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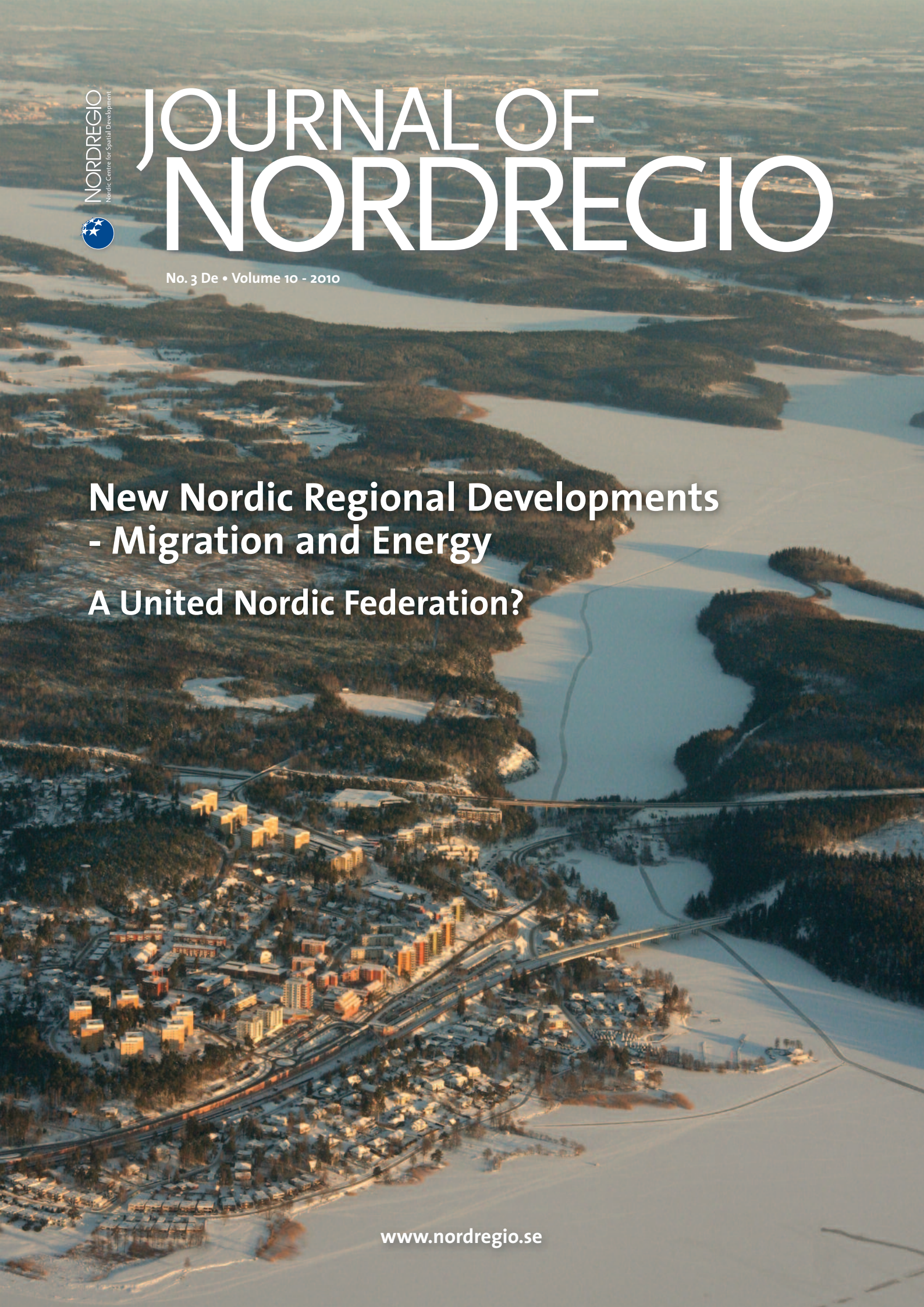

New Nordic Regional Developments - Migration and Energy

A United Nordic Federation?

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Contents

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NORDREGIO Nordic Centre for Spatial Development
norden Nordic Council of Ministers

Nordregio is a centre for research, education and documentation on spatial development, established by the Nordic Council of Ministers.

Regional development in the Nordic Countries

- New Report out now!

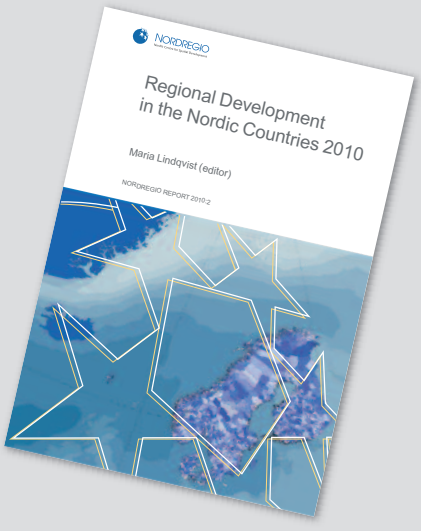
In December 2010, Nordregio will present the twelfth volume in the series "Regional Development in the Nordic Countries", which has regularly supplied practitioners with comprehensive analysis of the Nordic regional development scene. This is a summary report, using results from more than twenty recent or ongoing research and analysis projects.

After a period of strong economic growth all five Nordic countries were hit by the global recession in the autumn of 2008. This, of course, has constituted an important challenge to all countries, but to Iceland in particular.

The report presents the recent development of the human resources, economic growth and labour markets at national and regional level in the Nordic countries and gives a state-of-the art introduction to the current situation.

Even if the Nordic countries are perceived as relatively homogenous, important differences continue to exist between regions. This has contributed to an increased focus in regional policy on growth strategies based on regional challenges and potentials.

The report also includes more in depth analysis related to the core areas of research at Nordregio, for example on variations in migration patterns (see article on page 6) and the development of Nordic energy policy (see article on page 10). An introduction to the report is given on page 4.



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A United Nordic Federation?

Is there a case for a United Nordic Federation? "Yes" says the historian Gunnar Wetterberg. Earlier this autumn his new brochure *Förbundsstaten Norden* "The United Nordic Federation" was published - by none other than the Nordic Council of Ministers - who also initated and financed the study. More than anything the booklet is an attempt to re-launch the debate about a possible United Nordic Federation.

Who should be members? Today *Norden* is the five Nordic countries (Denmark, Finland, Iceland, Norway and Sweden) and the three autonomous territories (the Faroe Islands, Greenland and Åland). Geographically it is the Scandinavian Peninsula, Denmark and Finland attached to the European mainland and four island communities of varying size. Greenland, the largest, is almost 2.2 million km^2, which can be compared to the roughly 1.3 million km^2 of the five Nordic countries together.

