**Issue #03**—June 2019

# BUSINESS INDEX NORTH

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

**People**
Provides analysis on demographic and human capital trends in the region

**Business**
Gives an overview of business activity and perspective of value creation

**Development conditions**
Focuses on key issues of Connectivity, R&D in business and Electricity production

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**Cover Image**
Treehotel in Harads, Norrbotten
Photo: Treehotel

# 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 third "Business Index North" periodic analytical report focusing on socio-economic developments in eleven 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 correspond to the NUTS3 classification of territorial units introduced by the European Union. Hereafter in our report, we use the English names of these regions without the word "region" from each of the languages involved (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 Oblast |
| Russia | Arkhangelsk Oblast'[1] | Arkhangelsk Oblast (without NAO) |
| Russia | Nenets Autonomous District | Nenets |

These 11 regions are referred to collectively as the "BIN area" (see figure below). Our definition of the BIN area correlates with the EU concept of a macro-region[2]. The BIN area runs across national borders, has common characteristics and faces common challenges. The BIN area can be viewed as a strategic layer across countries for purposes of future development and cooperation.

[1] In this report, Arkhangelsk Oblast' (Region) excludes the Nenets Autonomous District (NAO). Although the NAO is an administrative part of Arkhangelsk Region, in statistics these are normally considered as distinct subjects of analysis. NAO data are presented separately when available.

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



BIN area


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 readily comparable to the adjacent Nordic countries and their northern regions. At the same time, the 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, and also of 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, business, development conditions. The last-named includes the topics: connectivity, R&D in business, renewable energy. Businesses can refer to this report 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 to 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.

# Executive summary

The BIN area consists of the northern regions of Finland, Sweden, Norway, and North-West Russia. This area holds unique business opportunities building on natural resources, transportation, and unique business and service offerings associated with northern lifestyle and the North. Activities directly connected to the extraction, refining, energy transforming and harvesting of natural resources account for 54% of all turnover in the BIN area. Trade, shopping, culture, and tourism account for 29.5% of the turnover and services for businesses and people make up 16.2 percent. In 2017 the BIN economy achieved a turnover of 94 billion Euro, including the Russian Nenets Autonomous Okrug, Arkhangelsk and Murmansk Oblast. Improved business cycles in recent years have helped companies in the north to grow more than the national economy in all regions except Lapland in Finland during the last three years. High growth rates of 5.4 percent annually for the last three years are well above the average growth of 2.9 percent on the national level for the BIN countries (for Russia comparison base is the North West Federal District).

Business opportunities in the BIN area are associated with high economic growth rates, increased demand for natural resource-based goods, renewable energy, increased tourism, and new high-tech and data storage companies. Efficient supply of capital, sustainable investment protocols, and more knowledge about opportunities in the north are needed in order to attract more investment and create more jobs in the BIN area.

The Nordic part of BIN, being above national levels of operational profit, is proof of its attractiveness to investors. Norwegian aquaculture, Swedish and Finnish mining companies currently yield the highest profit margin across the BIN area. However, the Russian BIN regions are experiencing low or negative growth in turnover (measured in Euro); the Murmansk Oblast together with Nenets is the hardest hit. Increased manufacturing activity reduces negative impacts for the Arkhangelsk Oblast.

The BIN area is characterized by well-developed digital infrastructures (the Nordic part), surplus of renewable energy, many highly innovative companies and increasing maritime traffic and international transportation along the Euro-Arctic coast. Taking the next leap in development from natural resource dependency towards a knowledge economy requires progressive measures to attract people and investments in research and development in the business sector.

## Business opportunities with high economic growth rates

- Business is booming across the BIN area, reaching a turnover of about 100billion Euro including the Russian BIN regions (86.5 billion Euro in the Scandinavian BIN area). Average annual turnover growth in the Nordic BIN area has been 5.4 percent annually for the last three years, which is well above the 2.9 % found in the national economies (including limited and stock exchange traded companies, excluding bank, finance, oil and gas companies).
- Russian BIN regions experienced negative annual turnover growth of about 1% during the 3 recent years
- Aquaculture and information and communication businesses have very high growth rates.
- Positive business cycles stimulate intense activity in traditional manufacturing and construction industries, whereas data storage and renewable energy production are emerging as important growth providers.
- Profits surpass national levels in all BIN regions in the Nordic countries except for Lapland. Most successful are the Norwegian BIN regions of Nordland, Troms and Finnmark, followed by Finland's North Ostrobothnia.
- Gross value added including public services reached 73 billion Euro in 2016 and of this, 60 billion gross value was added in the Nordic BIN areas.
- Positive signals of increased wealth can be derived from GVA (gross value added) growth in the Scandinavian BIN regions at 11 percent annually over the last three years compared to 9 percent at the national level.

## Demographics - a concern in the BIN area

- People are key in developing and sustaining the region
- BIN underperforms in attracting people in all regions and over time.
- BIN area has 99,593 fewer people than 10 years ago, the population decrease occurred predominantly in the Russian regions
- Decrease young population (0-19 year-olds) is the most worrying sign. The BIN area's population of 0-19-year-olds has decreased by 25,658 people since 2008
- Women are highly educated (35% of BIN population), men underperform in tertiary education attainment in the BIN area by 11 percentage points compared to women
- In the BIN area women on average hold more professional jobs (25%) than men (15%) of all people employed, which mirrors country averages
- In the BIN area, in spite of being highly educated (46% of all employees with tertiary education), a mere 4% of all employed women are in managerial occupations compared to 7% of all men

## Connectivity is improving; data center activity on the rise

- Digital infrastructure in the BIN area is good for supporting the needs of households
- On average, 75% of households in the BIN area have access to high speed broadband access of 100Mbs and higher
- Fiber optic access is available to 58% of households in the BIN area
- Sweden is leading in providing very high-speed broadband via fiber access to 82% of households in the High North regions, far higher access than in the other BIN areas

- Digital infrastructure accessibility for business users in Sweden and Norway is on average 10 percentage points lower than for households. One can expect a similar accessibility difference in Finland
- Data center activity is on the rise in the north
- Physical digital infrastructure and countries' national support for such activity are among crucial factors and lack of transcontinental fiber cables limits growth speed

## Low level R&D investments in the business sector limits further development

- All BIN regions except North Ostrobothnia have a far lower level of R&D activity in the business sector than their countries on average
- R&D cannot be on such a low level without having a negative impact on value creation
- Low R&D activity in business results in dependence on natural resources and means of production physically located in the regions
- BIN regions tend to remain a natural resource base for knowledge economy growth in the BIN countries

## Increasing electricity surplus based on renewable energy

- The electricity balance in the BIN area is characterized by an electricity surplus, and the BIN area combined accounts for one fifth of the total energy production in the countries. This situation is expected to continue.
- 85% of all electricity produced in the Nordic BIN regions originates from renewable energy sources
- Electricity production has increased in the BIN area (excl. Russia) by 16% from 61.7 TWh to 71.8 TWh from 2014 to 2017
- Electricity surplus has increased in the BIN area by 42% from 21.6 TWh to 30.7 TWh from 2014 to 2017
- The BIN area is a very attractive area for establishing new power-intensive industries, i.e. data processing centers and battery production. There has been growth in both electricity consumption and production in recent years.

# *How to use this report*

This report describes and analyzes many dimensions of socio-economic development in the BIN area in a comparative perspective. While the present situation in the BIN area is highlighted in terms of comparable indicators and graphic representations, the development trends are presented in terms of indices. Index numbers are a statistician's way of expressing the difference between two measurements by designating one number as the base, giving it a value of 100 and then expressing the second number as a percentage of the first. Indices enable us to compare trends across different indicators over a period of time[3]. We use the following layers of data analysis to ensure that the data and interpretations are linked to the context:

- 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 the index for its corresponding country[4]

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, and businesses briefly and concisely.

Please visit www.businessindexnorth.com for an electronic version of the present report and other reports.

On the web-site you will find practical data visualization tools to make your own figures and graphs based on the data obtained on the project Business Index North.

[3] The indices are constructed using data gathered from national statistical bureaus and other publicly available sources.
[4] The Russian BIN regions are compared to the averages for the North-West Federal District of Russia.



**Contents**

# People in the North

People who live in the North matter. People are key in developing and sustaining the region.

Moholmen, Mo i Rana
Photo: CH /Helgeland Reiseliv /Rana

In this chapter we study three main indicators concerning people in the North, focusing specifically on demographic trends, education and equality of opportunity.

We ask the following questions:
In this chapter we address the following questions:

- Do we have enough people to sustain the future development of the BIN area?
- Are people in the North educated to meet future challenges?
- Is development inclusive?

In addressing demographic trends, we look at the changes in total population over the last ten years from 2008-2017, including changes in the age distribution of children and young people (age groups 0-4 and 5-19 years) and young adults (age group 20-39 years). To study human development, we make use of indicators of tertiary education attainment. We compare tertiary education attainment among population and among employees by providing distributions of these indicators for both sexes. In order to assess whether development is inclusive we analyse occupational groups most likely to require tertiary education to do job. We analyse groups of professionals, technicians, associated professionals and armed forces and managers. By comparing statistics for male and female employees we scrutinise equality of opportunity.

## Main findings

- In attracting people the BIN area underperforms compared to each country overall in Finland, Sweden, Norway and North-West Russia
- In 2017 the BIN area has 99, 593 fewer people than 10 years ago; the population decreased predominantly in the Russian regions
- The decrease in those under 19 is the most worrying sign, amounting in the BIN area to 25,658 young people since 2008
- Women are highly educated; 35% have tertiary education attainment while men underperform in tertiary education attainment in the BIN area by 11 percentage points
- In the BIN area women (25%) on average work in professional jobs more often than men (15%) of all those employed, similar to country averages
- Results demonstrate weak opportunities for females to occupy managerial positions in the BIN area

**Figure 1.1 — Change in total population in the BIN area, %, 2008–2017**

All BIN regions, (except North Ostrobothnia) lag behind their corresponding country's average population growth. The most negative growth to be seen in Murmansk (-7.7%) and Arkhangelsk Oblast(-6.5%) in Russia and in Kainuu (-7.2%) in Finland. Negative population growth in Murmansk and Arkhangelsk Oblast is caused by low fertility rates and outmigration. The Nenets Autonomous Okrug had a population growth of 5.1% from 41,857 people to 43,997 people in 2017. This growth can be partially attributed to the Prirazlomnoye oil field development. However these statistics do not fully capture the flying-in and out workforce employed in the development projects.

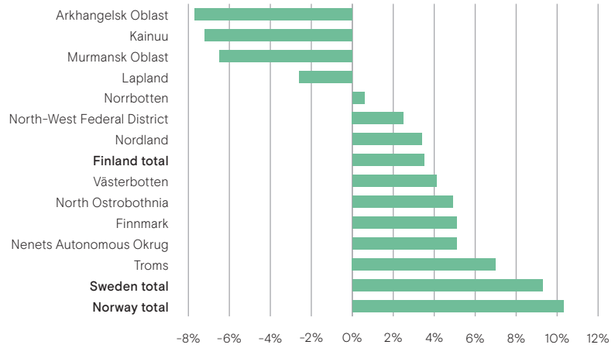



**Figure 1.2 — Change in population in the BIN area in absolute numbers, 2008–2017**

In absolute numbers, in 2017 there were 99,593 fewer people living in the BIN area than in 2008. North Ostrobothnia has the biggest increase in its population, amounting to 19,204 people, which is explained by the growing city of Oulu. The biggest losses occurred in Murmansk and Arkhangelsk Oblast, at the same time the Nenets Autonomous Okrug had a positive growth with 2,140 more people living there in 2017 than ten years earlier. Population increase in the Nenets Autonomous Okrug can be explained by a growing need for human resources in oil development projects in the region and by natural population growth since fertility in the region is high.

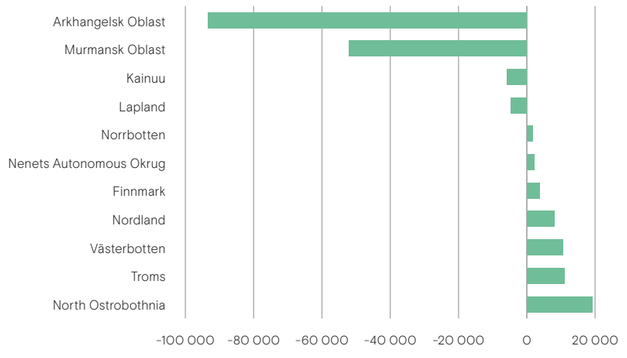
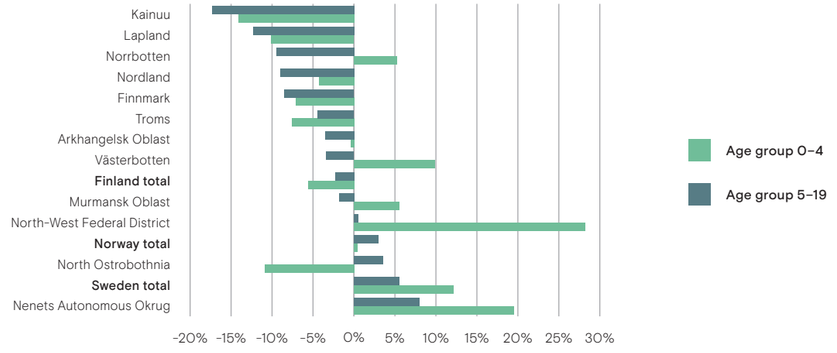





**Figure 1.3 — Change in BIN area population age groups 0–4 and 5–19, %, 2008–2017**




We look separately at age groups 0-4 and 5-19. We observe different patterns in 0-4-year-olds and 5-19-year-olds. The Finnish regions of Kainuu and Lapland had negative growth in both of these age groups, reflecting an ageing population structure in these regions and a lack of migration of young adults who would establish families and contribute to the growth of young population. A similar pattern is to be observed in Norwegian counties Nordland, Finnmark and Troms. North Ostrobothnia is an attractive place for students, hence and increase in the age group 5-19, but still demonstrating negative growth in the age group 0-4. Swedish Västerbotten and Norrbotten present an interesting case due to the attractiveness of the regions for young families, both regions exhibiting positive growth in age group 0-4 years. Russia provides an example of state-led measures to boost population growth by adopting a programme of maternity (family) benefit to support Russian families having or adopting a second or a third child or more in the period 2007-2021. It is hard to isolate the direct impact of family capital from other factors. We observe a significant increase in the population of 0-4-year-olds in the Northwestern Federal District where population aged 0-4 years increased by 184, 570. Similarly, we observe a growth in population aged 0-4 years in the Nenets Autonomous Okrug in the range of 20% for the last 10 years, while in Murmansk the growth is rather moderate, being in the range of 5% with no effect in Arkhangelsk Oblast. These results demonstrate that the state-led measures alone do not suffice to increasing the share of young population. We need to evaluate the attractiveness of the place in the light of opportunities offered, such as jobs for both males and females and opportunities for education and professional growth, coupled with the state of the housing market and families' disposable income.

