Sea, 73 into the East Siberian Sea, and 22 into the Chukchi Sea.



Figure 4

## Types of vessels operating on the Northern Sea Route in 2017 and number of voyages for each

2017




*Source: Centre for High North Logistics (CHNL)*

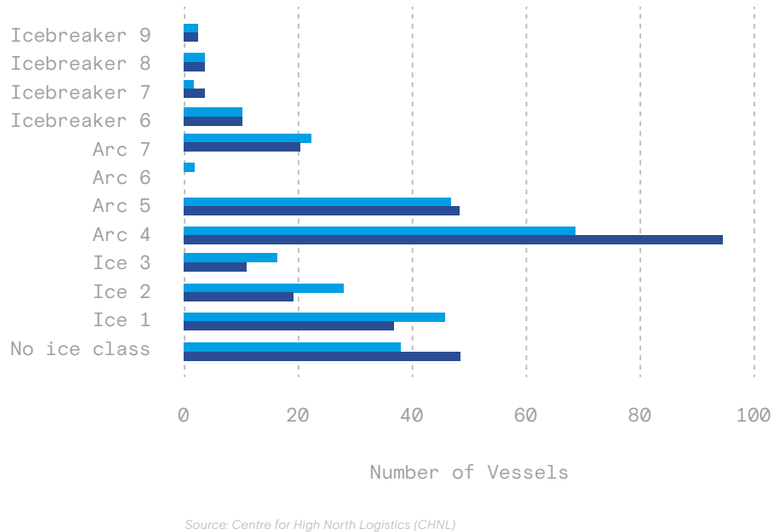
Of the 283 vessels operating on the NSR in 2017, 83 belonged to the general cargo category, followed by 51 tankers, 28 tugboats, 20 research vessels, and 19 heavy load carriers. Figure 4 shows the number of voyages for each vessel type. Of these vessels 49% were less than 5,000 gross tonnage (GRT). Most of the vessels under the Russian flag were under 10,000 GRT. The NSR is currently mainly used for the transportation of relatively small cargo volumes by small capacity vessels. Only four vessels were over 50,000 GRT in 2017 but this number will increase in the next few years with the arrival of additional  LNG carriers (128,800 GRT) transporting LNG from the Yamal LNG plant in the Ob Bay.

[1] The following definition of a voyage is used in this chapter: If a ship leaves a port and arrives at another port (or in another water area, e.g. for a research vessel that does not call at any port) then this is considered one voyage. When the same vessel departs from the first port or water area and returns to another port or destination then this becomes a second voyage.

**Figure** 5

## The ice class of vessels on the NSR

2016–2017




*Source: Centre for High North Logistics (CHNL)*

The most common ice-class displayed by vessels on the NSR in 2016–2017 was Arc4 (Russian Maritime Register of Shipping) with 95 vessels having this level of ice reinforcement in 2016 and 70 vessels in 2017. In the second place were vessels with ice-class Arc5, or 50 vessels in 2016 and 48 in 2017. Vessels with very weak ice-reinforcement, or ICE1–3, numbered 66 in 2016 and increased to 89 in 2017. A total of 49 vessels had no ice-class in 2016 and 38 in 2017.



**Table** 1

## Number of shipping companies, vessels and voyages on the Northern Sea Route

2016–2017

### 2016

| Country | Companies | Vessels | Voyages |
|---|---|---|---|
| Russia | 75 | 188 | 1188 |
| Netherlands | 11 | 35 | 112 |
| Germany | 7 | 17 | 40 |
| Cyprus | 6 | 7 | 70 |
| Norwary | 5 | 7 | 40 |
| Luxembourg | 4 | 12 | 25 |
| Belgium | 4 | 6 | 20 |
| Greece | 3 | 5 | 158 |
| UK | 3 | 3 | 10 |
| China | 2 | 7 | 13 |
| Hong Kong* | 2 | 2 | 9 |
| South Korea | 2 | 2 | 4 |
| Japan | 1 | 2 | 6 |
| Singapore | 1 | 1 | 2 |
| Malta | 1 | 1 | 2 |
| Denmark | 1 | 1 | 2 |
| Finland | 1 | 1 | 4 |
| **Total** | **129** | **297** | **1705** |

### 2017

| Country | Companies | Vessels | Voyages |
|---|---|---|---|
| Russia | 74 | 203 | 1538 |
| Norway | 8 | 11 | 92 |
| Netherlands | 7 | 14 | 52 |
| Germany | 6 | 15 | 31 |
| China | 5 | 12 | 20 |
| UK | 4 | 4 | 35 |
| Greece | 3 | 5 | 54 |
| Denmark | 3 | 4 | 18 |
| Luxembourg | 3 | 4 | 8 |
| Cyprus | 2 | 3 | 29 |
| Hong Kong* | 1 | 2 | 4 |
| South Korea | 1 | 1 | 8 |
| Japan | 1 | 2 | 6 |
| Panama | 1 | 1 | 6 |
| Poland | 1 | 1 | 2 |
| no info | 1 | 1 | 5 |
| **Total** | **121** | **283** | **1908** |

*Although Hong Kong now belongs to China it is listed separately due to its flag status.

*Source: Centre for High North Logistics (CHNL)*

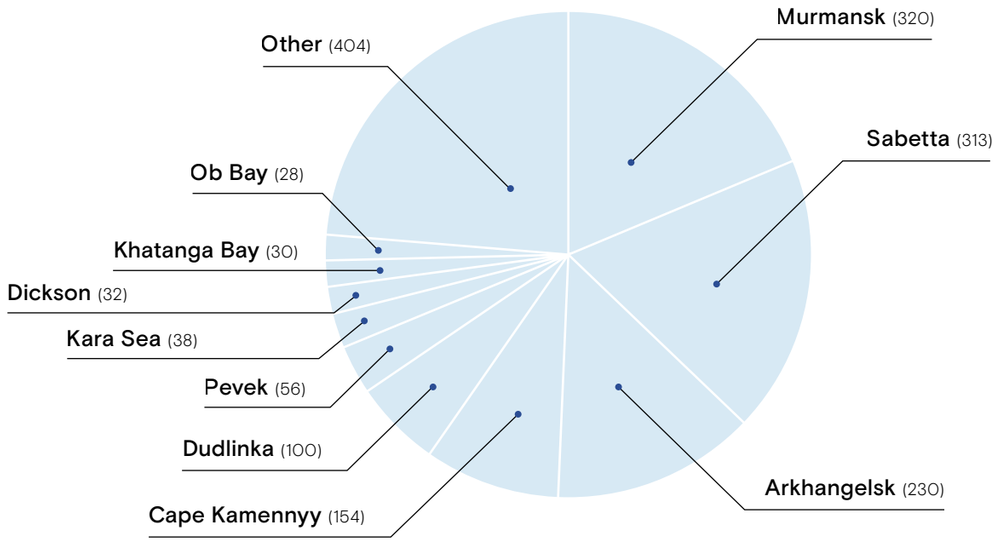
A total of 129 shipping companies were operating their vessels on the NSR in 2016; 75 were Russian companies and 54 non-Russian. In 2017 Norway had the largest number of non-Russian companies operating on the NSR with 11 vessels making 92 separate voyages.

In 2016 the largest number of voyages was made by the Murmansk Shipping Company (MSCO; 190 voyages), followed by Norilsk Nickel (175 voyages). In 2017, Sovcomflot (SCF; 175 voyages), Lena River Shipping (165 voyages) and Norilsk Nickel (162 voyages) were the most active shippers.

Figure 6

## Most frequent departure ports and numbers of voyages from each port

2016




*Source: Centre for High North Logistics (CHNL)*

Of the 1705 voyages on the NSR in 2016, 697 originated from NSR ports to ports located outside the borders of the NSR. A total of 576 voyages originated from western Russian ports to NSR ports. The largest number of these voyages was from Murmansk (320) and Arkhangelsk (230). A total of 46 voyages were from eastern Russian ports, including Vladivostok, Provideniya, Anadyr, Petropavlovsk-Kamchatsky, and Nakhodka. A total of 251 voyages were internal transport between NSR ports.