In between the landmasses there is a lot of ocean with seabed below. Since the *Loophole*-settlement between Russia and Norway earlier this year, seabed ownership is no longer such a divisive subject though potential areas of dispute undoubtedly remain, for instance over the *Loop-sea*.

It could however be argued that such issues do not really present realistic obstacles to a United Nordic Federation. Conflict over land and sea areas has until relatively recently been a part of the history of *Norden,* as in most other parts of the word. In fact some would argue that in a previous historical era parts of Northern Germany and what are now the Baltic States were once within the sphere of *Norden*.

Wetterberg's key argument is that the time is politically ripe for Federation. He puts it like this:

"Geography is economics, and it is in the hands of politics. From the founding of Switzerland, to the liberation of the Netherlands, to Italian unity, German reunification and the fall of the Soviet Union, political geography has, time and again, been redrawn and left its marks on the passage of history."

And he continues: "Now, the Nordic Region has just such an opportunity to shape the future of its people, companies and culture. This opportunity is the most important issue facing the countries' politicians. If they decide to grasp it, then the United Nordic Federation will have every chance of transforming the Region into an entity capable of offering its citizens far more than the individual countries ever could."

During the Cold War the security and foreign policies of the Nordic countries and territories were predominantly directed by how the interests of the Soviet Union and the United States of America were perceived. The superpowers ruled and the rest of the world followed.

In 1989 the Soviet Union collapsed. Many would argue that the USA is in a process of losing its global dominance. Their war against terrorism is not about territory. Furthermore, NATO is preparing to unite with Russia to build a new rocket-shield. They do not say against whom, but it is not difficult to guess that potential enemies include countries such as Iran, North Korea and perhaps China.

In other words, as long as *Norden* goes along with this new conflict scenario, global politics will not create difficulties in building the Federation. This hypothesis has indeed been borne out thus far. The Nordic Prime Ministers initiative some three years ago to investigate the possibilities of increased military and security cooperation in *Norden* (*The Thorvald Stoltenberg Report*) was not met by protests - from either the East or the West.

The United Nordic Federation would have 25 million citizens and a GDP of approximately $1 600 billion – about the same as Spain and Canada – making it one of the world's 10–12 biggest economies. This economic strength seems, for Gunnar Wetterberg, to be the most important argument for the Federation. In particular, he underlines that the federation could give the Nordic countries a real role in the G20.

Denmark, Finland and Sweden are member of the European Union. Iceland is likely to join within a couple of years. Norway may continue to stay out. But as long as it continues to adjust to the requirements of economic cooperation and the border-controls of the Schengen-agreement - and is a major supplier of oil, gas and fish - the implications of non-membership are of little practical importance. Therefore, the EU does not have to be a hindrance to a potential Federation.

Thus far the initiative, seemingly supported by the Nordic Council of Ministers, has been reported in all the main media outlets across the Nordic countries. Majorities in each country seem to be generally favourable if not all that interested. It is likely the debate will rumble on. Wetterberg suggests that the Federation could elect its first legislative assembly by 2030.

To this writer that date seems far too distant. If we are really to use the current political climate to our advantage why not go for 2020?

By indicating a ten year perspective for the process it might be possible to create some real debate and engagement. This would also signal a clearer indication of the real viability of the idea of a new United Nordic Federation.

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Discernable shift in Nordic developments

Over the last two decades there has been a discernable shift in focus in regional policy strategies in the Nordic countries from redistribution and state intervention to the promotion of a stronger focus on endogenous growth strategies. Whether and how far these shifts have had a major influence remains a topic of heated discussion.

The effects, since the autumn of 2008, of the financial crisis however clearly indicate the need for regionally adapted strategies to handle the significant variations in the challenges faced by individual Nordic regions. This is one of the major conclusions to be drawn from the latest edition of The Nordic Regional Development Report, published by Nordregio this autumn.

Strong economic performance

From the middle of the1990s until the financial crash in 2008 the global economy went through a period of exceptional growth, with Asia in the van. During this period, economic development in the Nordic Countries, as in many other advanced economies, became increasingly dependent on innovation and knowledge-related growth, as material investments decreased, while immaterial investments in human capital, R&D, education, organisational development and 'branding' became more valuable.

Most Nordic countries saw economic development above the EU average, with Iceland at the top and Denmark slightly below the EU average. In terms of welfare, measured as GDP *per capita* in PPS, 80% of the Nordic regions reached a level above the EU average. Only 60% of the regions however scored higher in terms of productivity per employee, indicating a potential for further development.

The economic development of regions is closely linked to the development of a competitive business sector, the supply and demand of human resources and a well functioning labour market. When combining total population change, the level of employment and economic performance, large variations emerge between the Nordic regions. The capital regions, together with some larger city regions, are performing well, while a negative level of development is to be found in many rural areas.

Challenges posed by the financial crisis

The global financial crisis beginning in the autumn of 2008 posed significant new challenges to the Nordic countries. The situation has been particularly severe in Iceland, where three of the largest banks collapsed, leading to a rapid depreciation of the currency and a severe downturn in the Icelandic economy.

The crisis resulted in a rapid increase in the European unemployment rate. In 2009, the annual average unemployment rate of the EU27 was 8.9%. Among the Nordic countries, Iceland, Sweden and Finland were especially hard hit. Iceland suffered the most dramatic change in unemployment. Before the crisis, the country had the lowest unemployment rate in Europe. Since then, the level of unemployment has risen to around 8%. In Denmark, the unemployment rate almost doubled, but still remained well below the EU27 average. Norway had the lowest unemployment rate in Europe in 2009 (3.1%).

The economic decline is also shown in trade statistics and many Nordic regions dominated by export-orientated manufacturing industries were hit hard by the crisis. The most striking example was Finland, were the volume of exports shrunk by 20% and imports by 18%. Norway had the least negative growth; probably due to the stable situation of the petroleum market. At a regional level, Finnish regions relying on the paper and pulp industry were heavily hit and West Sweden experienced a significant negative change due to the downturn in the automobile industry. In regions more dependent on services and on public sector employment, the effects of the crisis have, hitherto, been more limited.

As a result, there are substantial regional differences in terms of unemployment. The lowest figures (below 2%) are found in most municipalities in Norway and in the Finnish region of Åland, and the highest figures (above 14%) are found in northern Swedish and Finnish municipalities, in Nordjylland (Denmark) and Trollhättan (Sweden). In Denmark, Iceland and Norway, regional differences are smaller.