**Figure 1.4 — Change in population aged 20–39 in the BIN area, %, 2008–2017**

Growth in young adult population (aged 20–39) is below country average in all BIN regions. Of the Norwegian regions Nordland shows a high rate of population growth, followed by Troms. Job availability, professional growth and quality education opportunities are the drivers that influence the attractiveness of the region for 20–39-year-olds. Västerbotten achieved the best average performance in the last 10 years reflected in an increase in population aged 20-39 years of 11%, which is still below the national s average for Sweden of 14%. The Russian BIN regions and Kainuu in Finland experience difficulties in attracting and retaining young adults most likely to contribute to regional development.

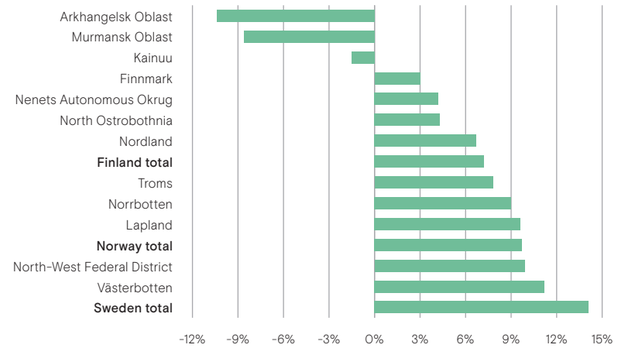


**Figure 1.5 — Tertiary education attainment among population, by sex, 2017**

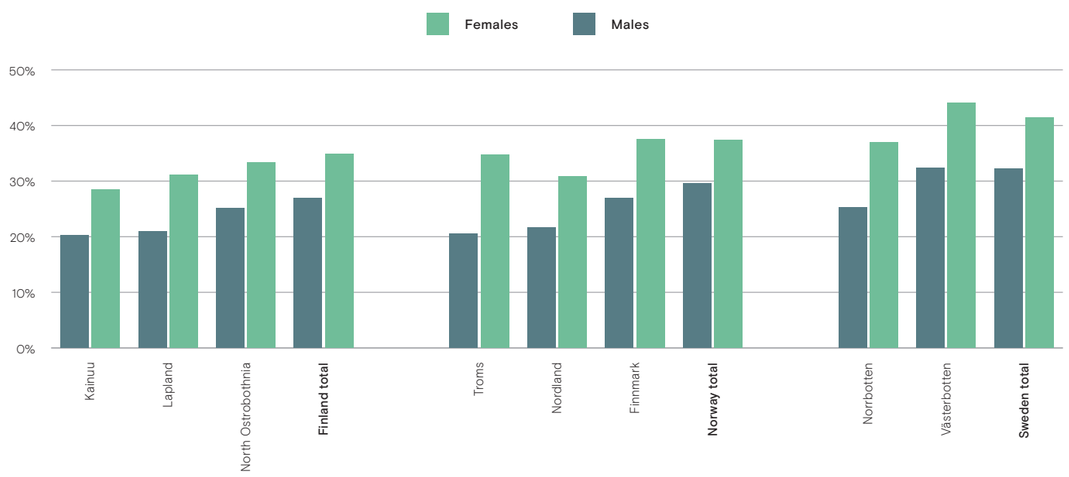



Figure 1.5 demonstrates the existence of a persistent tertiary education attainment gap in the BIN area. On average 35% of women living in the BIN area have tertiary education, while for males the corresponding number is 24%. The gap in tertiary education attainment is widening. In 2016 it stood at 10 percentage points between males and females, in 2017 it reached 11 percentage points. There are cross-regional differences, but overall the tertiary education gap brings challenges for the wellbeing of the region, and also affects the health and life expectancy of residents.

**Figure 1.6 — Tertiary education attainment among employees, by sex, 2017**

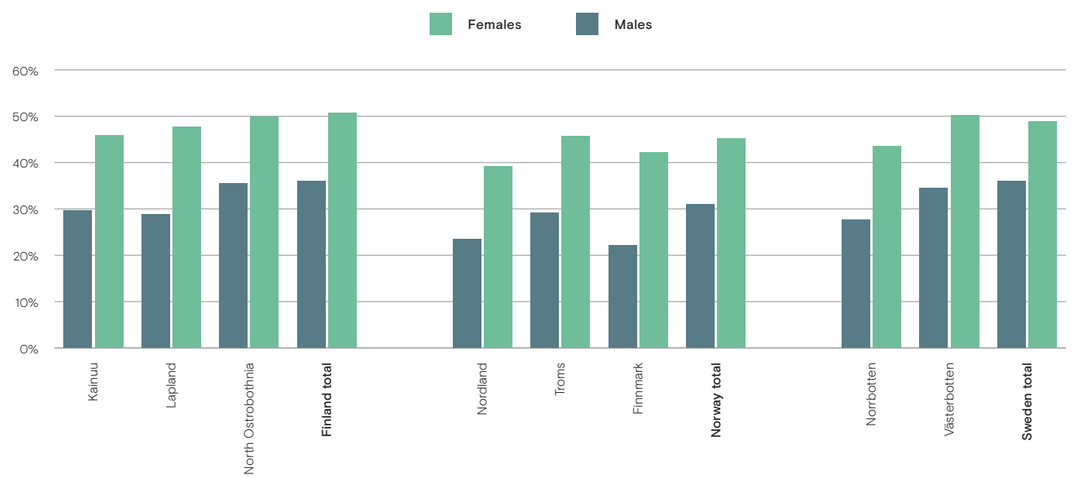



Figure 1.6 shows tertiary educational attainment amongst employees. On average 46% of employed women in the BIN area have a tertiary education qualification (the total for Finland, Sweden and Norway is 48%). On average only 29% of males in the BIN area have tertiary education (the total for Finland, Sweden and Norway is 34%). Hence the education gap between BIN area employed women and men amounts to 17 percentage points. We observe a greater concentration of highly educated women who work in the north; for each male with tertiary education there are 1.6 females, while on the country level (total for Sweden, Norway and Finland) this ratio is 1.4 females per male.

**Figure 1.7 – Tertiary education amongst employees by field of degree, by sex, 2017**

Figure 1.7 allows us to evaluate the set of skills available in the BIN region. These numbers indicate tertiary education by field of degree among employees without taking into consideration in what position or what industry the person works. Employees have the lowest percentage of tertiary education in services, agriculture, forestry and fisheries. Employees have a decidedly low percentage of degrees in natural sciences, vocational and technical subjects, which is especially apparent among BIN area male population (26%), which therefore lags 9 percentage points behind the country averages.

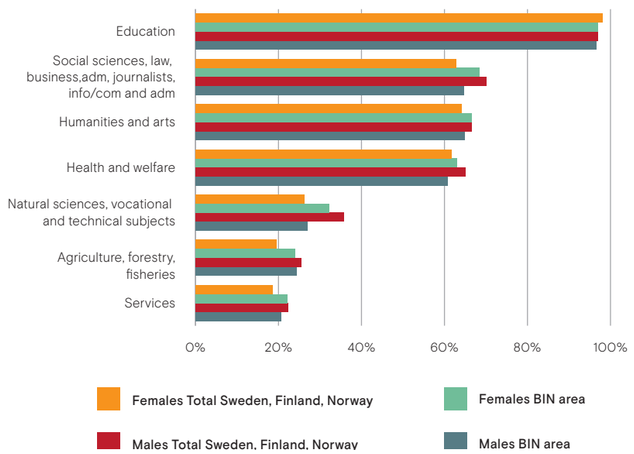


Figure 1.8 — Employees by occupation, %, 2016

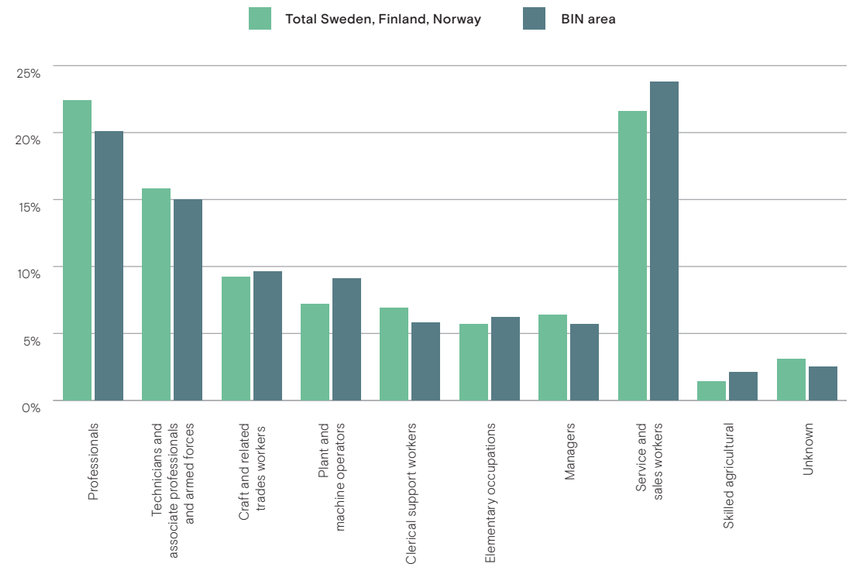



Figure 8 illustrates the distribution of employees by occupation[1]. Service and sales workers represent 24% of all occupations in the BIN area, which is two percentage points higher than in Finland, Sweden and Norway overall. Strong tourism, accommodation and related industries such as catering are a potentially explanatory factor. Professionals (20%), technicians, associate professionals and armed forces (15%) constitute the second and third most numerous occupations in the BIN area. The BIN area slightly outperforms Finland, Sweden and Norway overall in plant and machine operators' occupations (9% vs. 7%), which is due to the big share of manufacturing in the industry structure. Similarly, skilled agricultural occupations account for 2.1% of all employed vs. 1.4% in each of Finland, Sweden and Norway. In the next three graphs, we analyse three occupations that would mostly likely require completed tertiary education.

[1] Data: Labour Surveys in Finland, Sweden and Norway. Classification of Occupations 2010 (ISCO-08)

[2] Occupation refers to the kind of tasks performed and is defined as a "set of jobs whose main tasks and duties are characterized by a high degree of similarity". International Standard Classification of Occupations (ISCO-08)





Figure 1.9 — Professionals, % of employees, by sex, 2016

Occupational classifications group people on the basis of the jobs and tasks performed. People in professional occupations would generally have ISCO skill level 4, which involves performance of tasks requiring complex problem-solving, decision-making skills and creativity based on an extensive body of theoretical and factual knowledge in a specialized field. This means studying at a higher educational institution for 3-6 years corresponding to completion of tertiary education. The types of work performed by professionals include: conducting analyses and research in the natural sciences and mathematics, social sciences and humanities; a number of specialist roles in medical and health services; teaching in one or more disciplines at different educational levels; providing various business, legal and social services; creating and performing works of art, etc. The types of jobs professionals carry out include: science and engineering; tasks in healthcare (including those of medical doctors and nurses); teaching; business and administration, legal, social and cultural work. Females dominate in professional occupations both in the BIN area (25%) and of Sweden, Finland and Norway as a whole (27%). The percentage of males in professional occupations varies across regions, but on average reaches 15% in the BIN area and 18% in Finland, Sweden and Norway as a whole. The findings correspond to the educational attainment statistics among employees, where females have more tertiary education and hence are more likely to engage in professional occupations.

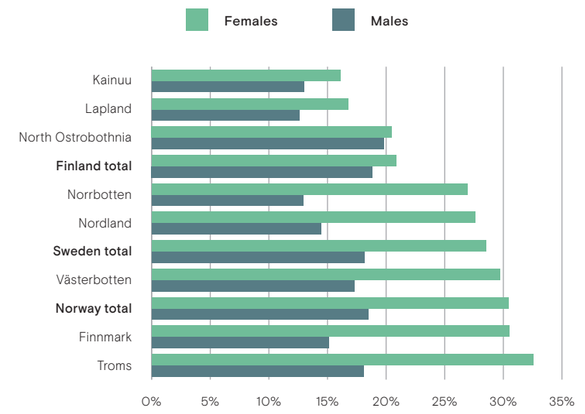



Figure 1.10 — Technicians, associate professionals and armed forces, % of employees, by sex, 2016

Figure 1.10 illustrates the distribution of technicians, associate professionals and armed forces occupations by sex in the BIN area. Technicians and associate professionals perform technical and related tasks connected with research and the application of scientific concepts and operational methods and government or business regulation. These occupations require skills at ISCO skill level 3 corresponding to the first stage of tertiary education. Occupations in this major group include the following subgroups science and engineering associate professionals, health associate professionals, business and administration associate professionals, legal, social, cultural and related associate professionals and Information and communications technicians. In the available statistics technicians and associate professionals are reported together with the armed forces. Armed forces is a heterogenous group since it includes occupations requiring skills starting from elementary education to advanced research degrees. In the BIN area the Finnish regions have on average 22% of females working as technicians, associate professionals and in armed forces occupations vs. 15% of males In the Norwegian and Swedish BIN regions the situation is the opposite, more males (16%) are working as technicians, associate professionals and in armed forces occupations than females (10%). The differences between countries in the BIN area regions may be due to the share of armed forces in these regions, which entail male-dominated occupations.