Voyages from European ports to NSR were 59 in 2016. The countries and number of voyages included Belgium (29), Spain (9), Netherlands (3), Estonia (1), France (1), Germany (1), Finland (1), and Great Britain (1). All these voyages delivered cargo to the Sabetta Port. From Norway the main location was the Kara Sea (13 voyages); these were mainly research vessels and tugboats working during the summer- autumn period.

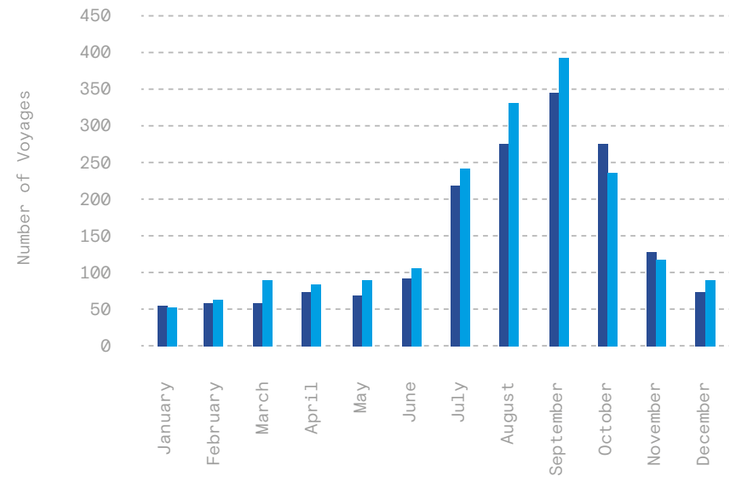
Voyages from NE Asian ports to NSR were 36 in 2016. These voyages were from China (20), South-Korea (14), and Japan (2) with NSR destination in all cased the Sabetta Port.
Finally, in 2016 there were a total of 19 transit voyages and 21 voyages were between NSR and other countries or locations.



Figure 7

## Number of voyages per month on the Northern Sea Route

2016-2017




*Source: Centre for High North Logistics (CHNL)*

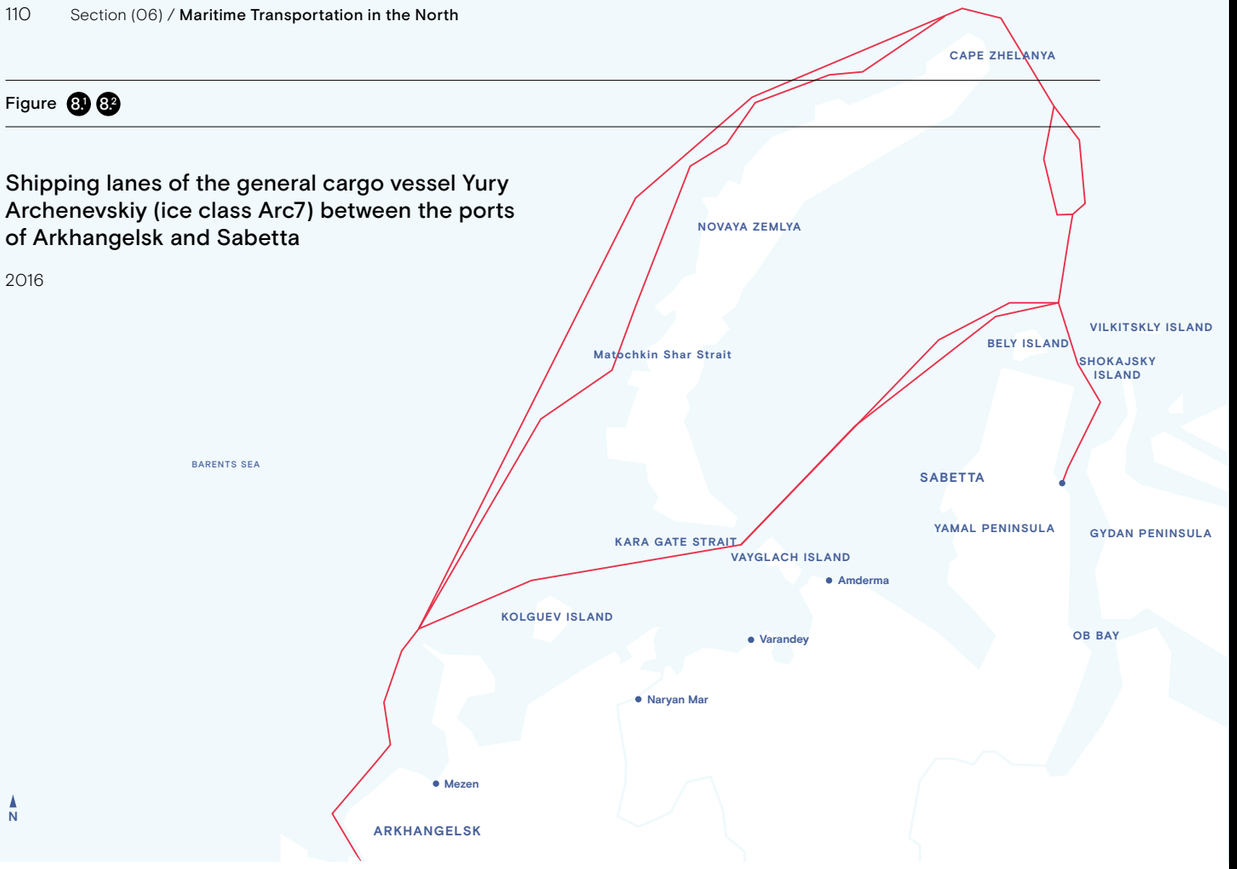
The figure shows the number of voyages on the NSR per month during 2016-2017. A total of 1,211 voyages took place during the summer-autumn season (July-November) in 2016 and 494 voyages in the winter-spring season (January-June + December). Corresponding figure for 2017 were 1,312 during the summer-autumn and 596 during the winter-spring season.

Due to yearly fluctuations in sea ice the start of the summer-autumn navigational season may vary, but in general begins in early July and extends to the end of November. During the month of September, which usually has the most favourable ice conditions, the number of voyages reached a total of 345 in 2016 and 393 in 2017. Although the figures indicate that navigation on the NSR has a pronounced seasonal character, cargo flow is increasing in the winter period in the Kara Sea as a result of year-round operations.

Figure 8.1 8.2

**Shipping lanes of the general cargo vessel Yury Archenevskiy (ice class Arc7) between the ports of Arkhangelsk and Sabetta**

2016




*Source: Centre for High North Logistics (CHNL)*

The average speed of 21 voyages in 2016 of the general cargo vessel Yuri Arshenevskiy (ice-class Arc7; 18,580 GRT) between Arkhangelsk and Sebetta was 9 knots. The vessel sailed independently during the summer-autumn season but required icebreaker assistance for parts of the route during the winter-spring season.

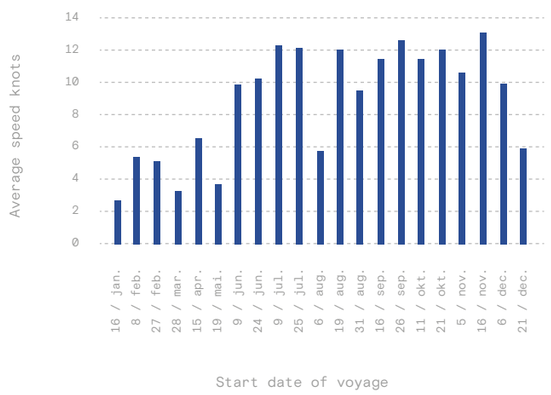
The duration of voyages between the two ports in the summer-autumn season was 4-5 days, but 10-18 days during the winter-spring season. Thus the average year-round voyage time was 7 days between Arkhangelsk and Sabetta.

In sailing between the two ports the approximate difference in travel distance passing through the Kara Gate versus Cape Zhelania is 250 nautical miles. With an average speed of 12 knots this is equal to one day saved by going through the Kara Gate rather than rounding Cape Zhelania.

The duration of the voyage and a vessel's average speed through the NSR depends on a number of different variables including sea ice conditions, the actual sailing distances, the vessel's engine power, ice class, visibility, wind strength and wind direction, and possible waiting time for icebreaker assistance.