In 2010 the global economy was still recovering after the crisis. During the first quarter of the year GDP expanded at an annual rate of over 5%. With strong public finances, Nordic economies, with the exception of Iceland, have been able to lend strong support to the financial sector and were among the first economies to recover.

Migration and ageing

All across Europe, we can see a trend towards an ageing population. Significant differences exist, however, between the European Union and the Nordic age structures. Compared to the EU27 average, the age group 60-64 years is significantly larger in the Nordic countries, while the age group 20-54 years is slightly smaller. At the same time, the Nordic countries have, in general terms, high birth rates and a larger share of children aged 0-19 years than the European average.

Most Nordic municipalities gained from international migration in the period 2005-2009. However, in Denmark, Norway and Sweden the overall level and share of international migration was much higher than in Finland. During this period, the Nordic countries saw a modest population growth of approximately 0.67% per annum, which was above the average EU growth of 0.40% per annum.

At the national level, Denmark, Finland and Sweden saw a population increase close to the EU average, while Norway had an annual growth rate above 1%. In Iceland, a rapid population increase was turned into a decrease as a result of the crisis in 2008, and in the autonomous regions population growth was negative (Greenland) or low (Faroe Islands).

Looking at the population structure by age and gender, regional variations remain. A common trend here is that the population in urban areas is younger than in rural and sparsely populated areas. Generally speaking, the city regions also have the highest share of female population, while in small and medium-sized towns and some more rural regions, especially in West Norden, males predominate.

Knowledge, a skilled labour force and research
In a globalised world, knowledge is becoming an increasingly important factor for innovation and regional competitiveness. A high level of education among the labour force, access to a high quality school system and investments in research and development (R&D) are important resource bases for innovation and development. From a broader European perspective the innovation potential of the Nordic countries is thus quite high.

The Nordic labour market has a highly skilled labour force boasting the highest levels of 'population with a tertiary education' in Europe at the regional level. When it comes to 'life-long learning', the tendency is similar and all Nordic countries have figures well above the EU27 average of 9%, with Finland (29%), Denmark (20%) and Sweden (18%) at the top. Skilled workers tend to be more productive, less exposed to unemployment; more satisfied with their professional lives and they retire at an older age. Nevertheless regional variations remain as higher education is clearly concentrated to the metropolitan areas in the Nordic countries.

The level of education and the quality of the entire educational system are crucial elements in the construction of a skilled labour force. Therefore, many of the measures designed to counter unemployment in the Nordic countries have focused on education and training. It is also crucial to provide a well-functioning infrastructure and new investment in transportation, housing and education to attract people to, and maintain them in, a region.

In 2008, the five Nordic countries had the highest public R&D expenditure as a share of GDP in the EU, with Iceland top. Finland, followed by Sweden was ranked highest in terms of private sector R& D expenditure.

Drivers of innovation
A high level of tertiary education or research expenditures may not however be enough to stimulate innovation and development. There is also a need for mechanisms to stimulate the exploitation of new ideas, the commercialisation of academic research and the transfer of different types of knowledge between the public and private sectors. Firms delivering knowledge-intensive business services (KIBS) have a key role here as integrators of knowledge from various parts of the innovation system.

A strong national and regional entrepreneurship culture is another mechanism that indicates a higher potential to create growth in established or new firms. In a global comparison the Nordic countries have not been found to be among the highest performers in terms of new start-up activities. There are, however, large variations between countries, regions and sectors.

While, on average, 58% of all students are female, the levels of self-employed women in the Nordic countries remained relatively stable at around 30% between 2002 and 2008. To increase this figure further emphasis has been placed on supporting the development of women entrepreneurs. This relates both to women's position in society and to the general importance of entrepreneurship in the development of economic growth. All of the Nordic countries, except Iceland, have a programme or an action plan with the aim of supporting women's entrepreneurship.

High on energy
The climate change measures taken in the Nordic countries highlight different institutional approaches to climate change adaptation. While Finland considers sectoral adaptation strategies, Denmark and Sweden emphasise the role of local or regional actors in carrying out climate change adaptation efforts. The Nordic countries are committed to further reducing greenhouse gas emissions by increasing their share of energy production from renewable sources.

Despite the fact that the Nordic countries are generating only moderate emissions of greenhouse gases compared to other developed countries of a similar size, due to their lower dependency on fossil fuels, their consumption of energy *per capita* is among the highest in the world.

Relatively high heating costs, due to the cold climate combined with a sparse population distribution pattern, a greater need for individual transportation, the presence of heavy process industries plus generally high levels of income, are some of the factors behind this high level of energy demand. In spite of the continuous economic growth in the region, however, the demand for energy has remained stable over the last ten years.

The most important energy sources for the Nordic countries, in order of importance, are oil, renewable energy sources (mainly hydro-, geothermal and wind energy), nuclear power, coal and gas.

Increasing cross border integration
Since the first Nordic commuter map was presented in 2001, cross-border commuting has steadily increased. In 2006, a total of 44 000 individuals were classified as cross-border commuters. Commuting from Sweden to Denmark or Norway is the major commuter flow, making up 75% of total cross-border commuting traffic. Norway has by far the largest number of in-commuters, followed by Denmark.

This report is the twelfth volume in the series "Regional Development in the Nordic Countries", which has regularly supplied practitioners with a comprehensive analysis of the Nordic regional development scene. It is a summary report, with the ambition of widening the diffusion of results from recent or ongoing research and analysis projects. Overall, input from more than twenty different projects has been used in its production.

By Maria Lindqvist
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Increasing importance of Nordic migration

During the last five years the Nordic population grew modestly by approximately 0.67% *per annum* or by a total of 842 000 persons. This was more than the European Union average, with a 0.40% growth rate or an increase of 9.9 million persons. At the national level, Denmark, Finland and Sweden each saw a total population increase around average EU rates. Norway had a higher annual population increase, above 1%. From a European perspective, Iceland had the most dramatic development with a population increase over 2% *per annum* in 2005-2008. However, as a result of economic changes the total population decreased by approximately 0.50% between 2009 and 2010.

The total population change is a combination the difference between births and deaths and migration. Twenty years ago the impact of these components to population development in Norden was more or less the same. Today the natural population development impacts on approximately 1/3 of total population change. Therefore the overall impact of migration on Nordic population size and structure is considerable and increasing.

The Nordic population has over time concentrated increasingly in the major city regions and regional centres. Over the last ten years the Nordic capital commuter catchments areas (excluding Copenhagen) experienced an annual average population increase of 1.0% or more. The population increase was even higher in several Nordic second-tier metropolises with especially high migration rates, particularly Stavanger/Sandnes (NO), Malmö/Lund (SE), Reykjanes Peninsula (IS), Tampere (FI) and some regional centres like Oulu (FI) and Vejle (DK). At the same time municipalities outside the city areas have experienced significant population losses in recent decades, mainly in the Danish, Finnish and Swedish countryside.