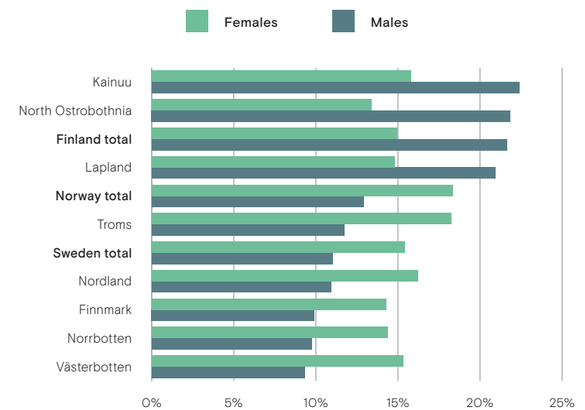


Figure 1.11 — Managers, % of employees, by sex, 2016

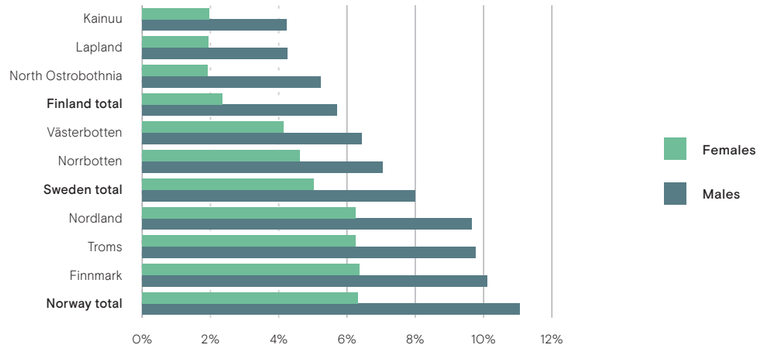



Figure 1.11 shows the proportion of managers by sex. Managers[3] plan, direct and regulate the activities of various types of organizations and review organizational policies, laws, rules and regulations. Managerial occupations include those of chief official officers, senior officials and legislators; administrative and commercial managers; production and specialized services managers; hospitality, retail and other services managers. These occupations require skills level corresponding to ISCO skill levels 3 and 4 (short and long tertiary education attainment). We observe that females are largely underrepresented in managerial occupations both in the BIN area (4%) and Sweden, Norway and Finland (5%) as a whole when compared to males (7% in the BIN area and 8% on average in Sweden, Norway and Finland as a whole). These results are indicative of inferior opportunities for females in the BIN area to occupy managerial positions; in spite of being highly educated (46% of all employees with tertiary education) women on average occupy just 4% of managerial positions.

[3] ISCO-8





# *Answers to questions*

## Do we have enough people to sustain development of the region in future?

Demographic trends show that the BIN area underperforms in attracting people. Population ageing in the region, coupled with negative trends in the share of children and young people in the population will in the future constitute a potential risk to the social sustainability of the European Arctic Region.

**How to address this challenge**

- Enhancing the attractiveness of the region for starting a family
- Providing quality daycare
- Providing career and work opportunities for both men and women
- Designing migration policies adapted for the needs of the North

## Are people in the North educated to meet future challenges?

The female population, especially employees, performs very well in tertiary education attainment and even outperforms certain country averages. The male population lags behind females in tertiary education attainment by 11 percentage points for the whole population and by 17 percentage points among employees. The sectoral changes linked to advances in automation and digitalization will create new demand for a number of typically high-skilled workers such as legal, social and cultural professionals, business and administration professionals, hospitality, retail and other services managers. Some medium and low-skilled occupations, such as customer services clerks and cleaners and helpers will also benefit from these sectoral shifts. It is expected that low-skilled occupations related to the primary production sector and utilities and manufacturing, like those of subsistence farmers, fishers, hunters and production line assemblers will suffer from the negative sectoral shifts (Source: CEDEFOP). We can therefore expect to see a rise in market demand for highly skilled professionals and a need for additional education for those in low-skilled occupations. The BIN area should be addressing these challenges due to the vast disparity in tertiary education attainment between males and females.

**How to address this challenge**

- By providing education opportunities for both males and females
- By creating education programmes that reflect sectorial changes and the needs of the BIN area with ever growing demand for highly skilled workers
- By offering lifelong learning and continuing education programmes to meet the demand for highly skilled workers

## Is development inclusive?

Our analysis of the occupational groups requiring tertiary education qualifications, such as professionals, managers, technicians, associate professionals and certain professions in the armed forces demonstrates that while women outperform men in professional occupations they are very poorly represented in managerial occupations. Despite their high level of tertiary education, women in the BIN area on average occupy a mere 4% of managerial jobs, while males occupy 7%.

**How to address this challenge**

- By tackling structural imbalances in career and work opportunities for both men and women
- By creating education opportunities to boost male participation in professional occupations
- By providing managerial university education at local BIN universities for professional women
- By adopting measures that reduce the managerial gap that break though the “glass ceiling” for females and create schemes that encourage them to assume managerial positions

# Business in the north

Business activities in the north are the key foundation for value creation, jobs and sustainable societies.

Worker
Photo: Momek Group, Bjørn Leirvik

In this chapter we focus on business activities in the BIN area measured in terms of turnover and profits of regional companies, as well as regional gross value added (GVA). GVA is a measure of total output and income in the economy. It indicates the value of 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. To measure turnover and profit for the Nordic BIN regions we use the statistics of limited liability companies with headquarters in one of the BIN regions, excluding the banking and finance sector, and excluding oil and gas companies. Turnover data from Russia includes companies operating in the BIN regions with exception of small businesses, state budget organizations, banks, insurance companies and other types of financial-credit organizations. Although the Russian and the Nordic turnover data can be compared with some limitations, the generalizations made here highlight key trends.

We address the following questions:

1. What are the trends in business activities in the North?
2. How does the BIN area contribute to value creation?

We look at trends over the last 10 years from 2009 to 2018 across the BIN regions and main industries. When comparing relative size of regions and industries, we employ turnover converted into EUR at annual average currency rates. When comparing growth over time, we employ indices calculated from national currencies from the base years 2009 or 2011. Due to marked inflation, all Russian currencies were deflated in order to be comparable or converted into Euro. Turnover and profit data for the Nordic BIN are based on the Odin database up to 2017. Data for the Russian BIN regions up to 2017 are based on Rosstat publications. Figures for 2018 are estimates (based on analysis of 10-year time series and economic development forecasts for countries and regions made by central banks and statistics agencies in the BIN countries).

## Key findings

- In 2018 business turnover reached 99 billion Euro including the Russian BIN regions (86.5 in the Scandinavian Northern Areas). Average growth reached 5.4% annually over the last 3 years, which is well above the 2.9% of the national economies
- The Russian BIN regions experienced negative annual turnover growth of about -1% during the 3 years 2014–2017, but the future prospects may be positive
- The fastest growing industries are aquaculture, forestry and fishing with an average turnover growth of 19.6% and information and communication with 11% growth over the period 2015–2018
- Gross value added including public services reached 73 billion Euro in 2016, of these 60 billion EUR gross value added was generated in the Norwegian, Finnish and Swedish BIN regions
- Gross value added grew at a significantly higher rate in the BIN area (excl. Russia) at an average of 11% annually over the last 3 years compared to 9% at national level. It is noteworthy that the growth was driven mainly by the Norwegian BIN regions and Lapland in Finland

**Figure 2.1 — Turnover, billion EUR, 2018**

The turnover in the BIN area in 2018 reached 99 billion Euro including the Russian BIN regions. The regions with the largest turnover are Nordland county with 17.5 billion Euro, followed by North Ostrobothnia (16.1 billion EUR) and Norrbotten (13.2 billion EUR). In Russia, Murmansk Oblast is the largest region with 5.5 billion EUR turnover followed by Arkhangelsk Oblast with 4.8 billion EUR and the Nenets Autonomous Okrug with 2.2 billion EUR. The Nenets Autonomous Okrug hosts a substantial oil and gas industry development both offshore (Prirazlomnoye oilfield) and onshore and expects to increase its economic activity in the coming years. Major industries for Murmansk are mining, manufacturing and fisheries. In Arkhangelsk Oblast a major part of turnover comes from the manufacturing industry with shipbuilding and pulp and paper as core segments.

**Source: Odin database and Rosstat. Turnover for the Russian BIN regions is calculated as an average for the period 2014-2017 to deal with fluctuations.**

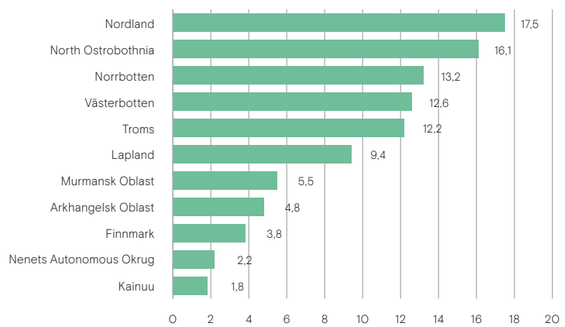



**Figure 2.2 — Growth in turnover as index of national currencies, BIN regions (exl.Russia), Index 2009=100, 2009–2018**

Of the BIN regions, Troms had the highest growth in turnover (267%) since 2009 driven by growth in fish farming and tourism. North Ostrobothnia's growth of 250% is due to the health and wellbeing cluster, construction and pulp and paper. In Nordland the growth of 237% is driven by fish farming, construction and tourism. Norrbotten, Västerbotten and Kainuu experienced growth at a level below average for the BIN regions at 209%.

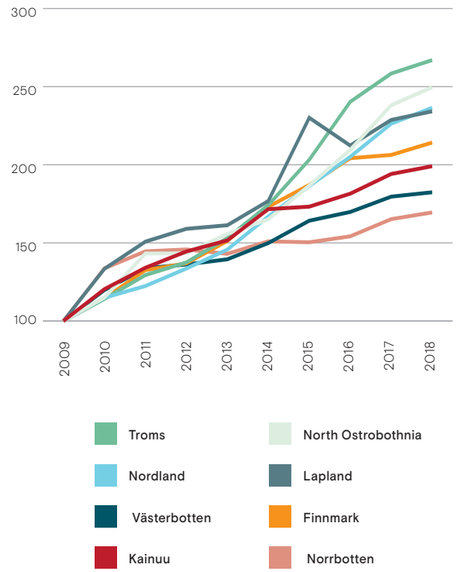



**Figure 2.3 — Growth in turnover in BIN regions as index of national currencies in current prices, Index 2009 = 100, 2009-2018**

In Figure 2.3 we study the BIN regions separately by country. Both North Norway and North Finland are in the lead in terms of turnover growth with index values of 243 and 240 respectively. North Sweden experienced slower growth with an index value of 175.6 over 10 years. North Norway reached 33 billion EUR turnover by 2018, averaging 9% annual growth over the last 3 years, ahead of North Finland, which reached 27 billion EUR, growing 6.5% annually over the last 3 years and North Sweden, which reached 25.6 billion growing at 4% annually over the last 3 years. The Russian BIN regions (here Murmansk Oblast, Arkhangelsk Oblast and the Nenets Autonomous Okrug taken together) demonstrated a controversial, unstable growth profile, largely dependent on world prices for natural resources, the international political climate, the devaluation of the national currency and state purchase orders for the manufacturing industry. A steep decline in turnover from 2013 to 2016 was followed by growth mostly driven by the manufacturing and shipbuilding industry in Arkhangelsk Oblast. Turnover in the Russian BIN regions reached 12 Billion Euro in 2017 with negative annual turnover growth of about -1% during the 3 years 2014-2017, but future prospects may be positive. Trends from 2017 onwards indicate marginally reduced growth rates across all BIN regions. Similar trends were found at the national level. To deal with devaluation of the Russian Rubel, the index for the Russian regions is calculated here for amounts of current prices converted into Euro.