**Average voyage speed of the general cargo vessel Yury Archenevskiy between the ports of Arkhangelsk and Sabetta**

2016




*Source: Centre for High North Logistics (CHNL)*



# Challenges and findings

## Implications for the BIN area

**Increased commercial traffic on the NSR eastward and westward could boost regional socio-economic development in the BIN area (Northern Scandinavia and NW Russia):**

A The NSR offers shipping companies and cargo owners the shortest trade route for imports/exports between the BIN area and the North Pacific market (USA, China, Japan, and South Korea). The proposed new railway connection between Rovaniemi in Finnish Lapland and the port of Kirkenes in northern Norway would further strengthen those trade routes. The same applies to a proposed railway connection between Arkhangelsk and the southern Urals.

B The NSR offers natural resource industries in the BIN area (oil, LNG, minerals, forestry products, and fisheries) the shortest route to transport raw materials or processed natural products to the rapidly growing Asian market. Arctic cruise tourism has also future growth potential.

C The ice-free deep-water ports in northern Norway (e.g. Kirkenes) and Murmansk on the Kola Peninsula are in a strategic location to serve as storage and transshipment hubs for various cargoes being transported along the NSR and as a location of logistics support industries. These ports lie at the western gateway of the NSR, midway between the Bering Strait in the North Pacific Ocean and Gibraltar at the entrance to the Mediterranean Sea.

D The shipbuilding and offshore resource extraction industries in the BIN area could further benefit from specializing in the design and construction of innovative and energy efficient ice class vessels, icebreaking technologies, mining and offshore equipment and platforms for Arctic operations, including vessel repairs and logistics services.

E Actors in the BIN area are in an ideal position to shape the future development of the NSR. This includes private and public investments in new transportation and logistics infrastructure with a focus on innovative, environmentally-friendly and cost-effective logistics solutions.

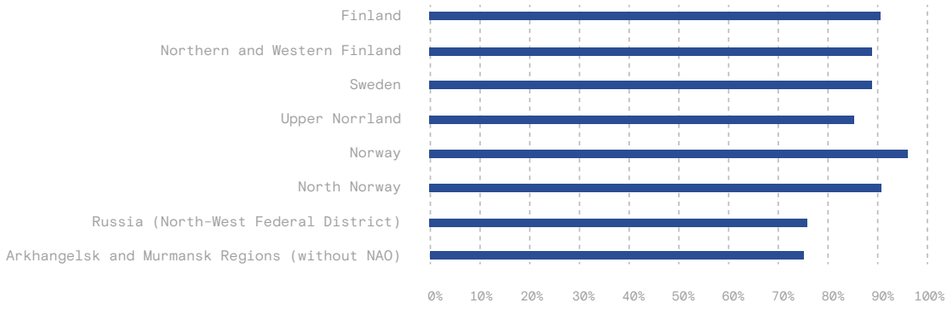
# A prerequisite for economic development in the North.

(07)

*Connectivity in the North*

## Households with broadband access, % (Basic Broadband)

2016




## Availability of fixed broadband, % of households, at least 100Mbps (High speed Broadband)

2016



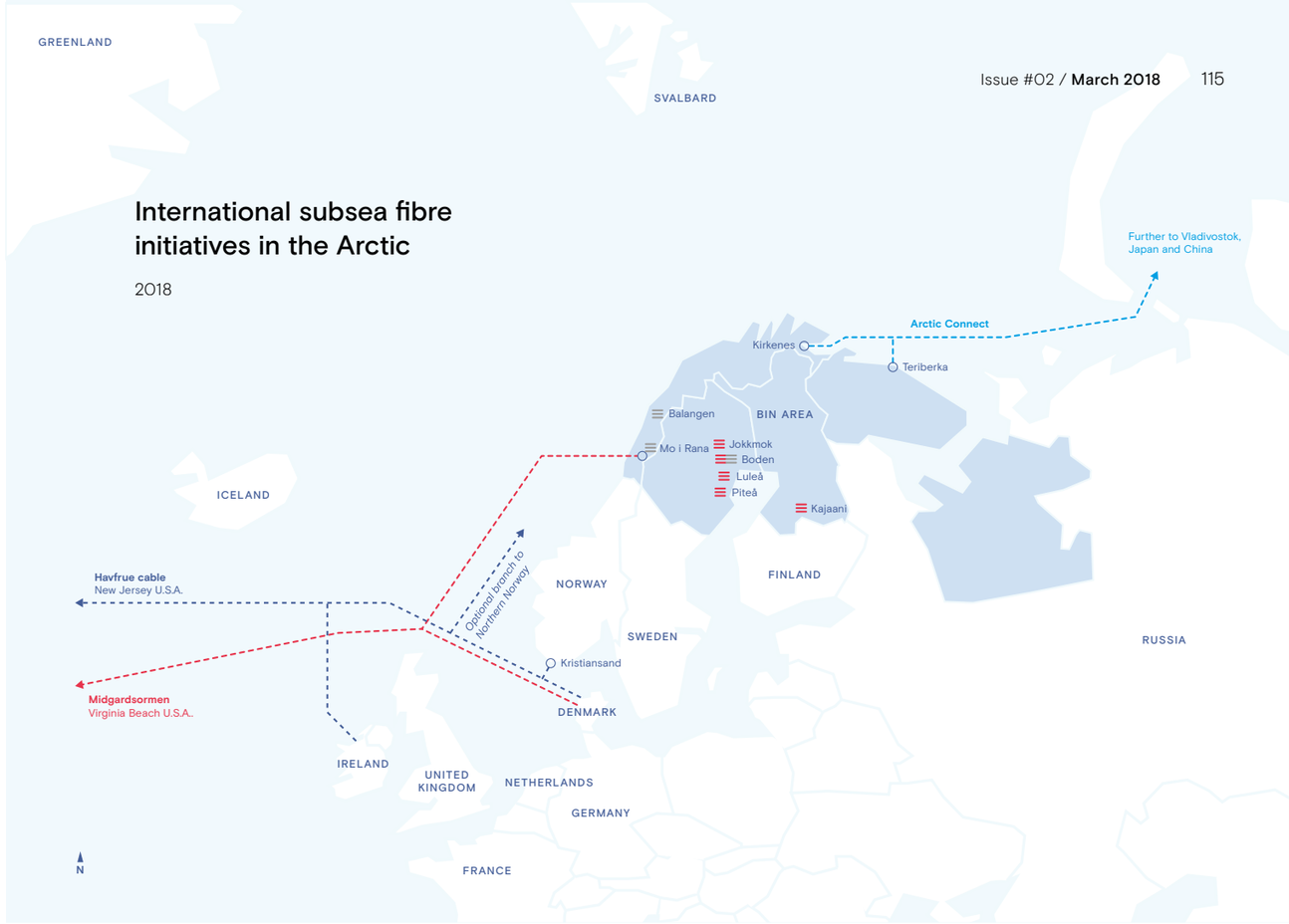

## 4G area coverage in the BIN regions, % of own territories

| County | Year | 4G, % |
|---|---|---|
| Murmansk Region* | 2017 | 5 |
| Arkahngelsk Region (without NAO)* | 2017 | 5 |
| North-West Russia* | 2017 | 26 |
| Norrbotten | 2016 | 45 |
| Västerbotten | 2016 | 61 |
| Sweden total | 2016 | 67 |
| Troms | 2016 | 75 |
| Nordland | 2016 | 83 |
| Norway total | 2016 | 87 |
| Finnmark | 2016 | 93 |