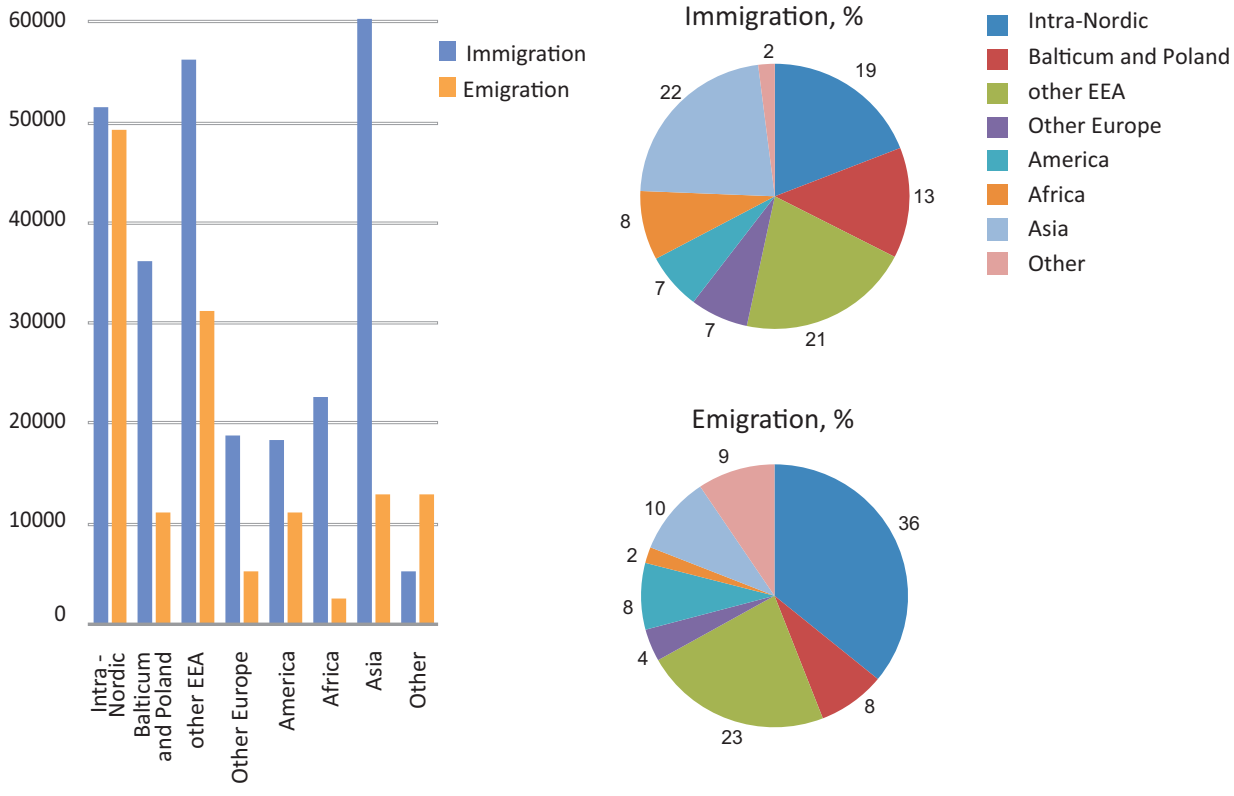
Measured at the municipal level, this migration-related concentration pattern has in any case changed to some extent in recent years. The question is mainly about the capital and metropolitan growth regions that has expanded with longer commuting distances especially along the main transport corridors but also on a lesser scale in relation to few local centres in the peripheral regions that have managed to move from out- to in-migration municipalities. This local development is mainly a result of the effects of the tourism industry. In Iceland and Norway some small coastal communities also saw positive net migration due to various fishing and aquaculture activities.

There are significant differences in terms of the intensity of migration and the shares of domestic and international migration flows in the Nordic Countries. Domestic migration patterns follow the overall migration picture, but with an even higher concentration to major city regions. In many rural municipalities, especially in Norway and Sweden, negative domestic migration is compensated by extensive international migration.

Mobile year 2009

Over 10% of the Nordic population changed its place of residence in 2009. Even if most of these people simply moved to