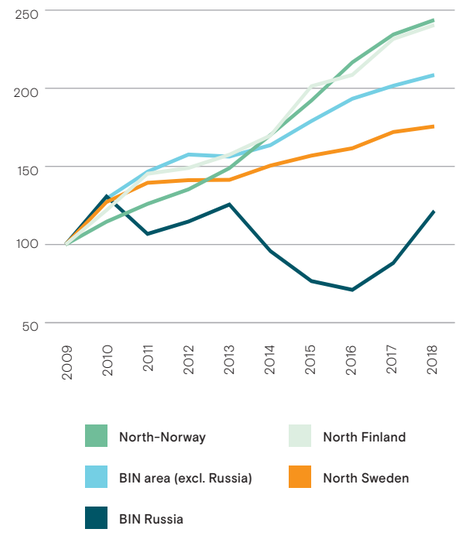
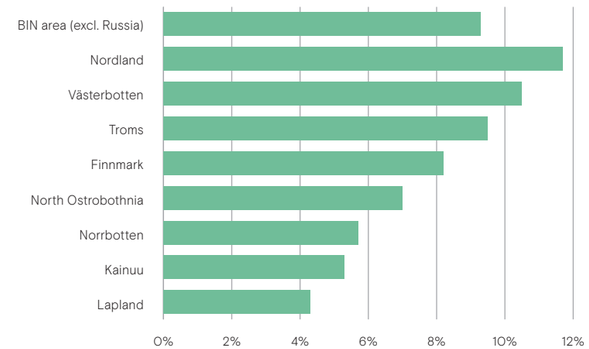


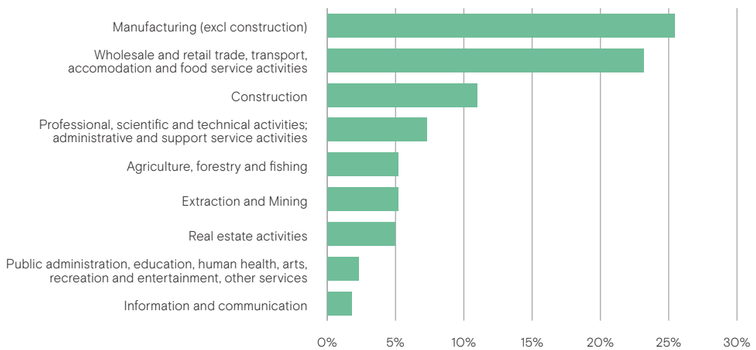

**Figure 2.4 — Operating profit margin (operating profit/loss as % of turnover), %, 2018**

In Figure 2.4 we measure operating profit margins of businesses in the BIN area excluding the Russian BIN regions. Operating profit margin is a profitability or performance ratio used to calculate the percentage of profit a company produces from its operations prior to subtracting taxes and interest charges. It is calculated by dividing the operating profit by total turnover, expressed as a percentage. The margin is also known as the EBIT (Earnings Before Interest and Tax) Margin. We can observe that three regions exceed the BIN average operating profit margin of 9.3%. Nordland region has the most profitable businesses with an operating profit margin of 11.5%, followed by Västerbotten with 10.5% and Troms with 9.5%. Below average comes Finnmark with 8.2%, North Ostrobothnia with 7%, Norrbotten with 5.7%, Kainuu with 5.3% and Lapland with 4.3%. Among the regions with the largest absolute turnover, Nordland demonstrates the highest operating profit margin. A rather large difference can be observed between Norrbotten and Västerbotten at 4.8% in favor of Västerbotten. Operating profit margin depends on the industry structure with information and telecommunications having the highest operating profit margins (11%) and food and accommodation having the lowest (2.5%)[1]. The rather low operating profit margin in Lapland is driven by the big share of the food and accommodation industry. By and large, high profitability in many BIN regions indicates opportunities attractive to investors - contrary to the skepticism often heard in capital markets about investments in Northern areas.




[1] Multiples are highest for the information sector (11.1x) and the mining, quarrying, and oil and gas extraction sector (8.6x). The lowest multiples are in the accommodation and food services (2.5x) and the other service sectors (3.0x). The median across all industry sectors is 3.0x. Source: BVR Business Valuation Resources.

**Figure 2.5 — Turnover per industry (excl. BIN Russia), billion EUR, 2018**




The top three BIN industries measured by turnover are manufacturing with 25.5 billion EUR, followed by wholesale and retail, trade, food and tourism with 23.2 billion EUR and construction with 11 billion Euro. Businesses in the Northern areas are dominated by activities directly derived from the extraction, refining, energy transforming industries and from the harvesting of natural resources, account for 54.3% of all turnover in the BIN area, whereas trade, retail, culture and tourism contribute 29.5% of the turnover and services towards businesses and people create 16.2%. Large production output and more visitors increase logistic activity. The growing business activities will require improved logistics with investments required for roads, harbors, railways and airports.

**Figure 2.6 — Annual average turnover growth per industry in the BIN area (excl. Russia), %, 2015–2018**

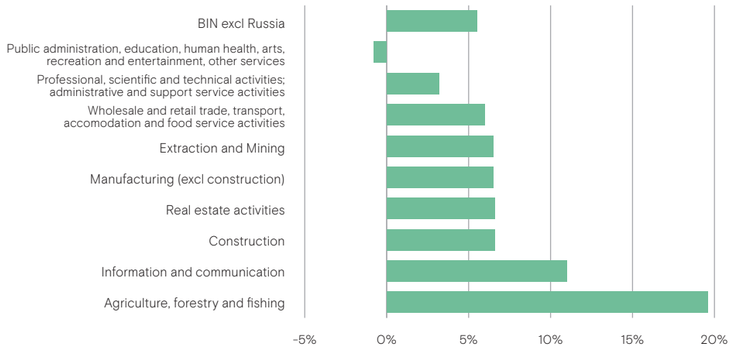



Figure 2.6 shows annual average turnover growth per industry. Agriculture, forestry and fishing high growth of 19.6% is fueled by fish farming and fisheries, which achieved outstanding growth levels driven by growth in demand and high market prices. Information and communication and construction followed with 11% and 6.6% turnover growth rates . Advanced services for businesses (professional, scientific and technical activities) lagged behind, likewise private education and health services. The measurements indicate stronger business cycles across more industries than in previous editions of Business Index North, indicating increased competitiveness among export companies, also in natural resource extraction.



**Figure 2.7 — Production industries in the BIN area (excl.Russia), Index 2009=100, 2009–2018**

In total, production industries accounted for 54% of all turnover in the BIN area (excl. Russia). Two industries show substantial growth above the BIN 10-year index average of 208. These are agriculture, forestry and fishing driven by North Norwegian fish-farming and increased catch value and construction. Fish-farming more than tripled turnover in 10 years, while construction more than doubled. After a weak period between 2009 and 2015, extraction and mining again show progress at the same level as the manufacturing industries.

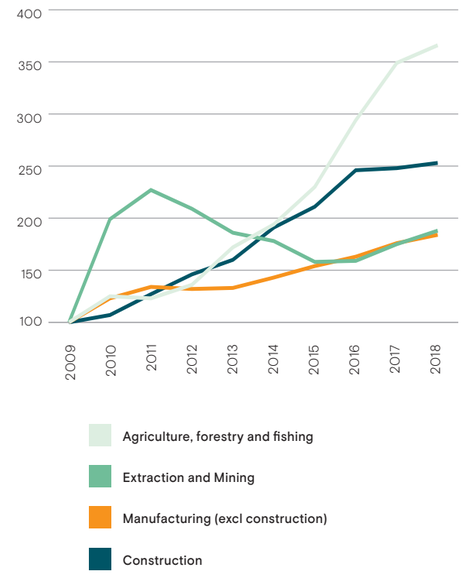



**Figure 2.8 — People oriented industries in the BIN area (excl. Russia), Index 2009=100, 2009–2018**

People-oriented industries accounted for 29.5% of all turnover in the BIN area in 2018 while trade, transport, accommodation and food services grew at close to the BIN average, doubling over the last 10 years. Increased market for private health care showed rapid growth until 2014. Since 2015, growth has leveled off, mostly due to more public services being available and to the introduction of new methods and technologies, especially in health care for the elderly.

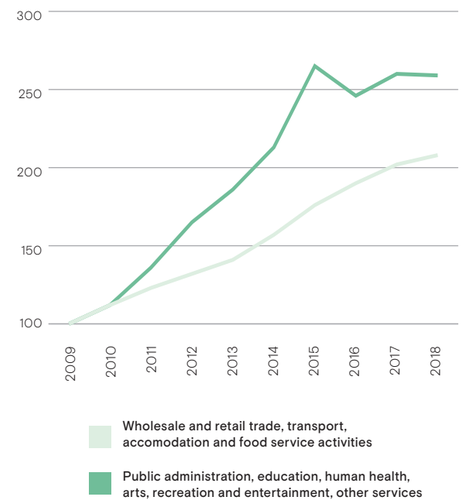


**Figure 2.9 — Professional services in the BIN area (excl. Russia), Index 2009=100, 2009–2018**

Figure 2.9 illustrates trends in turnover in professional services. One industry grew slightly above the BIN area average in the 10-year period. Although a small industry in terms of turnover (1.8 billion EUR), the information and communication turnover index grew to a value of 215, just above the BIN average of 208. Both real estate services and professional services grew below the BIN area average. While these industries have shown strong growth in capital areas in the BIN countries, the same situation is not observed in the northern areas. This creates a need for greater import of services, since northern companies require professional services at the same rate as in other parts of BIN countries. This pattern creates dependency on professional services from the capital areas. Alternatively, this finding suggests business potential for improving the supply of professional services in the north.

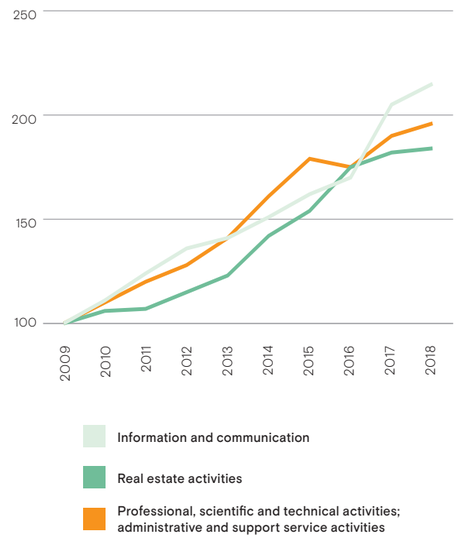



**Figure 2.10 — Relative size and operating profit margins of BIN area industries (excl. Russia), %, 2018**

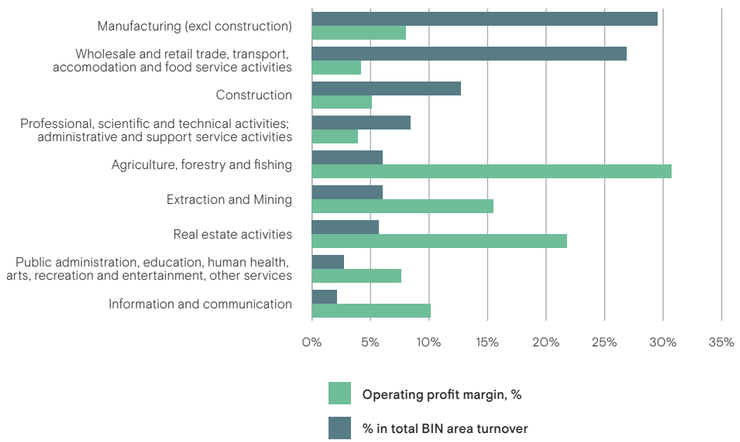



Figure 2.10 shows relative size and operating profit margins of industries in the BIN area. Out of all industries agriculture, forestry and fishing had the highest operating profit margin of 30.7% driven by fish-farming in North Norway[2]. Sustained demand and a rise in salmon prices contributed to the high operating profit margin. Operating profit margins for real estate services reached 21.8%, extraction and mining 15.5% and information and communications 10.1%. Manufacturing, the largest industry by turnover (30%) showed an operating profit margin of only 8%. Professional services and construction achieved even lower profitability (respectively 4% and 5%).

[2] Operating profit margin of farmed Atlantic salmon amounted to 37.2% in 2016. Source: The Norwegian aquaculture analysis 2017. EY.

**Figure 2.11 — Total GVA, billion EUR, 2016**

Figure 2.11 shows contribution of the BIN regions in terms of gross value added (GVA). GVA is defined as turnover (or sales) less the cost of bought in material and services (excluding employee costs) at a company level. At an aggregate regional level, it is calculated as the difference between the total value of goods and services produced in a particular region and the cost of raw materials and other inputs, which are used up in production. The BIN area's gross value added including the public sector amounted to 73.4 billion EUR in 2016. North Ostrobothnia achieved the largest value creation in absolute EUR, followed by Nordland and Norrbotten. The size of turnover in regions is mirrored in GVA, except for North Ostrobothnia, which had a higher GVA, while Nordland outperformed in turnover and speed of growth. GVA in Arkhangelsk and Murmansk Oblast was almost the same as in Lapland, even with a much larger population. This can pose challenges for the Russian regions if they rely excessively on imported goods, given the impaired purchasing power caused by low Rubel value.

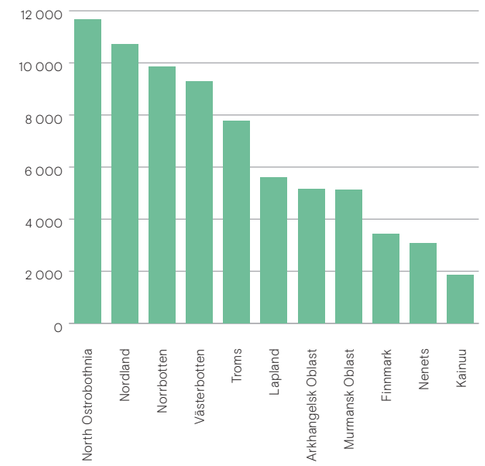
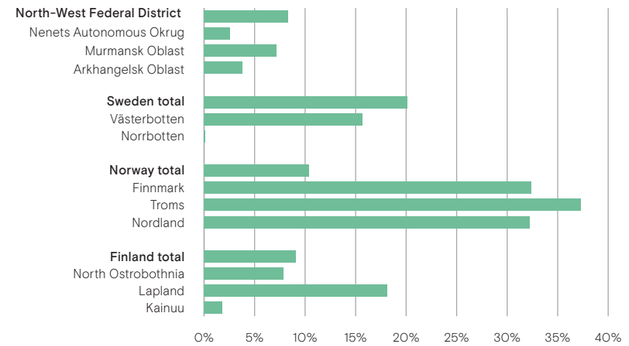



**Figure 2.12 — Growth in GVA including public sector, %, 2011–2016**




In Figure 2.12 we compare growth in gross value added (GVA) including the public sector per BIN region with national growth. Some BIN regions surpassed national growth in the five-year period where Nordland, Troms and Finnmark in Norway grew more than three times the national growth rate and the Lapland region grew at double the rate of national growth in GVA. GVA development across the regions demonstrates the importance of successful new industries and willingness to decentralize public sector service production, also across the Northern areas. Such initiatives cannot be said to be present in the majority of BIN regions (7 out of 11), where GVA growth lags behind national levels. Weaker GVA growth compared to national levels may lead to less interest in public investments and initiatives to stimulate population growth and create new attractive jobs, especially for young people.