## International subsea fibre initiatives in the Arctic

2018




**Data centers**

Active

Sweden: Piteå, Jokkmok, Luleå, Boden

Finland: Kajaani

Planned

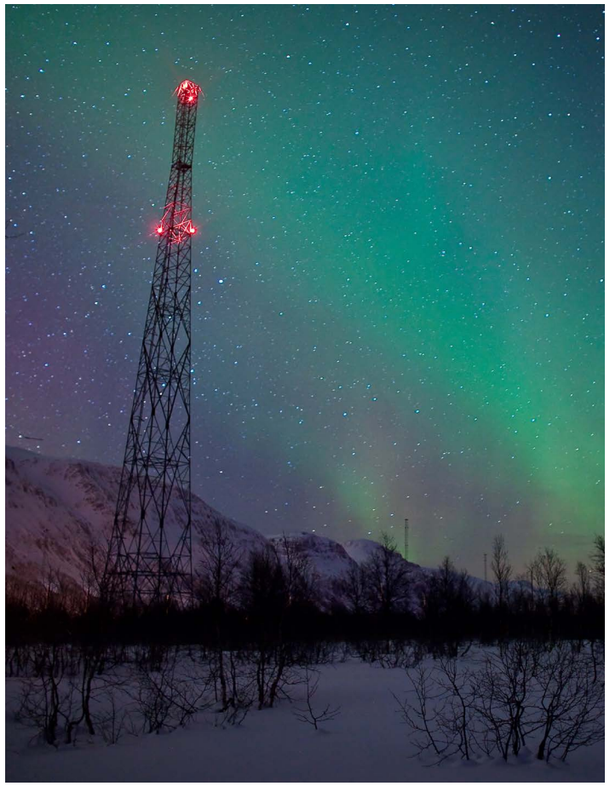
Norway: Mo i Rana, Balangen

Sweden: Boden

Section (07)

# Connectivity in the North

Connectivity is recognized as a prerequisite for economic development in the Arctic. Finland's Chairmanship of the Arctic Council 2017-2019 sets connectivity as one of the priority areas. Access to broadband is essential for connectivity as it serves the needs of business, communities and research.



Telecommunication tower and Aurora Borealis.
Photo: shutterstock

Access to broadband facilitates the development of e-health and digital education. Business opportunities in the Arctic involving shipping, oil and gas, data centres, mining and service industries all need reliable connectivity solutions.

The Nordic BIN - countries Norway, Sweden and Finland - have developed broadband plans and digital agendas; however, connectivity in the Arctic regions requires separate attention. The Arctic Economic Council reports provide an overview of the challenges and ways forward to develop Arctic broadband infrastructure. In this chapter the focus is on the measurable and comparable development of connectivity in the Arctic in terms of the availability, quality and affordability of fixed broadband (including all the main fixed-line broadband access technologies). Furthermore, availability of mobile broadband is reported. Analysis of broadband development projects in the Arctic further highlights drivers and success factors for improving connectivity in the Arctic.

We address *connectivity for people* and *for business* in the BIN area. The indicators used in this chapter come from broadband statistics on households. The use of such statistics is well suited for purposes of highlighting people's universal access to basic infrastructure and Internet. The needs of businesses for Internet might vary, but basic household broadband offerings would suffice for small and medium enterprises (SMEs) as the speeds also satisfy the needs of these customers. Broadband speed is usually measured in Mbps (megabits per second), where a high number means faster downloads and uploads when using cloud services, rapid streaming of music or video and smoother video calls. A broadband speed of 100 Mbps would be considered sufficient for SMEs, but larger firms require higher speeds and bandwidths. Analysis of subsea cable projects explores new potential for increased connectivity for business in the BIN area. This chapter describes living the conditions of people in the BIN area in terms of access to fixed and mobile broadband, identifies universal needs for broadband statistic information and presents implications for policy makers and investors.

## Indicators used:

Availability of fixed broadband shows the proportion of households with easy Internet access, whether they use it or not. It shows investments in basic infrastructure and people's universal Internet, without measuring actual usage.

**Quality of fixed broadband** is measured in terms of the availability of speeds of 30 Mbps[2] and 100 Mbps. This indicator demonstrates how well the BIN area meets the broadband coverage objectives of the EU Member States: universal broadband coverage with speeds of at least 30 Mbps by 2020 and broadband coverage of 50% of households with speeds of at least 100 Mbps by 2020.

**Affordability of fixed broadband** is measured by price level and by its percentage of average national income per capita. This indicator shows how well BIN area meets the targets of the UN Broadband Commission, namely that by 2025, entry-level broadband services should be made affordable in developing countries at less than 2% of monthly Gross National Income (GNI) per capita.

**Availability of mobile broadband** demonstrates mobile broadband availability in terms of population and area coverage.

**Map of potential subsea cable projects** illustrates subsea cable initiatives with a potential effect on the BIN area.

1. According to Eurostat, broadband refers to telecommunications in which a wide band of frequencies is available to send data. Broadband telecommunication lines or connections are defined as those transporting data at high speeds, with a speed of data transfer for uploading and downloading data (also called capacity) equal to or higher than 144 kbit/s (kilobits per second). In the Russian statistics minimum speed of broadband is 256 kbit/s.

## Findings:

AVAILABILITY

- Basic fixed broadband[3] was available to 95% of households in the Nordic BIN regions and in 75% of households in the Russian BIN regions.

QUALITY

- The target of the EU Digital Agenda for broadband with at least 100 Mbps per second for at least 50% of households by 2020 was already achieved in the Nordic BIN regions in 2016. The target of 30 Mbps for all is yet to be achieved.
- The BIN regions in Norway and Sweden exhibit higher levels of quality fixed broadband availability than in Finland
- The regions of Troms, Nordland (Norway) and Norrbotten (Sweden) lag behind their country averages in 100 Mbps fixed broadband availability by 8 percentage points and 7 percentage points respectively, while the Finnish regions of Northern Ostrobothnia, Kainuu and Lapland outperform Finland's average by 8 percentage points.

AFFORDABILITY

- Fixed broadband is affordable in the BIN area, with broadband expenses constituting from 1.6 to 3% of annual disposable income. Norway has the most expensive broadband, followed by Sweden and Finland. There is no significant price disparity between the Finnish BIN regions and Finland as a whole.
- Murmansk Region has more expensive fixed broadband than the Northwestern Federal District in Russia.

MOBILE BROADBAND

- In 2016 the BIN regions in Norway had the best mobile broadband coverage lagging behind the national average by only 3 percentage points, Swedish BIN regions lagged behind by 14 percentage points and the Russian BIN regions lagged 21 percentage points behind their corresponding national averages.

SUBSEA CABLE INITIATIVES

- The BIN region requires improved connectivity with the USA and Asia by subsea fibre cable. Capital-intensive projects demand careful consortium building and secured financing from the initial stage outset. The role of the governments should be considered in securing connectivity in the Arctic BIN area.

[2] Mbps and Mbit/s are used interchangeably

[3] Access to internet with download speed at least 256 kbit per second in Russia and with minimum speed is 144 kbit per second in Nordic BIN regions ok



## Availability of fixed broadband in the BIN area

Figure 1 shows the country specific shares of households with fixed broadband access. While Norway was the first to reach the 95% threshold in 2016, Sweden and Finland approached it in 2017. Russia is lagging behind by 20 percentage points as of 2016. Figure 2 shows that there is no disparity between BIN regions and their country averages (the share for both North-West Russia and the Murmansk and Arkhangelsk region is about 75%; for the Nordic countries and their corresponding BIN regions the shares are close to 95%). The development in North-West Russia in 2016 was at the 2009-10 level of the neighboring Nordic countries and their BIN regions. Today the difference in the share of households with broadband access between the Nordic BIN regions and North-West Russia is about 20 percentage points. In Russia, priority in extending Internet availability of at least 10 Mbps is given to settlements with a population of at least 250 people. When interpreting the results in Figures 1 and 2 one should remember that availability of fixed broadband meeting the minimum speed requirement is considered (access to internet with download speed at least 256 kbit per second in Russia and with minimum speed is 144 kbit per second in Nordic BIN area). See Table 1 for speed comparisons.