Nordic International migration in 2009, in persons



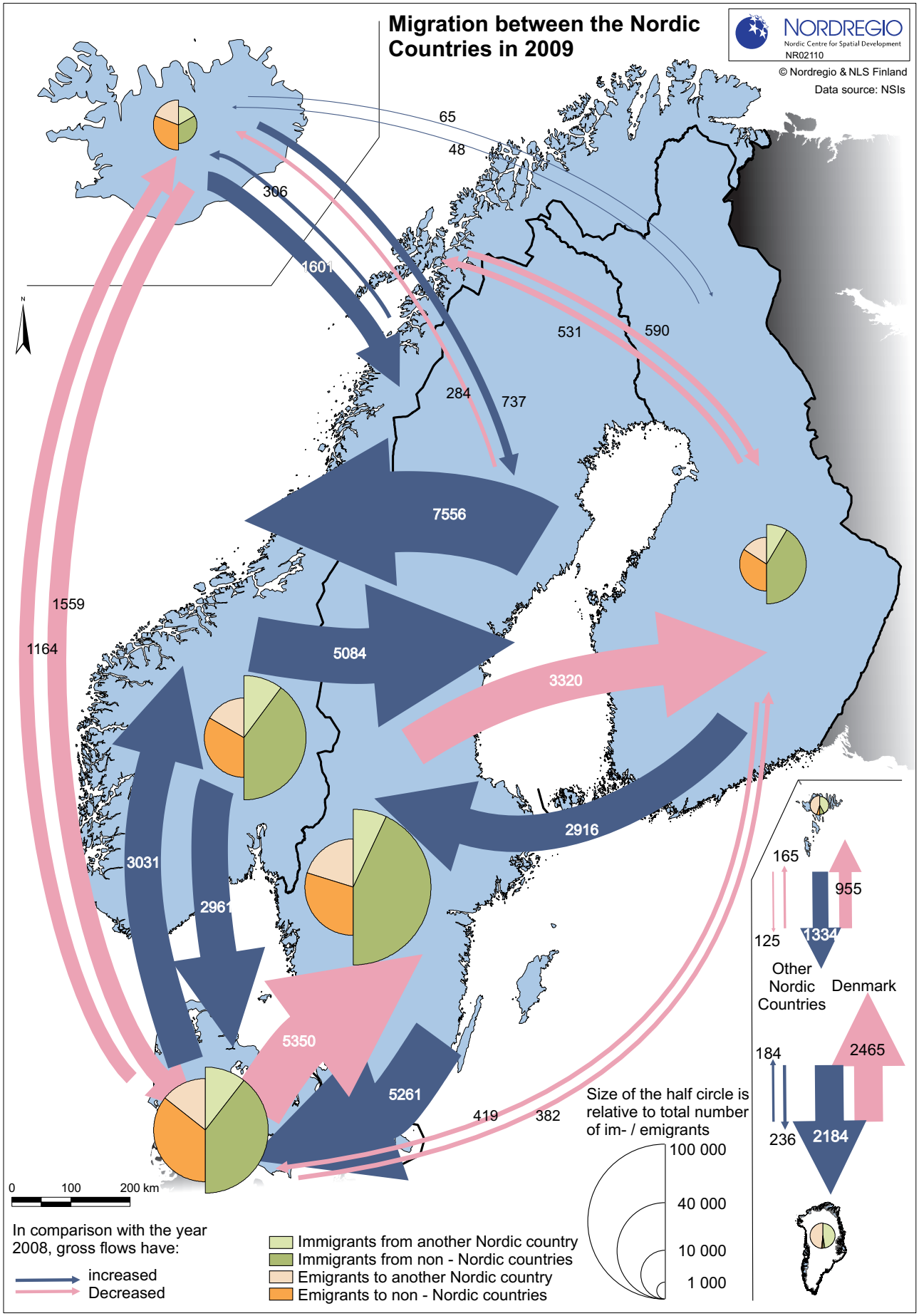


Figure 1: Migration between the Nordic Countries in 2009

nearby municipalities or to other regions in the same country, 1.6% of the Nordic population, or slightly more than 400 000 persons, nevertheless changed their country of residence. In terms of net migration, the Nordic population increased in total by approximately 130 000 persons due to immigration to the Nordic Countries in 2009.

In relation to total population people in Finland and Iceland were most mobile. Total mobility was highest in city regions with universities and in some tourism-oriented rural municipalities.

When dividing migration flows after direction, domestic migration flows are highest in the capital regions of Copenhagen, Stockholm and Uusimaa (Helsinki), and in the Finnish regions of Pirkanmaa and Pohjois-Pohjanmaa. International migration flows are most intense in the capital regions of Oslo, Copenhagen-Malmö and Stockholm, Norwegian Vestlandet, Åland and Iceland. In Denmark, Norway and Sweden the overall level and share of international migration was much higher than in Finland.

International migration

When looking at the direction of international migration on average 25% of all international migration in *Norden* occurs within the Nordic countries. On the international level total migration flows are highest to and from Denmark and Sweden, but compared to other international migration flows, people in Sweden move mostly to/from other Nordic Countries, whereas the relative share of Nordic migrants is highest in Iceland. Some interesting geographical and historical patterns are however visible.

Migration flows between Denmark, Norway and Sweden are significant in every direction. The main Nordic flows in Iceland are with Denmark and Norway. In Finland the flows to and from Sweden are the only significant Nordic flows. International migration in the Faroe Islands and Greenland is mostly to/from Denmark.

Something over 40% of all Nordic migration is to and from other European countries. The main (non-*Nordic*) European origin and destination countries are the Baltic States and Poland. Those countries have especially high rates to and from Iceland and Norway. In Finland, the share of Russian migration is also significant. The Nordic share of extra-European migration is around one third, immigration from Asian countries accounting for a significant share of this. At the national level Sweden has the highest extra-European migration rates.

The share of foreign population has been increasing in all of the Nordic Countries; it is interesting however to highlight that 23% of immigrants are actually nationals of the immigration country. A significant number of these persons are labour migrants and their families who have lived for a limited time abroad. On the other hand 48% of emigrants are nationals. In the Faroe Islands and Greenland, the share of national immigrants and emigrants varies between 85 and 93%. These high figures can be explained by temporary emigration due to studies and other short term activities. Also in Iceland the role of Icelandic emigrants and immigrants is significant.

By Johanna Roto

40 years of population change in West Norden

In the wake of the financial collapse Iceland has seen thousands of people emigrate. Even though this change in population development was quite dramatic it was not however unique in terms of the region as a whole. Across all of West Norden recent major political and economic phenomena, in addition to ongoing natural change processes, have had a significant influence on net migration rates.

Due to the small size of the domestic markets across the region, such phenomena can clearly be seen to have acted as either 'push' or 'pull' factors in terms of international migration rates where people are either moving (back) to regions in good times or 'voting with their feet' due to rapid and negative changes in their social conditions in bad times. As West Norden is characterised by natural resource dependency, and especially by dependence on fisheries, changes in fish stocks have historically affected migration rates.

When reviewing the last 40 years it can quickly be seen that in the 1970s and 1980s the net migration rate was rather modest, experiencing both net immigration and emigration. In 1973, for the first time in over 35 years, the Faroes experienced a positive net immigration. Some of the major factors in this change were the general increase in the standard of living, very low unemployment - especially compared to unemployment in Denmark, a rise in the number of jobs for women and particularly also in the fishing industry, better educational opportunities for young people, and rising demand for educated people. This precondition was supported in the Faroe Islands as early as 1965 when the University was founded.

Faroe fishing crisis

The main demographic crisis in the Faroe Islands is thus related to changes in the fisheries sector. During the 1970s successful skippers managed to accumulated capital and invested in new filleting plants, and thus a highly successful fisheries industry was established. This was however soon rocked by a marked decline in resources caused by a combination of over-fishing and environmental variation which led to a drastic decline in fish stocks off the Faroes.

At the end of the 1980s and the beginning of the 1990s the fisheries sector not only collapsed (fish made up approximately 90% of exports), but, due to over-investment in new technologies, the major Faroese banks went bankrupt and foreign indebtedness rose sharply. Most of the fish processing plants were closed and the Faroese economy was placed directly under Danish administration.

Combined with rapidly increased unemployment up to as much as 20% in Tórshavn, and even higher in the outlying islands, and a growing international boycott of Faroese produce over the pilot whaling (*grindadráp*) issue, many people emigrated. Heavy emigration between 1989 and 1994 saw the population decline by 10%, from approximately 48 000 to 42 000 persons. Emigration was especially high among young people.

The measures used to get the Faroes 'up and running again' largely worked, and in 1996 net immigration was one again positive. The economically positive years thereafter kept net immigration positive until 2004. Since then migration has remained rather stable.