Figure 2.13 — Value creation and employment – BIN regions and countries

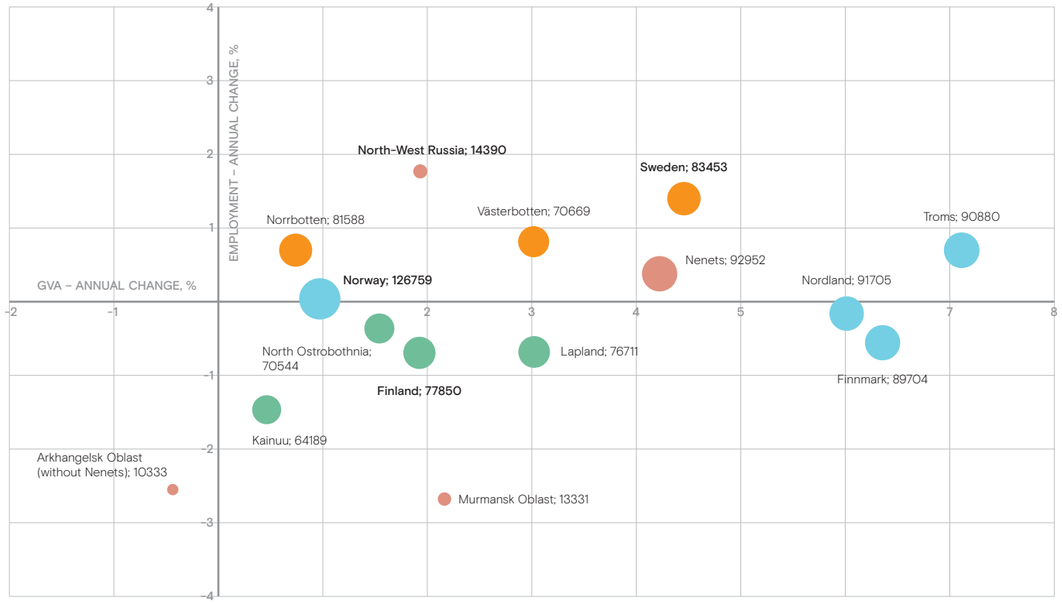



Figure 2.13 presents BIN business development in a socio-economic perspective. "Socio" stands for value for individuals and their groups and is measured through employment. Work, represented by employment, is a value as it provides purpose and security in people's lives. "Economic" represents value for legal entities and is therefore measured In terms of gross value added. Thus growth in employment and GVA are two dimensions of the chart in Figure 11. The BIN regions and their respective countries are placed on the chart according to changes on these two dimensions during the period 2012–2016. The size of the bubbles represents GVA per worker — a monetary representation of socio-economic value creation, in other words it is the relation between GVA and employment.

Troms is the BIN area leader in terms of combined growth in employment and GVA. Although GVA per worker in the Norwegian BIN regions is approximately at the same level, this is much lower than in Norway in general. Norrbotten and Västerbotten are part of the same positive trend, although they have substantial difference in GVA per worker (apparently due to the Norrbotten mining industry). Both Swedish BIN regions have lower GVA per worker than Sweden as a whole. The Nenets oil producing province is also part of the positive trend in socio-economic value creation. Its GVA per worker is much higher than the Russian standard and comparable to that of the Nordic BIN area.

The Finnish BIN regions, together with Nordland, Finnmark and Murmansk Oblast are part of the "efficiency" trend: business is growing with low or negative creation of new workplaces. Murmansk Oblast has the most dramatic reduction in workplaces. Arkhangelsk Oblast is in the most worrying situation in the BIN area - both employment and GVA show negative growth.

The greatest differences can be found in Russia: in terms of GVA per worker and growth rates for GVA and employment among the regions. Average GVA per worker is much lower than in the Nordic BIN areas when measured in Euro. However, the consumer price level is also much lower. In the Nordic countries, all BIN regions have lower GVA per worker than their countries averages. Probable reasons for this are location of headquarters of the largest corporations and higher intensity of knowledge-based and professional service activities in the capital areas and the dependence of the BIN areas on natural resources.





# *Answers to questions*

## What are the trends in business activities in the North?

Business activity is vibrant in the BIN region, amounting to 99 billion EUR including the Russian BIN regions. By size Nordland and North Ostrobothnia are the largest contributors to the turnover of the BIN area overall. All BIN regions in Finland, Norway and Sweden showed growth in turnover in the last ten years. Troms and North Ostrobothnia were among the fastest growing regions when measured as turnover index above the value 250. Business activities directly derived from extraction, refining, energy transforming industries and harvesting of natural resources account for 54.3% of all turnover in the BIN area (excl. Russia), whereas trade, retail, culture and tourism account for 29.5% of the turnover and services for businesses and people amount to 16.2%. These high growth rates over time can largely be explained by increased global demand for natural resource-based goods, renewable energy, increased tourism and new high-tech companies building their businesses in the north, providing, for example, data storage, salmon farming in Northern Norway, natural medicine and food ingredients, and health care technology. The growth can partly be explained by new technology and digitalization improving output from traditional industries increasing competitiveness and capacity.

## How does the BIN area contribute to value creation?

Each BIN region has lower GVA per worker than its corresponding country on average, except for the oil-producing Nenets Autonomous Region. However, Norrbotten, Västerbotten, Nenets and Troms are cases of positive growth in terms of both workplaces and economic value. In all Finnish BIN regions, Nordland, Finnmark and Murmansk Oblast business is growing with low or negative contribution to new workplaces. The most worrying situation was found in Arkhangelsk Oblast with a negative trend in both GVA and employment.

## Implications

- Positive trends and opportunities in business activities in the north should be matched by capital flows
- Awareness of sustainable investment opportunities in the north should be cultivated to attract more investment capital and create modern jobs in the BIN area
- High operating profit margins, especially in the fish-farming industry, indicate attractive investment opportunities. The environmental and health aspects of the industry need to be taken into consideration
- Regions with diversified industry structures have better business growth opportunities
- Regions with dynamic urban centres (e.g. North Ostrobothnia, Västerbotten) built around university cities perform best in producing businesses with high turnover
- Despite low or controversial growth rates, the Russian BIN regions may be potential future development spots for large investments.

# Connectivity

Connectivity in the North is vital to human and business development. Its importance has been acknowledged during the Finnish Chairmanship of the Arctic Council (2017–2019), where connectivity was chosen as one of the priorities together with education, environmental protection and meteorological co-operation.

Worker at HermanIT datacenter Kajaani
Photo: HermanIT

In this chapter we address the following questions:

- What are the levels of fast broadband accessibility of 100 Mbps and over in the BIN area?
- What are the levels of ultrafast broadband accessibility of 1 Gbps in the BIN area?
- What technologies are employed in providing fast broadband accessibility?
- Is there any difference in broadband accessibility between households and businesses?
- How is the data centre industry developing in the BIN area?

To address these questions, we collect and analyse comparable data across Finland, Sweden and Norway, but do not include the Russian BIN regions for which such detailed data is not available. Levels of broadband accessibility are compared by using an indicator of fast fixed broadband access of 100 Mbps and more. The EU broadband objectives for 2020 include providing half of European households with connectivity rates of 100 Mbps and by 2025 with access to connectivity offering at least 100 Mbps for all European households. To assess ultrafast broadband accessibility we collect data on 1 Gbps in the BIN area. Connectivity of 1 Gbps or Gigabit connectivity is needed for educational services online, digitally intensive enterprises, manufacturing systems, ordering and delivery processes, data storage and analytics. The EU's strategic objective for 2025 is to provide Gigabit connectivity to all main socio-economic drivers such as schools, transport hubs and main providers of public services, as well as digitally intensive enterprises . Additionally, we provide data on broadband accessibility for households and businesses to access how these two groups of users benefit from connectivity in the BIN area. Finally, we collect data to map existing and planned data centre activity in the BIN area.

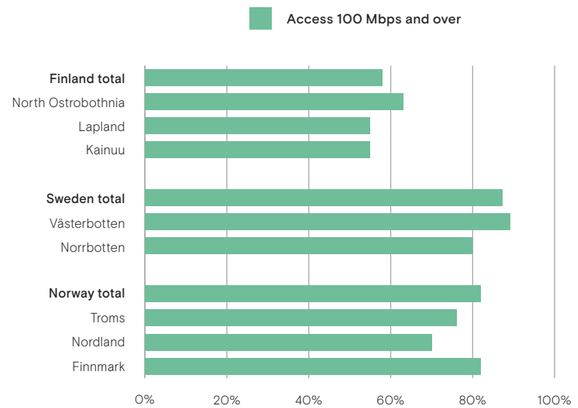
## Key findings

- Digital infrastructure in the BIN area is good for supporting the needs of households
- On average 75% of households in the BIN area have access to high speed broadband of 100Mbs and higher
- Ultrafast internet of 1 Gigabit via fiber optic access is available to 58% of households in the BIN area
- Sweden leads in providing very highspeed broadband via fiber access to 82% of households in the BIN regions
- Digital infrastructure accessibility for business users in Sweden and Norway is on average 10 percentage points lower than for households
- Data centre activity is on the rise in the north
- Physical digital infrastructure and countries' national support for data centre activity are among the most crucial factors for the future of this industry

[1] EC (2016) Connectivity for a Competitive Digital Single Market – Towards a European Gigabit Society

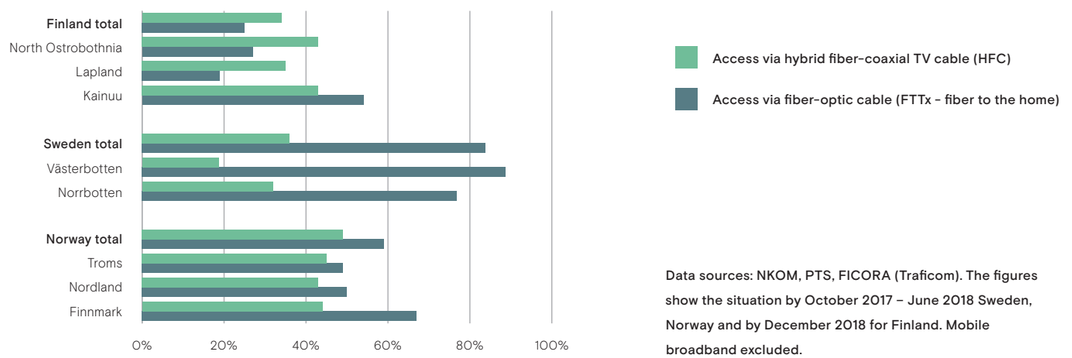
## Figure 3.1 — Fixed broadband access 100 Mbps and over, % share of households

Figure 3.1 demonstrates that high-speed broadband access is available to an average of 71% of households in the BIN area, which is five percentage points lower than the totals for Sweden, Norway and Finland (76%). In Norway, Finnmark has the highest fixed broadband access at 82%, with Troms and Nordland reaching respectively 76% and 70%. The topography of the place contributes to the ease of creating infrastructure, reflected in higher accessibility rates in the flat landscape of Finnmark compared to the mountainous terrain in Nordland and Troms. The low figures for Finland do not necessarily tell the whole story since 89% of households (10% of the area) are covered with at least one mobile network capable of providing 100 Mbps in ideal circumstances. Therefore, in Finland, the lower fixed broadband accessibility is compensated by access to high-speed mobile broadband. All BIN regions have already achieved the EU target of 50% of households with connectivity rates of 100 Mbps by 2020.




**Data sources: NKOM, PTS, FICORA (Traficom). The figures show the situation for the period October 2017, June 2018 for Sweden, Norway and by December 2018 for Finland. Mobile broadband excluded. Data sources: NKOM, PTS, FICORA (Traficom)**

## Figure 3.2 – Digital readiness for very high speed broadband 1 Gbps+, by technology, 2017–2018

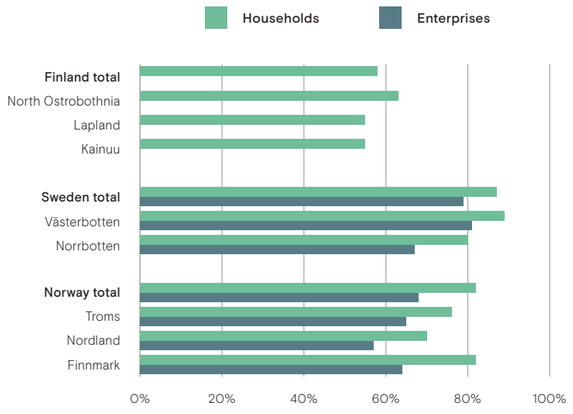



**Data sources: NKOM, PTS, FICORA (Traficom). The figures show the situation by October 2017 – June 2018 Sweden, Norway and by December 2018 for Finland. Mobile broadband excluded.**

Figure 3.2 demonstrates infrastructural readiness for the provision of very high-speed internet of 1Gbps and more. The data is available for the provision of very high internet access via hybrid fiber-coaxial TV cable (HFC) or via fiber-optic cable (FTTx-fiber to the home). The difference between these solutions lies mainly in the upload speed, with fiber-optic cable solutions providing high-speed symmetrical services in both downloading and uploading. Different patterns emerge in the choice of technological solutions across countries, e.g. Sweden has invested heavily in fiber-optic cable (82% of households have accessibility via Access via FTTx -fiber to the home), hence this option leads in readiness to provide very high-speed broadband to households in the BIN area. On average 58% of households in the BIN area have access to fiber-optic cable vs. 56% in the whole of Sweden, Norway and Finland. The high percentage of fiber cable in the BIN area is skewed by the Swedish regions of Norrbotten and Västerbotten with accessibility of 77% and 89% respectively. Access via hybrid fiber-coaxial TV cable is available to 37% of households in the BIN area vs. 40 % in the whole of Sweden, Norway and Finland. The question of technical solutions is also important to keep in mind when thinking in the long- term; fiber-optic is currently the recommended medium for the link between the core network and the final sub-networks for 5G wireless, so the role of fiber-optical cables is crucial in the uptake of 5G. All BIN regions apart from Finnmark and Västerbotten underperform compared to the country averages in the digital readiness via fiber-optic solutions.