Figure 1

### BIN countries-share of households with broadband access, %

2008-2017[4]

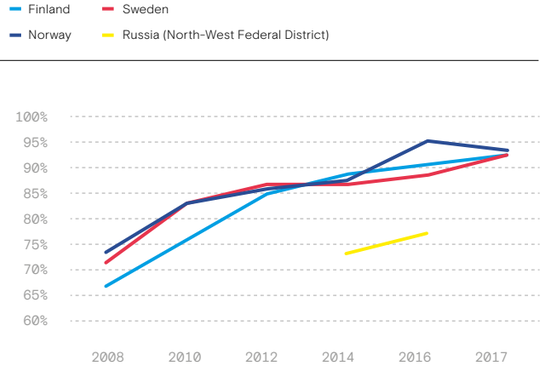
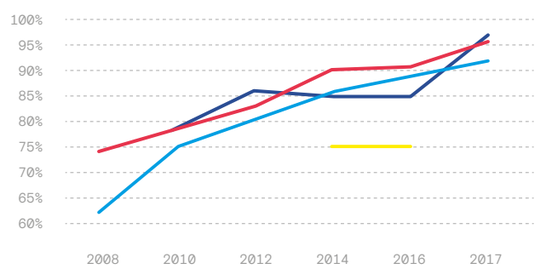



Figure 2

### BIN regions-share of households with broadband access, %

2008-2017




[4] In the Russian statistics, broadband is defined as access to internet with download speed of at least 256 kbit per second. In the statistics for the Nordic countries, according to Eurostat, the minimum broadband speed is 128 kbit per second.

The Digital Agenda presented by the European Commission proposes to better exploit the potential of information and communication technologies (ICTs) in order to foster innovation, economic growth and progress.

## When it comes to broadband, the Digital Agenda has the following targets:

- All in Europe shall have access to internet with speed over 30Mbps per second by 2020 as the latest.
- 50% of all households in Europe shall have internet subscription with speed more than 100 Mbps by 2020.

In order to give some indication of what these speeds mean for the user, Table 1 compares the broadband speed required for downloading a 5-minnute video and a 2-hour movie over internet by using theoretical calculation. When using an internet connection with 100 Mbps it takes 1.5 min to download a 2-hour movie, while using 256 kbits it would take 9 h and 19 minutes.

Table 1

### Broadband speed comparison

| Content | Size | 256 kbits | 1Mbps | 20 Mbps | 100 Mbps |
|---|---|---|---|---|---|
| 5 min video | 30 MB | 16 min | 3 min | 13 s | 2.5 s |
| 2 h movie | 1-1.5 GB | 9 h 19 min | 2 h | 10.5 min | 1.5 min |

*(Source: fastmetrics.com)*



Figure 3.1

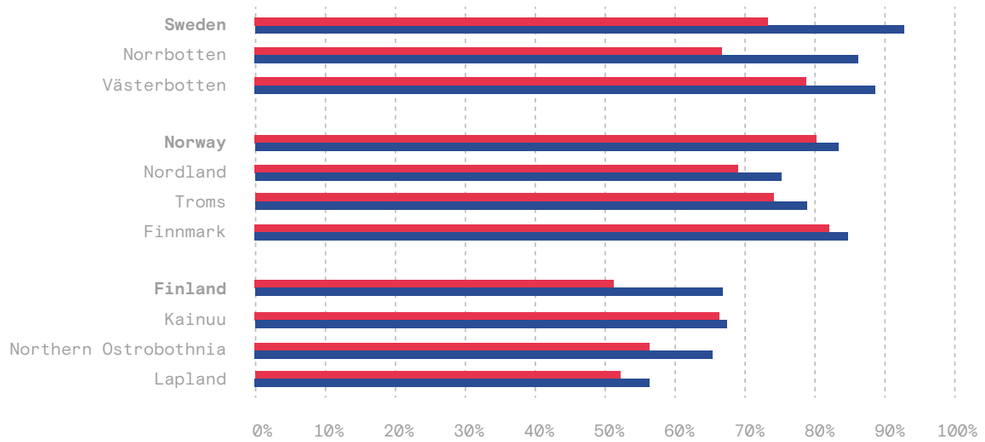
At least 100 Mbps  At least 30 Mbps

### Availability of fixed broadband, % of households

2016

Figure 3.1 shows the quality of fixed broadband availability in the BIN area. The target of the EU Digital Agenda for broadband with at least 100 Mb per second for at least 50% of households by 2020 was already achieved in the BIN regions of Nordic countries in 2016. The target of 30 Mbps second for all was yet to be achieved. Percentages just represent the possibility to acquire broadband (infrastructure in place). The total level of broadband accessibility in Finland is significantly lower than in Sweden and Norway, lagging by 22% for 30 Mbps and 25.5% for 100 Mbps compared to the average for Norway and Sweden. The regions of Västerbotten, Finnmark and Kainuu are among the best performing regions in their respective countries in terms of access to internet with at least 100 Mbps. The differences across countries are explained by country-specific initiatives to support fibre enabled Internet availability. In Finland, the commercial bias has been more toward mobile network development. In Sweden state aid coupled with regional broadband co-ordinators acting as the link between the regional and municipal level and the market actors deploying broadband infrastructure proved to be efficient in achieving availability of high quality broadband. In Norway there have been more public financial support schemes available in order to cover the costs of the "last mile" of infrastructure in rural areas [5].
No comparable statistics are available for Russia.

*Data sources: Finnish Communications Regulatory Authority, Norwegian Commnications Authority, Swedish Post and Telecom Authority*




5. ACS Telecoms REPORT

Figure 3.2

## Difference in fixed broadband availability by speed compared to country average, %

2016

Figure 3.2 shows that six out of the eight BIN regions underperform in 30 Mbps availability compared to their respective country averages, ranging from a 10 percentage points gap in availability in Lapland to a 1 percentage point gap in Northern Ostrobothnia. In Sweden, Norrbotten region underperforms in both 30 Mbps and 100 Mbps availability, while Västerbotten outperformed by 6 percentage points in 100 Mbps compared to the Swedish average (see Figure 3). In Norway, both regions of Nordland and Troms underperformed in fixed broadband availability, especially in 100 Mbps speed Nordland lags behind by 11 percentage points and Troms by 6 percentage points. Finnmark region performed slightly better than the Norwegian average. In Finland the BIN regions of Kainuu (15 percentage points), Northern Ostrobothnia (5 percentage points) and Lapland (10 percentage points) outperform Finland's average in 100 Mbps broadband availability equaling 51%, which is considerably lower than for the Swedish and Norwegian BIN regions. There is need to address fixed broadband disparities in the BIN regions.

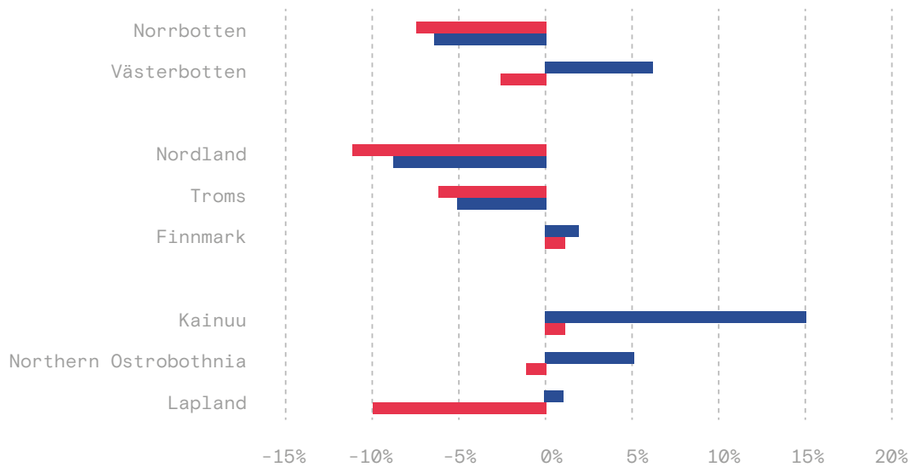



Figure 4

## Subscription price per month, minimum 100 Mbps, lowest price offer in EUR

2017

Figure 4 demonstrates that subscription prices for fixed broadband with at least 100 Mbps second are differ widely among the BIN countries. Norway has the highest price and Russia has the lowest. Prices in Sweden and Finland fall in between. Unfortunately, we could not find detailed statistics for the Norwegian and Swedish BIN regions. However, according to the experts, there is no significant difference between regions within the countries. In addition to the subscription price, users often have to pay an opening fee (not shown in the figure). The average level of the opening fee differs greatly between the countries. While in Norway the opening fee is around 564 EUR, in Sweden and in Finland, it is about 1,750 EUR. This means that for first-time users of high speed broadband (100 Mbps is available on fibre lines), the total cost in Norway is lower than in Sweden and Finland if considering a two-year plan. The opening fee in Russia can be up to 500 EUR if there is no fibre cable connected to a house. However, there is a connection to most of blocks, and if there is none people normally do not go for it but opt for a wireless connection plan.