In Greenland, before Home Rule was established in 1979, the importation of workers from Denmark was often used to maintain a stable and viable workforce. While the 1950s and 1960s in Greenland were characterised by an influx from Denmark of short term labour connected to the building industry, a number of these people got married to Greenlanders leading eventually to the out-migration of both Danes and their Greenlandic spouses during the 1970s.

Home Rule 1979

With the establishment of Home Rule in 1979 Greenlanders took over many jobs leading to a massive increase in out-migration which, by the 1980s had the knock-on effect of a perceptible decline in the volume of international migration. Parallel to this, the establishment of attractive workplaces in Greenland has impacted on the migration pattern, as have major investments in education. This helped to reduce the emigration rate of native Greenlanders.

This shift in government change related migration saw a peak in Greenlandic net migration figures. The policy which oversaw native Greenlanders taking over those jobs previously held by former colonial power nationals turned out to be rather successful in the sense that only ten years after Home Rule was established net out-migration had ceased. Most of the jobs, however, were for men, so the migration pattern is highly gender and born-place oriented.

For the Greenland born population, a major share of emigrants are female, and the out-migration of younger people – primarily women – looking for educational and job opportunities has led to a continuous outflow since the beginning of the 1990s of both Greenlanders and Danes.

This has led to a situation where more than 18 000 Greenlanders (defined as persons born in Greenland) are now living in Denmark, compared to the total number of just below 50 000 actually living in Greenland.

Iceland

Until recently the population development in Iceland had been rather stable. In the period 1986-2008 up to 79% of Icelandic citizens who migrated returned after an average stay of 2.4 years abroad. This pattern of short term employment and study period 'excursions' kept migration rates rather stable.

The diversification and liberalisation of the Icelandic economy after 1994, when Iceland joined the European Economic Area, can clearly be seen as being expressed in an increase in net immigration rates. In the period 2003-2007 Iceland developed from a nation best known for its fishing industry into a country providing sophisticated financial services. Due to the emergence of new business opportunities, beginning in 2004, a huge influx of persons came from abroad to Iceland, with 2005 and 2006 seeing recorded figures which were relatively higher than any other European country.

Part of this undoubtedly related to the building activities connected with the *Alcoa* aluminium smelter in eastern Iceland in 2004-2008, with a 1 500 -person foreign workforce, mostly from Poland. Iceland was hit hard by the 2008 global financial crisis, which extended into 2009. The crisis has resulted in the greatest migration from Iceland since 1887. In 2009, net emigration was around 5 000 persons, half of those being foreign citizens. However, between January and June 2010, the Icelandic population increased by approximately 400 persons.

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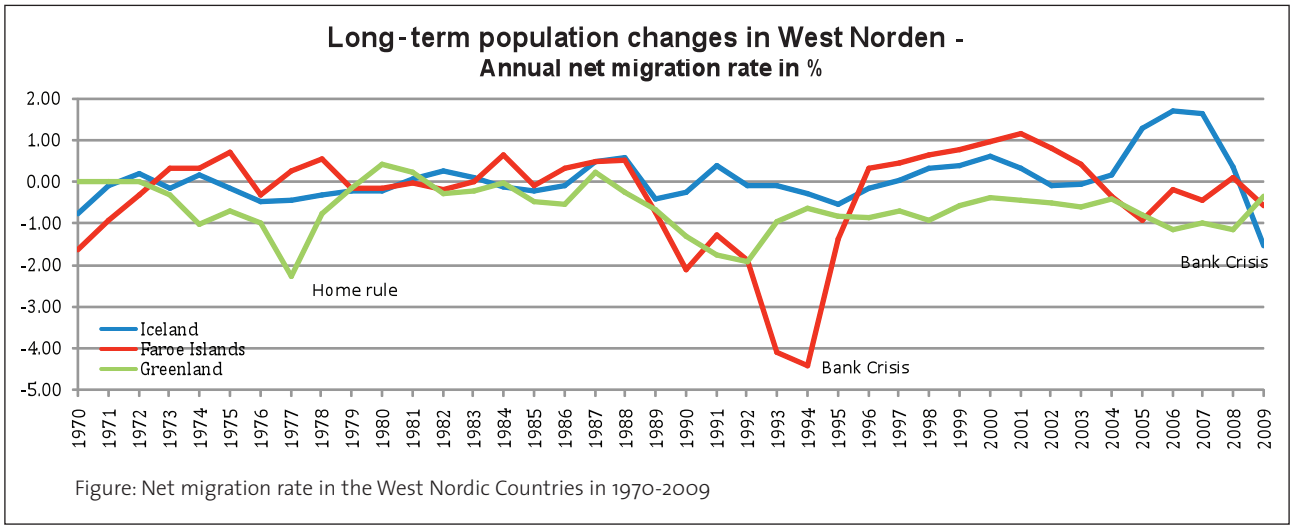


Figure: Net migration rate in the West Nordic Countries in 1970-2009

The producers of aluminium are heavy users of electricity. Picture shows Hydro aluminium plant in Sunndal at the west coast of Norway. Photo: Øivind Leren

Nordics top world energy consumption

The Nordic countries generate only moderate emission levels of greenhouse gases compared to other developed countries of a similar size. This is related to their lower dependency on fossil fuels. However, their consumption of energy *per capita* is among the highest in the world.

Relatively high heating costs, due to the cold climate combined with a sparse population distribution pattern and the greater need for individual transportation plus generally high levels of income, are considered the main factors behind this high level of energy demand. Despite continuous economic growth in the region, however, the demand for energy has remained stable over the last ten years.

At the regional level the differences in terms of the geographical distribution of energy production and demand become even more pronounced. In terms of the generation of hydro power, the Norwegian regions, especially in the south, dominate thanks to the ready availability of suitable hydrological sources.

Sweden, on the contrary, has a more heterogeneous supply mix, as hydropower dominates in the north while the major urban regions in the south are supplied by nuclear power plants.

In Denmark, thermoelectric generation is the main source of electric energy while wind energy generates approximately 20% of the country's total energy supply.

In Finland, nuclear energy is dominant in the south along with thermoelectric generation from natural gas and biomass. Hydropower generation is however rather modest in Finland and is mainly found in its northern regions.

Capitals consume a lot

The metropolitan regions in the Nordic countries with the highest level of consumption of electric power are *Stockholm* (20.5 TWh), *Västra Götaland* (19.8 TWh), *Oslo og Akerhus* (16.1 TWh), *Hordaland* (13.4 TWh), *Uusimaa* (13.2 TWh) and *Skåne* (12.6 TWh). Services are the most intensive sectors in these regions particularly in *Stockholm* (49.8 %), *Oslo og Akerhus* (42.1%) and *Uusimaa* (42.7%). Households also account for a considerable proportion of the total consumption of electricity in the metropolitan regions: *Oslo og Akerhus* (48.5%), *Skåne* (35.9%), *Uusimaa* (35.6%), *Stockholm* (31.5%) and *Västra Götaland* (28.5%).