## Figure 3.3 – Fixed broadband access by households and enterprises, 100 Mbps and over

Figure 3.3 compares fixed broadband accessibility of 100 Mbps and over in households and enterprises in the Swedish and Norwegian BIN regions. The Finnish broadband statistics does not provide data on the enterprise level, but the household statistics serve as a proxy for enterprise broadband accessibility. We observe that on the country level in Norway and Sweden fixed broadband accessibility is on average 12 percentage points lower for enterprises as opposed to households in the same countries, compare 67% vs. 79%. The Norwegian BIN regions have 100 Mbps broadband accessibility for enterprises in the range of 57%-65%. The difference between 100 Mbps broadband accessibility between households and enterprises on country level as on the BIN regional level can be attributed to the infrastructure installed ready to use within the reach of households, while for enterprises located outside available infrastructure some additional investments may be necessary. Additionally, smaller enterprises of less than ten employees (i.e. 93% of all enterprises in Finland) can be better represented by using statistics of lower speed internet accessibility.



## Data centres in the BIN area

By 2030, the number of devices connected to the internet will have reached 125 billion, up from 27 billion in 2017[2]. These devices rely on the data stored in data centres. The growth in data centres is driven by demand in digital content, mobile computing, Internet of Things (IoT) and cloud computing. Firms worldwide rely more and more on big data and data analysis by external service providers. In 2018 of all Finnish firms using big data 45% relied on external services. In our overview, we examine types of data centres and their capacity. As a measure of capacity we use MW as it best describes power available at data centres.

In our data centre mapping activity in the BIN area we focus on the following types of data centres:

**Cloud** Cloud facilities are owned and operated by the cloud companies, which deliver an array of computing services. The larger cloud providers build multisite regional set-ups with a range of availability zones to ensure low latency and high reliability in the service. The client bases for the cloud companies are all corporate, governmental and individual's applications[3].

**Colocation** A data centre owner sells space, power and cooling to multiple customers in a specific location[4]. The customer typically provides server equipment and the colocation provider hosts it in their data centre by providing space, power and cooling.

**Hyperscale** These are large data centre facilities above 20 MW, owned and typically operated by the company they support. They are usually service platforms for social media, search engines, communication & entertainment, artificial intelligence, machine learning and e-commerce[5]. These data centres are normally located close to the power grid. An example of a hyperscale data centre is the Facebook data centre in Luleå.

**Greenfield/ brownfield** Greenfield deployment refers to the installation of data centres where previously there was no infrastructure in place, hence necessitating building from scratch. Brownfield development refers to using existing infrastructure not in operation (e.g. old warehouses, factories etc.). Brownfield developments may benefit from existing electricity links. For both types of development brownfield and greenfield offer specifications of the data centre (e.g. cloud or hyperscale) determined by the future owner or customer.

Table 1 reports data centre development activity in the BIN area by looking at the types of data centres and their operating and planned maximum capacities (where such data is available). All types of data centres are currently being developed in the BIN area, while future sites are mostly greenfield developments. Out of 10 future greenfield development sites, at least four are specifically suitable for hyperscale data centres with electricity capacity expansion of 100 MW up to 300 MW and four planned data centres with expansion capacity above 35 MW. Capacity data were available for 19 data centres out of 27 data centres, both planned and existing. Operating capacity of existing data centres amounts to 296 MW. If we include operating capacity of planned data centres the result amounts to a total of 635 MW available on short notice. Capacity for expansion data for 13 out of 27 both planned and existing data centres provide an estimate of 1.5 GW operating capacity in the next three years. In terms of energy consumption, it would equal an energy consumption of 13.1 TWh per year. In the chapter of the BIN report devoted to energy, the surplus of the electricity produced in the BIN area amounted to 30 TWh in 2017. Hence, if all planned data centres are built and expanded, the data centre industry may potentially consume up to 44% and more of all energy surplus in the BIN area. Electricity produced from renewable energy sources serves as one of the main attractions for data centre location in the BIN area. Closeness to the grid and fiber, low cost of electricity, security and political stability and natural cooling conditions are among the selling points encouraging investment in the data centre business in the BIN area. Looking at the regional differences, the Swedish BIN regions are the most prolific in terms of existing and planned data centres compared to their Finnish and Norwegian counterparts. This

[2] ESPAS (2019) Global Trends to 2030: Challenges and Choices for Europe.

[3] Definition from Nordic Council of Ministers (2018). Data centre opportunities in the Nordics.

| Name | Location | Region | Status | Type of data center/ development | Capacity | Possibility for expansion |
|---|---|---|---|---|---|---|
| **NORWAY** | | | | | | |
| Sundsfjord | Sundsfjord | Nordland | complete | greenfield | 40 MW | N/A |
| Arctic Cloud Data Service | Mo i Rana | Nordland | complete | cloud | 0.3 MW | 5 MW |
| Arctic Circle Data Center | Mo i Rana | Nordland | planned | colocation/cloud | 10 MW | 100 MW+ |
| Balsfjord | Balsfjord | Troms | planned | greenfield (suitable for hyperscale) | 100 MW+ | 250 MW+ |
| Fauske | Fauske | Nordland | planned | greenfield | 20 MW | 100 MW+ |
| **SWEDEN** | | | | | | |
| Facebook | Luleå | Norrbotten Norrbotten | 2 completed data centres | hyperscale | 120 MW | N/A |
| Hydro66 | Boden | Norrbotten | complete | colocation | 120 MW | N/A |
| Fortlax | Piteå | Norrbotten | 3 completed data centres | colocation/cloud | 15.3 MW* (information available for 2 out of 3 data centers) | N/A |
| Facebook | Luleå | Norrbotten | planned (to be completed by 2021) | hyperscale | N/A* | N/A |
| Skellefteå port | Skellefteå | Västerbotten | planned | greenfield | 1 MW | 35 MW |
| Skellefteå east | Skellefteå | Västerbotten | planned | greenfield | 1 MW | 35 MW |
| Finnfors | Skellefteå | Västerbotten | planned | colocation | 120 MW | N/A |
| Industrial Park | Luleå | Norrbotten | planned | greenfield | 65 MW | 100 MW+ |
| Storheden | Luleå | Norrbotten | planned | greenfield | 0 MW | 15 MW |
| Haraholmen | Piteå | Norrbotten | planned | greenfield | 10 MW | 40 MW |
| Nyfors greenfield | Älvsbyn | Norrbotten | planned | greenfield | 1 MW | 50 MW |
| Svartbyn | Boden | Norrbotten | planned | greenfield (suitable for hyperscale) | 0 MW | 300 MW |
| Räfsan | Luleå | Norrbotten | planned | brownfield | 1 MW | 25 MW |
| Helicopter Air Base | Boden | Norrbotten | planned | greenfield | 10 MW | 300 MW |
| Etix Jokkmokk | Jokkmokk | Norrbotten | planned | colocation | N/A | N/A |
| **FINLAND** | | | | | | |
| Herman IT | Kajaani | Kainuu | complete | colocation | 1 MW | 20 MW |
| CSC | Kajaani | Kainuu | complete | hyperscale | N/A | N/A |
| Oulun data center | Oulu | North Ostrobothnia | complete | cloud | N/A | N/A |
| **RUSSIA** | | | | | | |
| Polyarnye Zori | Polyarnye Zori | Murmansk Oblast | planned | hyperscale | N/A | N/A |

**Note: All data collected from publicly available sources and by direct requests from the data centre operators. May not be complete.**

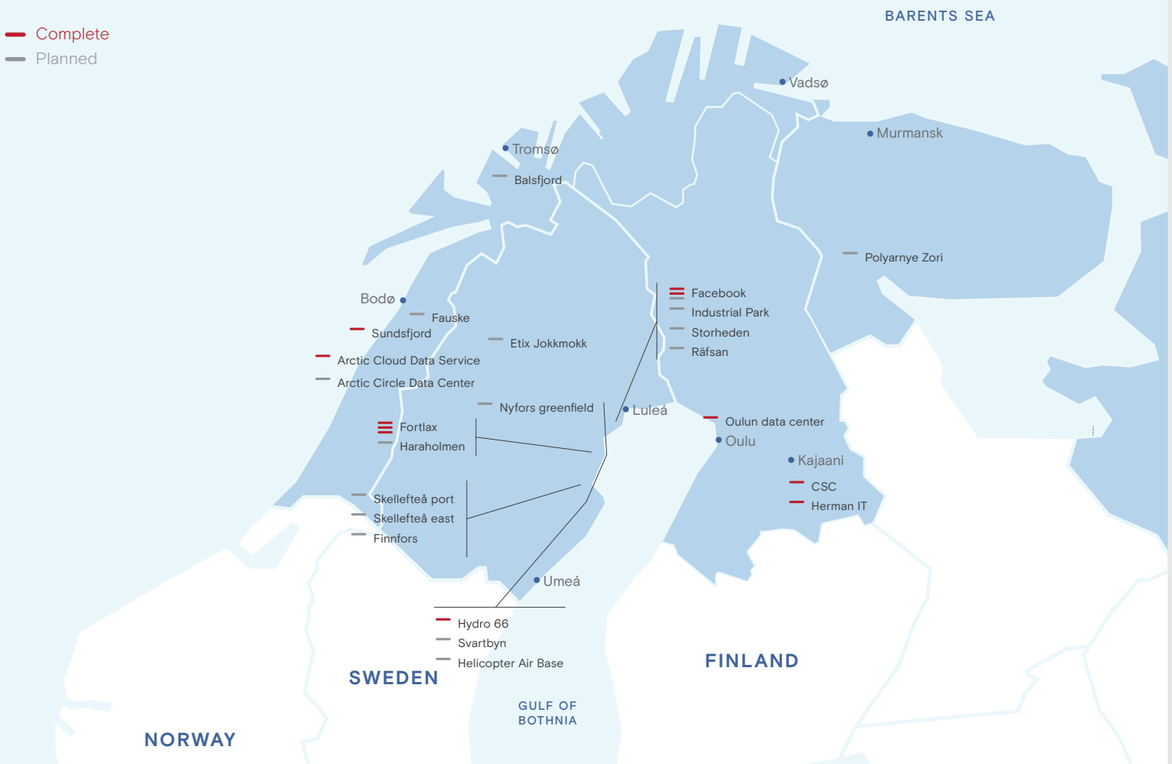
**The indicative table is to be used for a general overview of data centre activity in the BIN area; *estimated size as big as the first two Facebook data centers.**

is due to the tax incentives introduced by the Swedish government in 2017 to stimulate the ICT sector. As a result newly introduced tax cuts reduced overall electricity prices by around 40 percent for any existing or new data centre greater than 0.5 MW from January 2017 . Additionally, the power companies Vattenfall and Skellefteå Kraft actively promote and facilitate data centre development in the Swedish BIN regions through a Node Pole jointly owned entity established in 2017 serving as a commercial investment and development hub providing dedicated support for investors within the cloud industry and other energy-intensive industries.

Connectivity in the digital age is important for both economic and social development. At the same time, it should not be isolated from the bigger picture, where both positive and negative impacts of increased connectivity are analysed. This type of analysis would intrinsically include environmental impact assessment of both physical infrastructure and future construction projects, e.g. data centres. Additionally, the social component of connectivity should be investigated further, whether better digital infrastructure is the solution to such social problems as loneliness and isolation.

Map 1 shows data centre activity in the BIN area in terms of operating and planned data centres. There are currently 11 operational data centres in the BIN area, ranging from Facebook-owned hyperscale data centres in Luleå to the colocation Herman IT data centre in Kajaani. Facebook has confirmed its additional data centre development in Luleå with at least the same capacity as the previous ones (120 MW) scheduled to be operational in early 2021. The Norwegian BIN regions of Nordland and Troms have plans for data centre industry expansion in Fauske and Balsfjord, both of which can be used as hyperscale data centres due to the availability of high electricity capacity. The Swedish BIN regions have seven operational data centres and the data collected reveals that there are 12 potential development sites that can be utilized for data centre industry purposes. The Finnish regions of North Ostrobothnia and Kainuu collectively have three functioning data centres. Little data is available on the data centre development activity in the Russian BIN regions; in 2018 the administration of Polarnye Zory city signed a co-operation agreement with a Chinese high-tech firm for a hyperscale data centre development in the city.

Map 1 Locations of existing and planned data centres in the BIN area






# *Answers to the questions:*

## What are the levels of fast broadband accessibility of 100 Mbps and over in the BIN area?

**Answer:**
On average 75% of households in the BIN area have access to high-speed broadband of 100 Mbs and higher. However, cross-regional differences exist with the Swedish BIN regions having higher levels of 100 Mbps accessibility.

**To consider:**
Analysis of the more detailed municipality level data should be performed to estimate the digital divide between urban and rural areas in the BIN area.

## What are the levels of ultrafast broadband accessibility of 1G bps in the BIN area?

**Answer:**
Ultrafast internet of 1 Gigabit via fiber-optic access is available to 58% of households in the BIN area

**To consider:**
Physical infrastructure in place does not reflect the actual deployment rate, hence more research is needed on the deployment of ultrafast broadband and the associated challenges in the BIN area.

## What technologies are employed in providing fast broadband accessibility?

**Answer:**
On average 58% of households in the BIN area have access to fiber-optic cable vs. 56% in the whole of Sweden, Norway and Finland. The high percentage of fiber cable in the BIN area attributable to the Swedish regions of Norrbotten and Västerbotten with accessibility of 77% and 89% respectively. The hybrid fiber-coaxial TV cable (HFC) solution is used to a lesser extent.

**To consider:**
Fiber rollout strategies need to be considered holistically in the BIN regions by analysing their impact on socio-economic development. The Swedish example should be studied in further detail with a view to expanding fiber solutions in the BIN area.