*Data sources: Finnish Communications Regulatory Authority, Swedish Post and Telecom Authority, Internet providers.*

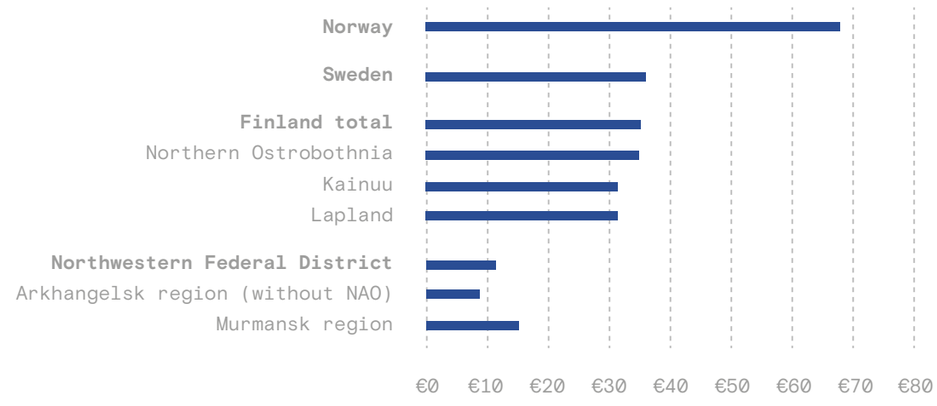


Figure 5


## Affordability of fixed broadband by speed: annual subscription price as % of annual net income

Figure 5 shows affordability of fixed broadband as percentage of annual net income. Broadband of 100mbps is most affordable in Finland, and amounting to 1.9 % of annual net income, followed by Sweden (2%). The most expensive high-speed broadband is in Norway, 3% of annual net income. Affordability of 30 Mbps broadband was under 2% in all BIN regions and their corresponding countries. The greatest affordability disparities are in the Murmansk region.

*Data sources: Finnish Communications Regulatory Authority, Swedish Post and Telecom Authority, Internet providers, Statistics offices in Norway, Sweden, Finland, Russia.*

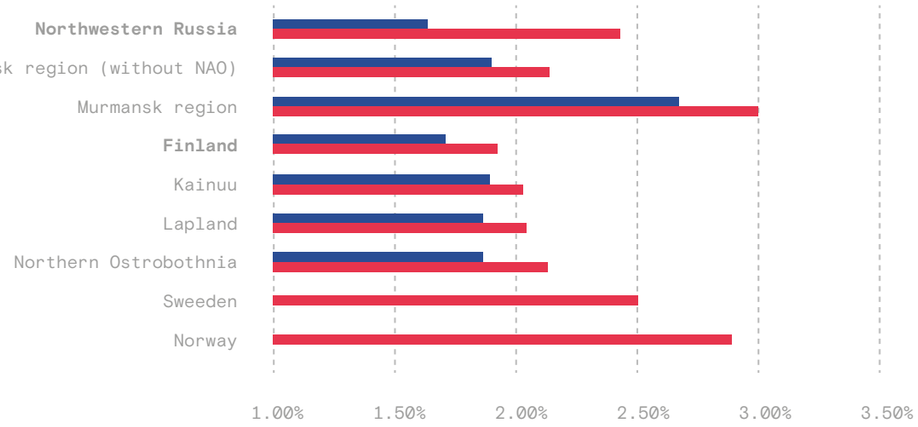
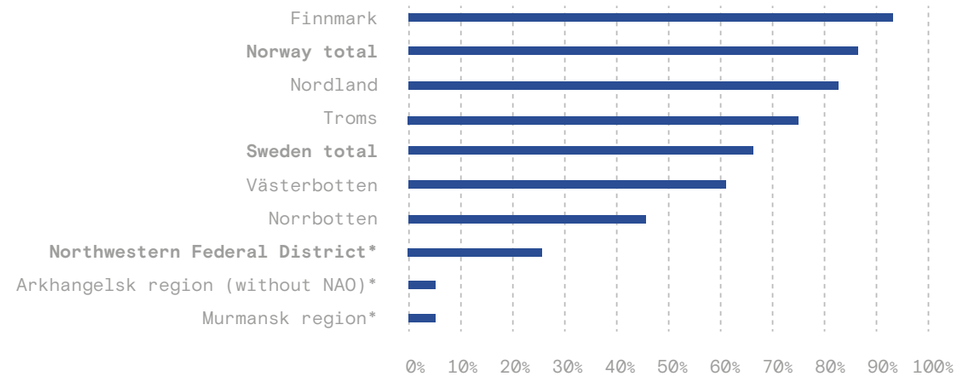





Figure 6

## 4G area coverage in the BIN regions, % of own territories

Russian BIN regions year 2017, Nordic BIN regions year 2016

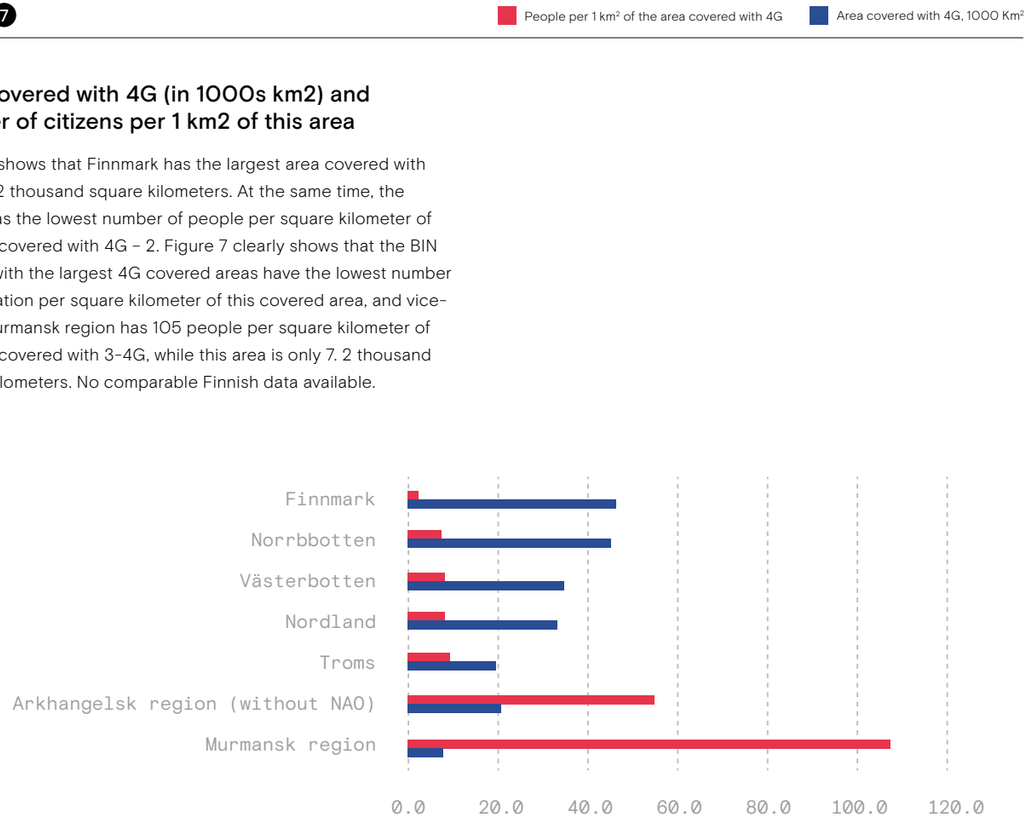



*3-4G coverage for Russian regions

## Mobile broadband in the BIN area

The estimated share of the population with access to mobile data based on 4G (all mobile networks, outdoor coverage) is close to 100% in all BIN regions in Norway, Sweden and Finland. In the Russian BIN regions of Murmansk, Arkhangelsk and Northwestern District in Russia as a whole most households are covered with 3G and some have 4G. While population coverage with mobile broadband is nearly complete, the area coverage in the BIN regions is much less (Figure 6). The northern territories of Norway, Sweden, Finland are much less covered with 2G, 3G, 4G than the southern parts of these countries. The situation on the Russian side is even more dramatic – most of the Northwestern Federal District Territory remains uncovered. On the Nordic side, most of the territory covered has 4G and a secure 3G back-up. In Russia most of the territory covered has 2-3G, while 4G is available only in more densely populated places. Mobile networks are developed first in populated areas (see Figure 7). The higher percentage of  territory covered - the more dispersed the population in the region is and vice versa. Finnmark in northern Norway has the largest share of own territory covered with 4G - 93%. In general, regions in Norway have a higher share of own territory covered than do Swedish regions. The Russian regions have the lowest share. No comparable Finnish data available