Industry

The industrial sector is the major consumer in Iceland (76.8%), followed by Finland (52.6%), Norway (45.8%) and Sweden (41.2%). The metallurgic industry is among the most energy intensive in the Nordic countries, particularly in Iceland, but also in Norway and Sweden.

The pulp and paper industry also consumes a considerable share of electricity particularly in Finland, Sweden. As a consequence of the availability of natural resources for these industrial activities the regions with high energy consumption patterns by industrial sector are often located in the northernmost regions of Sweden and Finland or along the west coast of Norway.

Renewable energy

The Nordic countries have made considerable progress in the use of renewable sources of energy over the last two decades. On average, the Nordic countries generate electricity from renewable sources at four times the level of the OECD countries.

There are considerable variations between countries and regions mainly as a result of the availability of natural resources as shown in the maps on pages 14-15. Iceland and Norway almost exclusively base their electricity generation on renewable energy sources while, in Norway hydropower accounts for almost 100% of all the electricity generation from renewables. In Iceland hydropower accounts for approximately 76% of the total supply of electricity while the rest comes from geothermal power.

Denmark produces approximately 30% of its electricity from renewables of which approximately 64% is generated from wind power with the rest coming from solid biomass and municipal waste. This implies that wind power accounts for approximately 20% of the total amount of electricity generated in Denmark.

In Finland and Sweden biomass and hydropower are the main sources of renewable energy, which combined account for approximately 35.5% in Finland and 55% in Sweden of the total generation of electric power. Hydropower in Sweden accounts for approximately 84.6% of the total electric power generated from renewables while in Finland this figure is approximately 58%.

Contrary to its Nordic neighbours, however, Greenland is still entirely dependent on non-renewable energy sources for electricity generation.

The demand for renewable energy has been fairly stable over the last ten years in Finland and Sweden. Common to all the Nordic countries however is the increase in the use of biomass for heat generation. Denmark in particular has seen a significant improvement in this respect by increasing the ratio between the electricity produced from renewable energy sources and the gross national electricity consumption - from 5.8% in 1995 to 28.2% in 2005 - mainly thanks to the fast development and deployment of wind energy technologies.

Future potentials
Because certain renewable energy sources have been exploited to the extent that further expansion possibilities are limited, as is now the case in Denmark in respect of wind energy, and in Norway and Sweden with hydropower, future developments in terms of renewable sources of energy are expected to focus on the utilisation of currently un- or under-exploited resources.

This is the case in both Norway and Sweden, where wind power appears to be the currently preferred option and the one with the highest potential for expansion. Offshore windmill parks in particular have become a topic of joint interest across the Nordic countries.

Governmental interactions
The generation of electricity and heat power from renewable sources in the Nordic countries has been dependent on various public support schemes. Examples here include feed-in-tariffs - fixed price or premium (Denmark), green certificates (Sweden), taxation of fossil fuels in heat production (Finland, Sweden and Denmark) and CO_2 emission trading and R&D support.

In Iceland, state subsidies or other support schemes for electricity generation have been considered unnecessary given the abundance of, and easy access to, hydro and geothermal power.

Market deregulation
Progressive deregulation towards the market-based trade of electric power in the Nordic countries has been an ongoing theme for many years. Indeed it is claimed that this is a successful process and one that has received significant political support from the national authorities.

Nuclear or wind?

Throughout November 2010 Sweden has witnessed a lively debate on the issue of investment in the future production of electricity. Should investment in nuclear power be continued or has the time finally come to shift to wind-power as the basis for future energy expansion?

The debate began with an initiative from three of the central environmental organisations, The Swedish Society for Nature Conservation (SSNC) *Naturskyddsföreningen*, The Federation of Swedish Farmers LRF and *The Tällberg Foundation*. Senior representatives of the three organisations went publicly asking *Vattenfall*, the large state-owned Swedish energy-company, not to undertake further investments in nuclear-based production of electricity.

The basis of their argument was partly environmental; wind-power is cleaner than nuclear-power, and partly economic; to produce electricity from nuclear power will become increasingly expensive compared to wind-power. Therefore to follow the nuclear-path would also lead to less profit for *Vattenfall's* owner, namely, the Swedish state.

Not everyone however agreed with the figures quoted by the environmentalists. The Energy-section of The Royal Swedish Academy of Science was in particular voicing their disagreement. Their senior representative claimed that nuclear-generated electricity would, like wind-power, become cheaper to produce over time. They added that the new generation of generators also would produce much less waste material. 2010 has seen the birth of 5 new nuclear-generators in Sweden and 50 more are planned or are under construction.

Approximately half of the electricity produced in Sweden originates from the chain-reactions of the Uranium (U235) atom. Therefore to substitute this with wind-power would be completely unrealistic, argued the spokespersons of The Royal Academy. On the other hand, this was never suggested by the environmentalists. Rather, they argued that the planned 20% expansion of Swedish electricity-production - equivalent to 30 TWh - could be based on wind. With no conclusion in sight the debate will undoubtedly rumble on into 2011.

By Odd Iglebaek

The Nordic power sector acts today as a single integrated market and transmission operation managed by independently regulated operators that initially cooperated in Nordel. In 2009 the European Network of Transmission System Operators for Electricity (ENTSO-E) took over the operational tasks of Nordel together with five other TSO associations in Europe.

Energy innovation

The Nordic countries have a strong position worldwide in energy innovation thanks to strong national support for this sector. These countries account for more than 30% of the word's market in the production of wind energy technology. Innovation in bio-energy is also strong in the Nordic countries which have a share of almost 30% of all the biomass-based generation of heat and power in the industrialised world and around 10% of the total scientific knowledge production.

Energy innovation is a very important economic activity in the Nordic countries assuming approximately 6% of total revenues and employment in the region while the export of energy technology and equipment accounts for approximately 5-9% of total industrial exports.

Sweden, Finland and to a lesser extent also Denmark exhibit a strong position as regards innovation in relation to bio-energy, particularly in Combined Heat and Power (CHP) generation. The main reason that Sweden and Finland are strong in bio-energy is the existence of their highly developed forestry and paper pulp industries, providing for the easy availability of biomass.