## Is there any difference in broadband accessibility between households and businesses?

**Answer:**
The data reveal a 10 percentage-point gap in broadband accessibility between businesses and households.

**To consider:**
Qualitative data collection may help to identify concrete challenges in broadband accessibility for enterprises.

## How is the data centre industry developing in the BIN area?

**Answer:**
Data centre activity is on the rise in the BIN area with 11 operational and 13 planned data centres identified.

**To consider:**
A data centre impact analysis is needed to ascertain how this industry is likely to affect electricity consumption and people's livelihoods in the BIN area in the future.

# R&D in the business sector

R&D activity is one of the major drivers of economic growth in a knowledge-based economy. In a knowledge-based economy, growth is sustained through technological advantage, access to information and know-how; to a lesser extent it depends on natural resources and means of production. In particular, R&D activity in the business sector is about the formal creation of new knowledge and important conditions for building competitive advantage. Knowledge-based businesses are able to operate on markets far beyond their regions of origin. Conversely, a low level of R&D activity causes businesses to be dependent on natural resources and means of production physically located in the regions.

Riina Kangas (Graphic designer) and Seppo Kopsala (CEO), Optomed
Photo: Alexandra Middleton

According to the UNESCO Institute for Statistics[1], R&D spending by the business sector is an underlying factor for country-level success. In case of lower level of R&D activity in the private business sector, even if it is compensated with heavy public R&D spending, an advanced innovation system can hardly be created. This is because innovation systems rely on collaboration between public and private entities in a systematic way. The university sector appears to be an important contributor to this process.

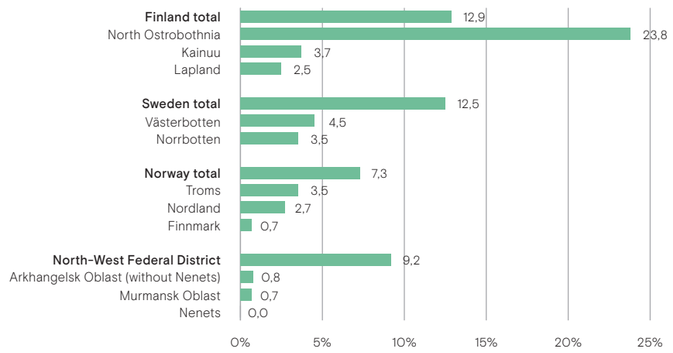
In this chapter we investigate R&D activity in the business sector of the BIN area by focusing on numbers of R&D staff and patenting. Numbers of R&D staff serve to indicate the resources (investments) inputted into innovative activity. Patenting is an output characteristic associated with the capacity of firms to develop new products and take steps towards the commercialization of new knowledge. Considered in combination, both indicators are markers of competitiveness of an industry, its capacity to develop and commercialize new knowledge, as well as the attractiveness of regions to highly-skilled people.

## Main findings

- All BIN regions except North Ostrobothnia have a much lower level of R&D activity in the business sector than their countries on average
- R&D on such a low level inevitably has a negative impact on value creation
- If no action is taken, development of the BIN area would continue to depend on natural resources, use of own territories, local manufacturing; opportunities for technological leadership would remain very limited

[1] http://uis.unesco.org/apps/visualisations/research-and-development-spending/

**Figure 4.1 — Number of R&D staff in business sector per 1000 people employed (annual average for 2013–2017)**



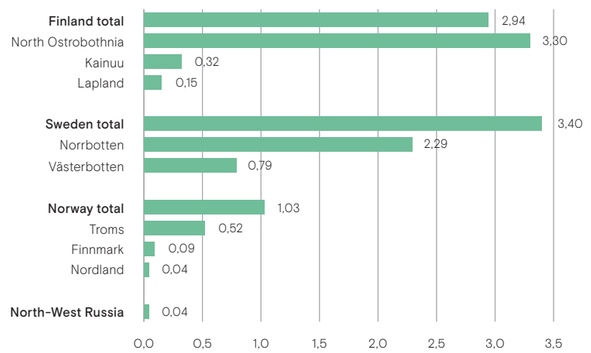

The figure shows the number of man-year R&D staff (annual average for 2013–2017) in the business sector per 1000 people employed for all sectors. R&D staff encompasses all personnel directly involved in research and development, including administrative personnel, persons in supporting functions, both inside and outside the R&D department.

All BIN regions except North Ostrobothnia have far fewer R&D staff in the business sector than their countries on average. The example of North Ostrobothnia is remarkable as it has nearly a twice higher level of R&D human resources than Finland on average. The success of North Ostrobothnia is associated with the combined effect of Nokia's strategic involvement in this region since the early 1990's followed by the development of a cluster of ICT companies and with the University of Oulu having a pronounced technological profile. North Ostrobothnia is competitive on the global scale as it has a concentration of business R&D personnel comparable to that in the metropolitan areas of Stockholm, Helsinki-Uusimaa and even the capital region of South Korea (the world's highest R&D spender in terms of % of GDP and involvement of business).

The regions of Västerbotten, Norrbotten, Troms, Lapland and Kainuu and also Nordland have some, but a relatively low volume of business R&D staff in total employment.

The regions of Finnmark, Murmansk, Arkhangelsk and Nenets are practically devoid of R&D human resources in the entrepreneurial business sector.

**Figure 4.2 – Number of patent applications to EPO per 10000 capita (annual average 2016–2018), by address of inventor**

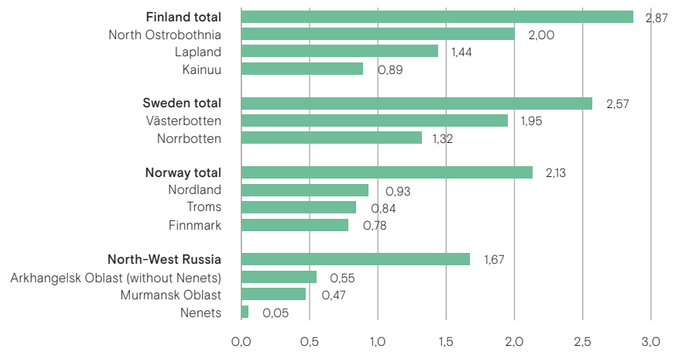



The figure shows intensity of patenting activity through the European Patent Organization (EPO). This is an indicator of knowledge aimed to be commercialized outside its country of origin. BIN region residents participated in this activity as inventors. Some of the inventions included in these counts for BIN regions are owned by companies from the outside. For example, Nokia and Ericsson, headquartered in capital areas, own a major number of patented inventions made in North Ostrobothnia and Norrbotten respectively.

In most BIN regions, intensity of the patenting activity through EPO is lower than the corresponding country average, except North Ostrobothnia. Norrbotten performs relatively well due to the involvement of Ericsson in the region. There are some regional firms with numerous international patents competing on the global market, such as Optomed (North Ostrobothnia), Liko Research and Development AB (Norrbotten), Sweetree Technologies AB (Västerbotten), Lytix Biopharma AS (Troms).

There is a very low level of patenting activity through EPO in North-West Russia (it may be that inventors in Saint Petersburg, which has a fairly high concentration of R&D, use different routes than EPO for patenting their inventions).

**Figure 4.3 – Number of patent applications to national offices per 10000 capita (annual average 2016–2018), by address of owner**




The figure shows intensity of patenting activity through national patent offices. This is an indicator of knowledge commercialized domestically (although national offices are also used as first entry to international patenting, this figure shows only the number of domestic applications). The figure shows inventions both made and owned by regional residents (thus the counts for Nokia and Ericsson are included in the country statistics for Finland and Sweden).

All BIN regions perform worse than their countries on average, yet there is a fairly high level of patenting activity in North Ostrobothnia and Västerbotten, followed by Lapland and Norrbotten, then by Kainuu, Nordland, Troms and Finnmark.

Regions of Arkhangelsk and Murmansk performed much worse than North-West Russia in average (there city of Saint Petersburg has relatively high level of patenting activity).

# *Implications*

Finland, Sweden and Norway are among the top five countries in the world in terms of knowledge economy performance according to the recent World Bank's Knowledge Economy Index[2] report. Russia was placed 54 among 144 countries assessed by the WB, but inside Russia the North-West Region adjacent to Northern Europe has significant potential for R&D accumulated in the city of Saint Petersburg. The results reported here illustrate that national knowledge economy performance does not necessarily translate to the regional level.

With a low level of R&D in business activity, today the BIN regions are hardly participating in their countries' leadership in knowledge economy performance (with the notable exception of North Ostrobothnia). If no actions are taken, the economy of the BIN area will have to continue relying on natural resources, use of own territories and means of production based in the regions. As such, the BIN regions would make a very limited contribution to the technological leadership and development of knowledge economy in the BIN countries and internationally. The creation of highly-skilled professional jobs in the region, such as in the R&D sector, would also enhance the attractiveness of living in the area for highly educated professionals.

Taking the next leap in development from natural resource dependency toward a knowledge economy requires progressive measures to attract people and investments in research and development in the business sector. There are five general suggestions on how to improve the current situation.

- Facilitate state and private investments in development of existing regional R&D clusters. There are concentrations of business R&D activities in the regions of North Ostrobothnia, Norrbotten, Troms and Västerbotten. The areas with the highest R&D concentration activity are electronic communications (North Ostrobothnia, Norrbotten), radio communications, computing and calculating (North Ostrobothnia), biotechnology and medical or veterinary sciences, food and foodstuffs (Troms), chemistry (Västerbotten and Troms), manufacturing companies within the automotive and patient care industries (Norrbotten). The rest of the BIN area has rather sparse business R&D activity
- Design policy measures to attract big companies to place their R&D activities in the BIN area. There is a remarkable example of North Ostrobothnia with Nokia, an advanced IT cluster and a technologically profiled university. What if new large companies operating in the area are encouraged to contribute to the local community by investing in own R&D?
- Facilitate and support R&D activities in the existing industrial environments. For example, policy measures can be designed to attract R&D companies to industrial parks (e.g. Mo Industrial park in Norway is a concentration of companies with shared infrastructure and interconnected technologies
- Stimulate cooperation between innovation hubs (clusters, technological and industrial environments) already established in the BIN area
- Establish shared R&D infrastructures[3] for actors in the BIN area

The five proposed directions are of a general character. There is a need for further studies to assess their feasibility. The BIN project is a natural and competent partner for such subsequent feasibility studies.

[2] The Knowledge Index is an economic indicator prepared by the World Bank Institute to measure a country's ability to generate, adopt and diffuse knowledge. According to this methodology, knowledge economy consists of education and human resources, the innovation system and information and communication technology.

[3] Definition of research infrastructure: https://www.scienceeurope.org/policy/policy-areas/research-infrastructures/

# Electricity

This chapter focuses on electricity production and consumption in the BIN area. We study energy mix and the share of renewable energy in total electricity production.

Knyazhegubskaya hydro power station
Photo: Roman Polikarpov

The BIN area is a significant provider of electricity produced from renewable energy sources for Norway, Finland, Sweden and the North-West Federal District. It is also a significant provider of renewable energy for the Nordic power market.

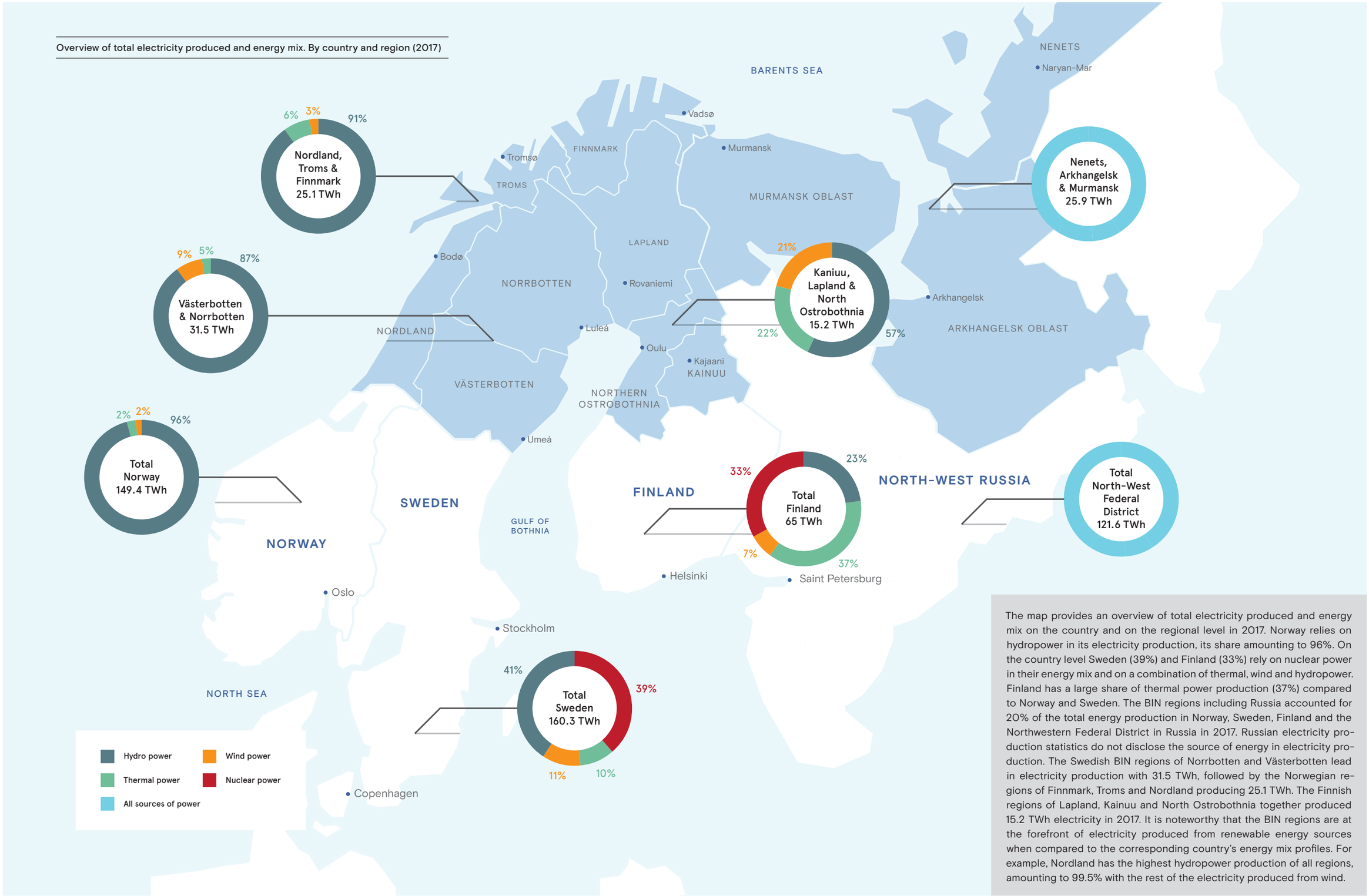
In this chapter we address the following questions:

- What are the trends in electricity production in the BIN area for the period 2014-2017?
- What is the share of renewable energy sources in electricity production?
- What business opportunities does electricity surplus bring to the BIN area?