Figure 7




## Area covered with 4G (in 1000s km2) and number of citizens per 1 km2 of this area

Figure 7 shows that Finnmark has the largest area covered with 4G – 45.2 thousand square kilometers. At the same time, the region has the lowest number of people per square kilometer of the area covered with 4G – 2. Figure 7 clearly shows that the BIN regions with the largest 4G covered areas have the lowest number of population per square kilometer of this covered area, and vice-versa. Murmansk region has 105 people per square kilometer of the area covered with 3-4G, while this area is only 7. 2 thousand square kilometers. No comparable Finnish data available.

## International subsea fibre initiatives in the Arctic

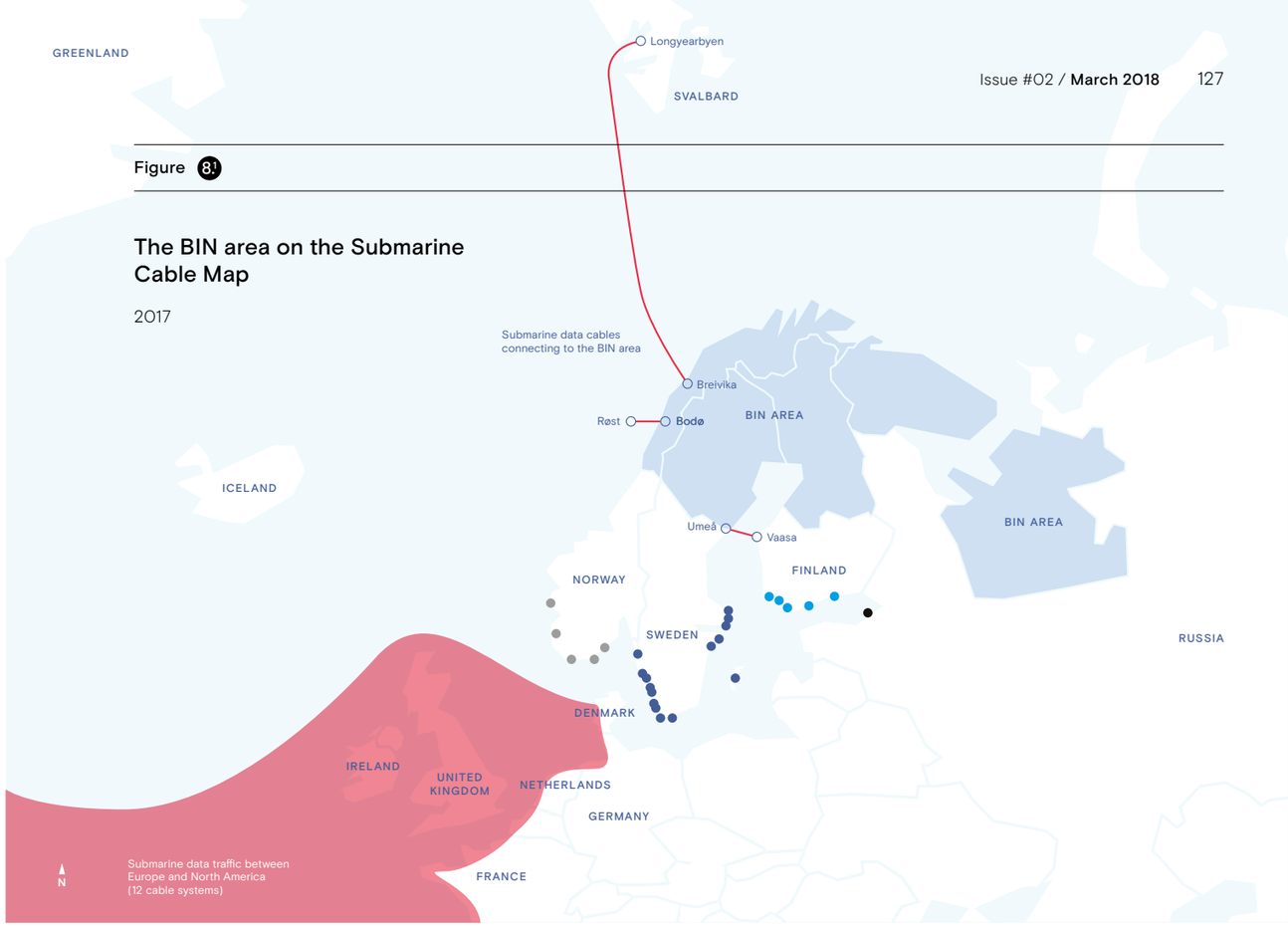
The needs of modern internet users require fast internet with low latency, meaning short delays in data transmissions. The driving factors behind the need for higher bandwidth are among others increasing cloud driven traffic, IoT developments, Industry 4.0[6], autonomous vehicles, emergence of 5G technology which offers data transfer up to 150 times faster than the current 4G networks. Subsea fibre cables carry close to 100% of transoceanic voice and data communication.



Figure 8.1

## The BIN area on the Submarine Cable Map

2017




*Source: https://www.submarinecablemap.com/ The Submarine Cable Map is a free and regularly updated resource from TeleGeography.*

**Landing points to submarine cable to Europe**

- Norway
- Sweden
- Finland
- Russia

Figure 8.1 shows that on the global scale the BIN area has no direct international subsea fibre cables connecting it to the USA or Asia. The lines on the map show the routes of the cables and territories they connect. As of early 2017, there are approximately 428 submarine cables in service around the world[7]. The total number of cables is constantly changing as new cables enter service and older cables are decommissioned. Historically, these cables were built as commercial projects financed by private enterprises rather than governments. Most of long-distance subsea cables have landing points in Sweden. The BIN area has no direct subsea cables to the USA or Asia; the existing cables are connected to the southern parts of Nordic capital cities. Major subsea cables that connect Finland, Sweden and Norway with the rest of the world have interconnects in continental Europe, which introduces latency into data traffic.

[6] Industry 4.0 is the comprehensive transformation of the whole sphere of industrial production through the merging of digital technology and the internet with conventional industry (EU definition)