## Key messages

- The BIN area produces 20% of the total electricity in Norway, Sweden, Finland and the North-West Federal District in Russia
- 85% of all electricity produced in the European BIN regions originates from renewable energy sources
- Electricity production has increased in the BIN area (excl Russia) by 16% from 61.7 TWh to 71.8 TWh from 2014 to 2017
- Electricity surplus has increased in the BIN area by 42% from 21.6 TWh to 30.7 TWh from 2014 to 2017
- Electricity production from renewable energy sources is on the rise in the BIN area
- Industry and construction consume 65% of all electricity produced in the BIN area

Overview of total electricity produced and energy mix. By country and region (2017)




The map provides an overview of total electricity produced and energy mix on the country and on the regional level in 2017. Norway relies on hydropower in its electricity production, its share amounting to 96%. On the country level Sweden (39%) and Finland (33%) rely on nuclear power in their energy mix and on a combination of thermal, wind and hydropower. Finland has a large share of thermal power production (37%) compared to Norway and Sweden. The BIN regions including Russia accounted for 20% of the total energy production in Norway, Sweden, Finland and the Northwestern Federal District in Russia in 2017. Russian electricity production statistics do not disclose the source of energy in electricity production. The Swedish BIN regions of Norrbotten and Västerbotten lead in electricity production with 31.5 TWh, followed by the Norwegian regions of Finnmark, Troms and Nordland producing 25.1 TWh. The Finnish regions of Lapland, Kainuu and North Ostrobothnia together produced 15.2 TWh electricity in 2017. It is noteworthy that the BIN regions are at the forefront of electricity produced from renewable energy sources when compared to the corresponding country's energy mix profiles. For example, Nordland has the highest hydropower production of all regions, amounting to 99.5% with the rest of the electricity produced from wind.

**Figure 5.1 — Electricity balance 2017, TWh**

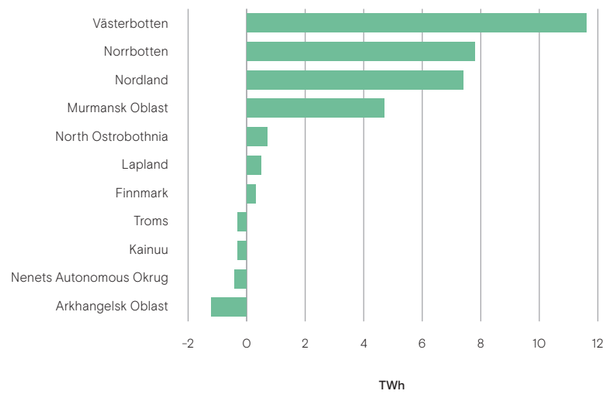



Figure 5.1 demonstrates the electricity balance in the BIN area. Electricity balance represents the difference between consumption, production, import and export of electricity. The electricity balance in the BIN area is characterized by an electricity surplus, and seven out of 11 regions in the area had a surplus of renewable energy in 2017. The total surplus of electricity in the BIN area amounted to 30.7 TWh in 2017, with the biggest surplus occurring in the region of Västerbotten totalling 11.6 TWh. Both Norrbotten and Nordland account for a large share of the electricity surplus. The exception is the regions of Troms, Kainuu, Nenets and Arkhangelsk, whose electricity consumption exceeds production. Compared to the statistics for 2014 the situation has improved. In 2014 only three of the regions in this area had a surplus of electricity (Västerbotten, Norrbotten and Nordland), in 2017 North Ostrobothnia, Lapland and Finnmark have turned from being electricity importers to regions with electricity surplus. The surplus in the energy balance in the Finnish regions can be attributed to the growing role of wind power. In 2014 North Ostrobothnia, Kainuu and Lapland collectively had 6% of electricity originating from wind power and in 2017 this rose to 21%. The BIN area accounts for only a small part of the national consumption level of energy.

**Figure 5.2 – Electricity production in the BIN area 2017, TWh**

Figure 5.2 illustrates the total electricity production in the BIN area and the rest of the countries. In total the BIN regions produced 97.8 TWh in 2017. Norway, Sweden and Finland produced a total of 397.8 TWh the same year. This means that the BIN area accounts for a relatively large share of total production in the respective countries, although some of the regions consume more energy than they produce. Industry and the construction sector consume 65% of all the electricity produced. Households and agriculture consume 23% of all electricity, followed by services and transport contributing to 12% of consumption. The BIN area is a very attractive area for establishing new power-intensive industries, and we have seen a growth in both electricity production and consumption in recent years.

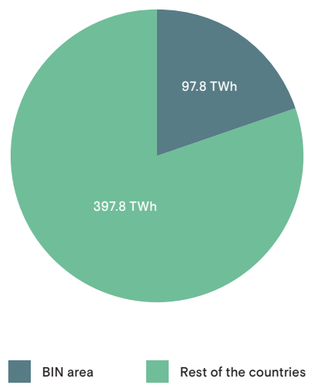



**Figure 5.3 – Electricity production from hydropower and wind power 2017, TWh**

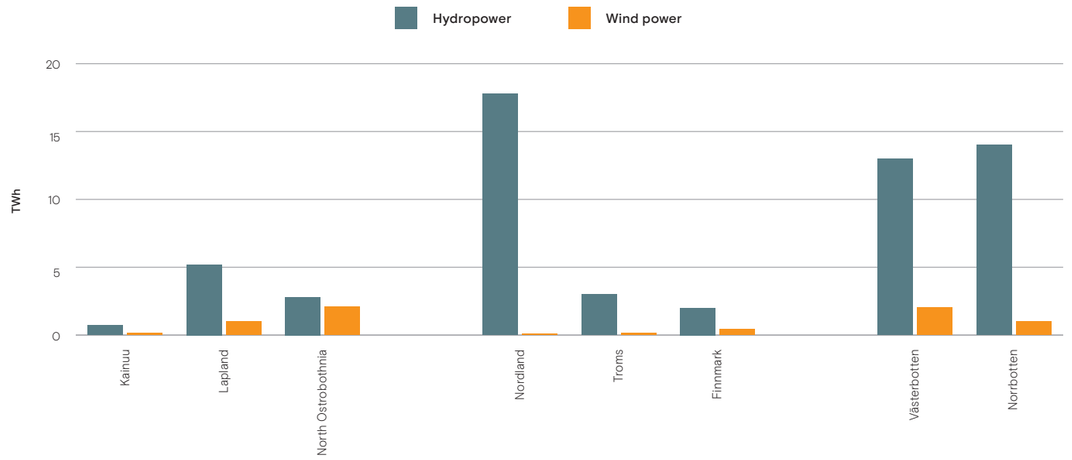



Figure 5.3 illustrates electricity production from both hydropower and wind power in the BIN regions in 2016. Hydropower accounts for the biggest share of electricity production in the BIN area. The figure shows that Nordland is the largest hydropower production region in the BIN area, producing a total of 17.8 TWh in 2017, which is over 30% of the total hydro power production in the BIN regions excluding Russia. At the same time Nordland has one of the lowest wind power production levels at 0.097 TWh. Sweden has the highest production of wind power, and accounts for about 44% of the total wind power production. There has been an increase in the development of wind power parks and wind power production in the BIN area in recent years.

# *Answers to questions*

### What are the trends in electricity production in the BIN area for the period 2014–2017?

The BIN area is a strong provider of electricity, also for other regions with a growth in production of 16% over the last three years (BIN excl. Russia) and 13.3 % for the BIN area incl. Russia. Electricity surplus has increased in the BIN area (incl. Russia) by 42% from 21.6 TWh to 30.7 TWh from 2014 to 2017.

### What is the share of renewable energy sources in electricity production?

Electricity produced in the BIN area comes predominantly from renewable energy sources. The dominant form of production in all the BIN regions continues to be hydropower. In recent years energy production from wind power has increased in the BIN area. Thermal power production is a significant source of energy in Sweden and Finland.

**How to address challenges**

The Finnish and Swedish BIN regions continue to rely on thermal power in their energy mix. We observe that reliance on thermal power decreased from 24% to 22% in the Finnish BIN regions and from 13% to 5% in the Swedish BIN regions in the time period 2014-2017. There are opportunities to decrease the carbon footprint in energy sources in electricity production even further. The feasibility of clean energy sources is to be studied further, including wind, solar and tidal power production.

### What business opportunities does electricity surplus bring to the BIN area?

Abundance of electricity originating primarily from renewable energy sources makes the BIN area attractive for energy-intensive industries, such as data centres, manufacturing, battery production and steel making etc.

**How to address challenges:**

The BIN area needs to exploit its advantageous position with regard to electricity surplus for developing a comprehensive policy on utilization and energy storage. The feasibility of attracting new energy-intensive industries to the BIN area needs to be further investigated from the social and environmental perspectives.



# *Conclusion of the BIN report*

### What brings value to development of the North?

The BIN report provides a comprehensive analysis of sustainable business development in the European north. The report is based on statistical data from multiple sources, using scientific methods, and provides factual and comparable indicators across a set of topics and geographic regions. Several implications and recommendations are presented at the end of each chapter.

We emphasize the value of the people who live in or deal with the north, their livelihoods, and the importance of quality education and job creation. At the same time, successful business activities and economic development are another vital component of value creation. Thus, value creation involves activities beneficial to both persons and legal entities. In this regard, Business Index North seeks to trace both societal and economic developments in the Arctic and offers a nuanced considered view of how these evolve in combination. Sometimes we observe success stories associated with positive trends for both, sometimes we face worrying contradictions.

The BIN report is a key tool to understand demographic and human development trends, business activities and opportunities, as well as core conditions such as connectivity, knowledge infrastructure and electricity production in the BIN area. By bringing the pieces of the puzzle together our report offers an intellectual insight into the process of value creation for business and society in the North.

### What do we know?

Our report highlights worrying demographic trends whereby population growth in the BIN regions is well below national averages and even negative in the Russian BIN regions. The BIN area fails to attract young adults and families; hence the young population is declining. Men in the regions are decidedly less well educated than women.

Business shows positive trends, especially measured in terms of growth in turnover. Businesses rely on natural resources extracted from the region, but new opportunities in value-added business such as information and communications are on the rise.

Is business development in the BIN area socially sustainable? In the meantime, high economic growth in the BIN area is associated with negative job creation rates. Each year, every 100 new workplaces created in the BIN countries (Norway, Sweden, Finalnd, North West Federal District of Russia considered together) are associated with 15 workplaces lost in the BIN regions of these countries considered together.

The BIN area generates electricity from predominantly green energy sources that create attractive business opportunities for energy-intensive industries such as data centres. Broadband accessibility is good for the needs of households but requires further development for the needs of businesses. Research and development in the business sector is below national averages everywhere except North Ostrobothnia. Thus, being advangeiously positioned in terms of energy and connectivity, businesses in the BIN area have limited capacity to contribute to a knowledge economy based on intellectuial resources, information and know-how.

### What is next?

Interest in the Arctic and High North among globally operating businesses is driven by the demand for natural resources and the opening up of sea transportation routes. Knowledge about the past gives us some indication of what lies ahead. We expect the growth in economic activity in the north to continue. However, this growth needs to be supportive of the local people and local communities. Any major disruptions, such as the opening of new mines or manufacturing plants, need to be taken into consideration in terms of socio-economic impacts and demographic challenges to the region. We also strive to show the image of the North not only as a source of extractible resources but as a place full of ideas and unique solutions, which we highlight in a separate BIN Innovations report. The BIN report can serve as a platform for creating a vision for sustainable business in the north that is respectful of nature, people and northern values.

The BIN report is produced in order to serve as an analytical tool for various stakeholders, including decision-makers, media, NGOs, academia and others. The report provides an impartial and independent analysis that can be used for benchmarking and as input for policy-making. It can be used for teaching and raising awareness of the BIN area to the wider world. We continuously upload new reports to the web site **www.businessindexnorth.com.** Moreover, we develop data visualization tools and infrastructure maps which can be applied by users according to their specific interests. We believe that all people who would like to contribute to sustainable development of the Arctic will find BIN a practical and insightful tool.

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# BUSINESS INDEX NORTH

Business Index North (BIN) is a project that contributes to sustainable development and value creation in the Arctic. The overall goal is to establish a recurring, knowledge-based, systematic information tool for stakeholders. This is the third issue of the "Business Index North" analytical report focusing on the BIN area, including eleven northern regions of Norway (Finnmark, Troms, Nordland), Sweden (Norrbotten and Västerbotten), Finland (Lapland, Northern Ostrobothnia and Kainuu), and North-West Russia (Murmansk Region, Arkhangelsk Region (not including the Nenets Autonomous District), and the Nenets Autonomous District. In future issues of the report we would like to include Alaska and the Northern territories of Canada, Iceland, and Greenland, as well as more territories of the Russian High North.

The main implementing partners are 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.

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