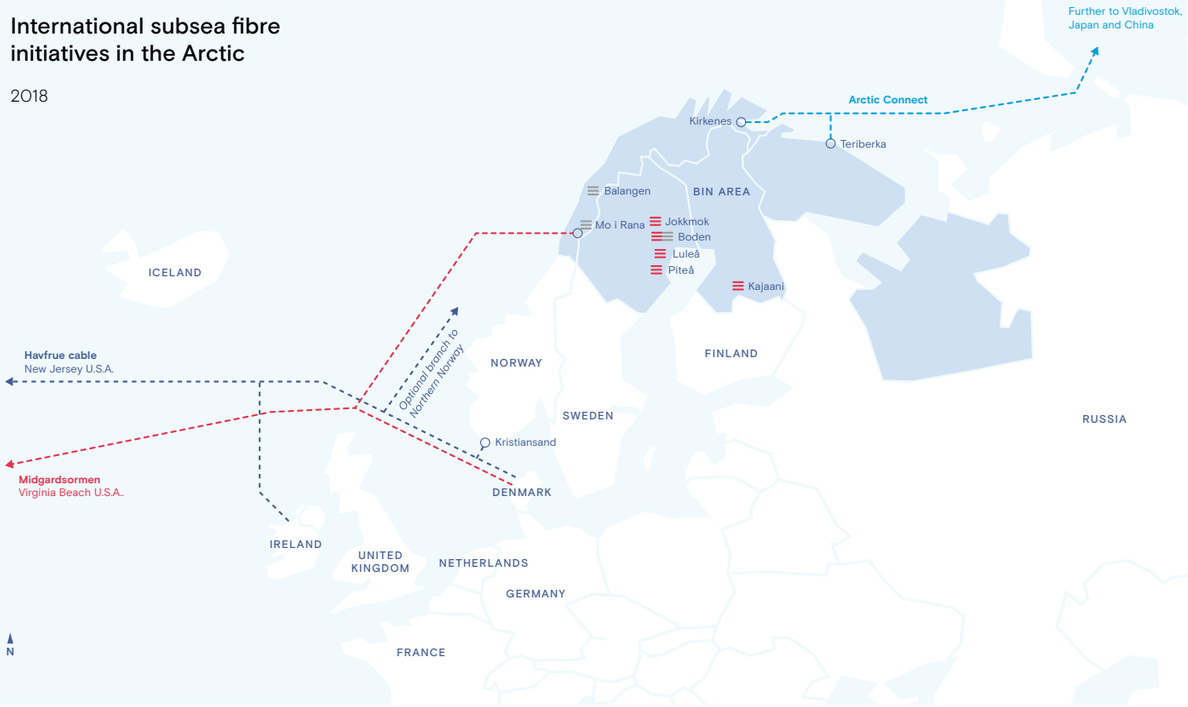
[7] TeleGeography

[8] The University of Oulu has a 5G Test Network https://5gtn.fi/

Figure 8.2

## International subsea fibre initiatives in the Arctic

2018




*Source: https://www.submarinecablemap.com/ The Submarine Cable Map is a free and regularly updated resource from TeleGeography.*

**Data centers**

Active

Sweden: Piteå, Jokkmok, Luleå, Boden

Finland: Kajaani

Planned

Norway: Mo i Rana, Balangen

Sweden: Boden

The opening of the Arctic sea and operational Northern Sea Route create preconditions for northern subsea cables (see Figure 8.2). The growing business potential of the Arctic requires new subsea cable solutions to improve Arctic connectivity with the rest of the world. In the BIN area, the need for fast connectivity is driven especially by:

- Interest in the BIN area as an attractive place for opening data centres (see datacenters on the map)[10] running on low cost green energy, benefitting from cold climate and taxation incentives
- Offshore wind industry
- Mining
- Oil and gas industries
- Increased demands of local businesses in cloud computing services
- Tourism and transport industry connectivity needs
- BIN area being a frontrunner in 5G research [8]

In our analysis we investigate three BIN area related subsea cable initiatives originating in different countries and at different stages of completion. Attention is paid to how projects are organized and their sources of investment. As a benchmark we investigate two reference projects with potential impact on the BIN area. The main development and success drivers are identified.



## BIN area subsea fibre cable projects

**Arctic Connect** is a cooperative opportunity for PolarNet and Cinia Group Oy to relaunch Polar Net's Russian Optic Trans Arctic Submarine Cable System (Arctic Connect). The Russian Optical Trans-Arctic Submarine Cable System ("R.O.T.A.C.S.") is a Russian-led project that began in the year 2000 and was developed by PolarNet.

**Midgårdsormen** Norwegian-led project seeking to design, build and operate a Norway-centric transatlantic 7,500 kilometre cable system to connect Norway and Sweden to the East Coast of the United States. Specifically, Midgårdsormen proposes to connect Virginia Beach, Virginia to Blaabjerget, Denmark, with a possible connection to Mo i Rana, Norway.

**NXTVN´S Oulu Nordic Express Europe** proposes a cross-border, Nordic-centric, Gulf of Bothnia bridge connecting cities in the Nordic regions of Finland and Sweden to Norway with onward connections to mainland Europe via submarine and terrestrial networks. NXTVN specializes in Data Center Parks solutions.

| Project name | Initiated by | Technology | Vol. of Investments | Source of investments | Expected completion date |
|---|---|---|---|---|---|
| Arctic Connect | Russia and Finland | A capacity of 100 Gbit/s. 6-8 fibrer pairs with PFE[9] station and off-shore branching units | Development costs $6mil, and total cost of the project is estimated to be around $700 mi | Equity – debt ratio is expected to be 50/50 percent; EIB, Asian Infrastructure Funds, private investors | Development phase 2017-2018/2019 Implementation phase 2019-2020 |
| Midgårdsormen | Norway | 6 or 8 fibre pairs | Total costs estimated at = 2,5 bill NOK ($322 mil) | Equity – debt ratio is expected to be 60/40 percent | Passed market analysis and vendor negotiations phases in 2017. Status: The project is on hold due to competing Havfrue Cable System that announced its plans in January 2018 |
| NXTVN´S Oulu Nordic Express | Finland, NxtVn HQ is in Amsterdam | Subsea cable project at concept phase | Approximately $80 million dollars (depending upon the number of landings) | N/A | Acquired 31,000 square metres of ready-to-use buildings in Halli (Finland) for a data centre facility |

9. PFE-power feeding equipment

10. There are datacenter initiatives at initial stage in North-West Russia that are not displayed on the map

## Reference subsea fibre cable initiatives

For reference, we use two projects that are in the operational stage and that are likely to affect connectivity in the BIN area.

**Quintillion** brings high-speed Internet access to the North American Arctic through subsea cable. Quintillion is a private operator that contracts to sell capacity on a wholesale basis on its network.

**Havfrue** subsea cable will run through the North Atlantic connecting mainland Northern Europe to the USA. Optional branch extensions to northern and southern Norway are also included in the design. The first new transatlantic cable in almost two decades.

| Project name | Initiated by | Technology | Vol. of Investments | Source of investments | Expected completion date |
|---|---|---|---|---|---|
| Quintillion | USA, HQ in Anchorage | 9,500 - 9,700 miles subsea and terrestrial fibre optic network (1,400 mile segment completed 2017) | Not disclosed Estimates for predecessor Arctic Fiber $620 million in 2013 | 100% private investment, funded by U.S. private investment firm Cooper Investment Partners | Phase I (Alaska) completed 2017 Phase II Asia Phase III Canada - U.K |
| Havfrue | Consortium partners (US, Norway, Ireland) | a cross-sectional cable capacity of 108Tbps | N/A | Consortium of owner/operators including Aqua Comms, Bulk Infrastructure, Facebook, Google and others | Route survey operations for the system have begun and system ready-for-service (RFS) is expected in Q4 2019 |

## The analysis served to identify the following success drivers of subsea cable projects:

- Secured finances
- Strong consortia
- Growing role of OTT players (over-the-top), e.g. Facebook, Google and Amazon as initiators of subsea cable investments



# Challenges and findings

**Recommendations**

Overall, connectivity of the BIN area should be addressed at the government level, including the interests of different stakeholders such as communities, businesses and academia.

**For Policy**

- **A** Providing all households with access to internet with speeds over 30 Mbps per second by 2020
- **B** Improving mobile broadband availability in the BIN area
- **C** Decreasing discrepancies in broadband affordability in the Russian BIN regions
- **D** Addressing the needs for increased connectivity by means of subsea cables connecting the BIN area with the USA and Asia
- **E** Addressing the needs for increased connectivity using the mix of technologies including satellite solutions

Business Index North (BIN) is a project that contributes to sustainable development and value creation in the Arctic. The overall goal is to set up a recurring,?? knowledge-based, systematic information tool for stakeholders. This is the second issue of the “Business Index North” analytical report that focuses on the BIN area, including ten northern regions of Norway (Finnmark, Troms, Nordland), Sweden (Norrbotten and Västerbotten), Finland (Lapland, Northern Ostrobothnia and Kainuu), and North-West Russia (Murmansk Region and Arkhangelsk Region without the Nenets Autonomous Okrug). For the third issue of the report we would like to include more territories of the Russian High North, as well as Alaska and the Northern territories of Canada.

The main implementing partner is the High North Center for Business and Governance at Nord University Business School. Nordland County Council and The Norwegian Ministry of Foreign Affairs provide basic funding for the BIN project.

***www.businessindexnorth.com***

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KunnskapsParken Bodø

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