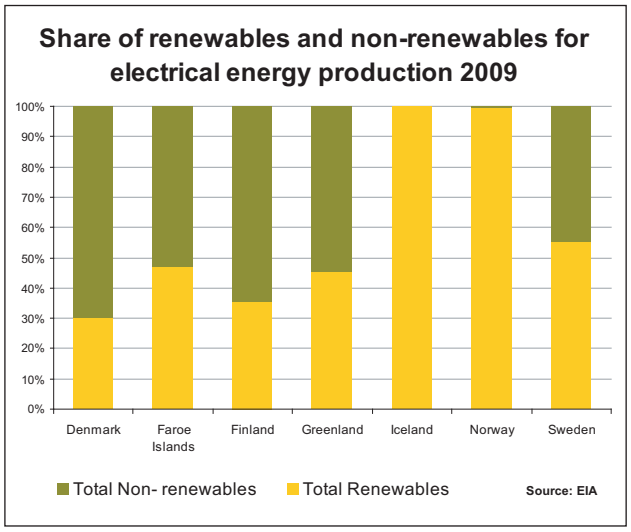
Denmark is an innovation leader in the wind energy sector which has become an important exporter of technology. Norway on the other hand has gained a reputation in the solar energy industry through the development and production of components supplying the internal market. Norway is also stronger in small hydro-based technology relative to its Nordic neighbours.

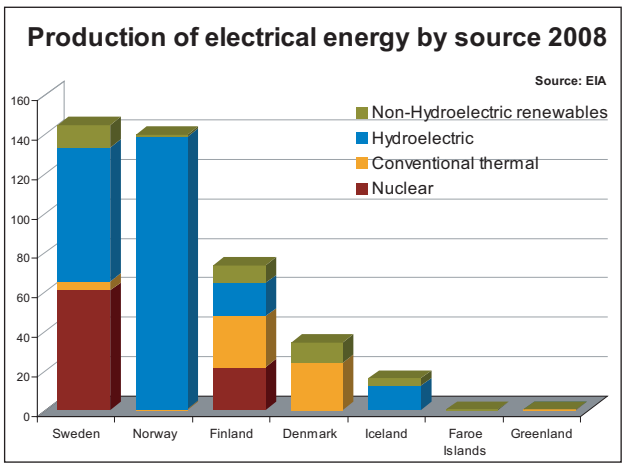
An understanding of the three pillars of energy policy, namely energy efficiency, security of supply and the environmental impact of energy usage has clearly been a part of the discourse in the Nordic countries.

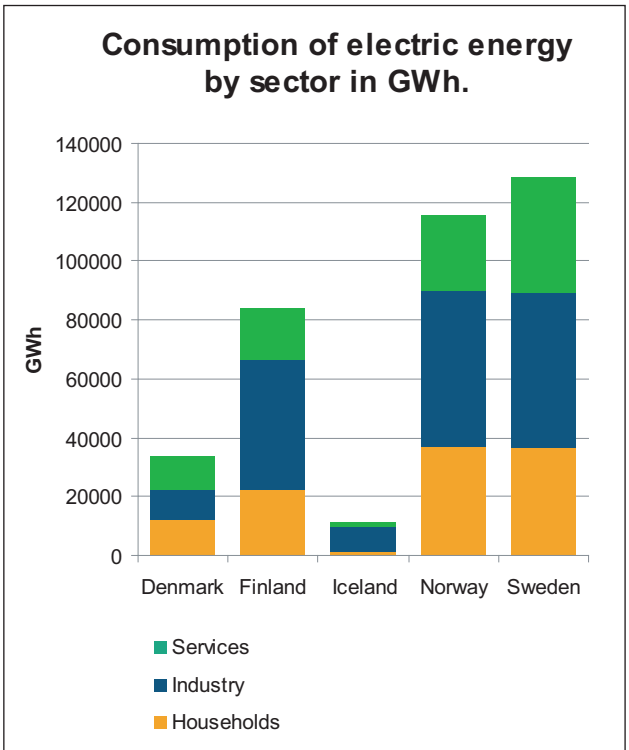
Over the last three decades, the five countries have sought to respond to economic and environmental challenges through various national policy frameworks for the energy sector.

Starting in the 1970s and in the wake of the 'oil crises', security of supply leaped to the top of the political agenda. This materialised into power generation from coal in Denmark, while in Sweden and Finland nuclear power was chosen.

In Norway, the abundance of hydropower resulted in the extensive building of dams and hydro-electrical power stations.







	Households	Industry	Services	Total
Denmark	12 243	10 210	11 257	33 710
Finland	22 069	44 259	17 587	84 178
Iceland	1 192	8 813	1 475	11 480
Norway	36 808	53 006	25 851	115 664
Sweden	36 552	52 923	38 871	128 349

(Source: statistics institutions, Energiateollisuus and EIA)

During the 1970s, Iceland witnessed an expansion of hydropower as well as geothermal energy, a source that has been exploited for district heating since the 1930s.

As a result of environmental concerns during the 1980s and 1990s, renewable energy sources have progressively substituted for coal - mainly wind power in Denmark and district heating based on biomass in Sweden and Denmark.

In Finland and Norway overall increases in renewable energy usage have however been modest during this period. The major exception is in heat production by Finnish industries where biomass became an important energy source.

Oil is important

In terms of volumes produced oil is undoubtedly the most important energy source in the Nordic countries followed by renewable energy (mainly hydro-, geothermal and wind energy), nuclear power, coal and gas.

Norway and to some degree Denmark also are oil and gas exporters. Norway produces over 600% more energy than its domestic demand while Denmark produces approximately 50% more than it requires. Iceland, Finland and Sweden however produce hardly any of their own primary fossil fuel requirements.

The Nordic region has good access to renewable energy sources as well as a high innovation capacity and efficient national energy policies. The region is also, in the main, able to supply its own energy needs.

Norway, Iceland and Sweden have the ability to produce electricity based primarily on hydropower. In Iceland geothermal energy is an additional major contributor to the country's energy supply while in Finland and Sweden nuclear power is an important source of energy.

Greenland had its first hydropower plant in 1993. The expansion of capacity and construction of additional three hydro power plants during the last years has led to a situation where 11% of the total energy consumption and almost 50% of electricity consumption is based on renewable energy.

Changing nuclear policies

Sweden and Finland use nuclear power as a major source of electricity generation. Since the beginning of the 1990s the Swedish energy sector functioned under the assumption that nuclear power would be phased out as current capacity reached the end of its commissioned life. In July 2010 however this decision was reversed when the ban on building new nuclear reactors was removed by the Swedish Government.

Considerable uncertainty however continues to exist over nuclear development issues in Sweden due to the enormous cost of building new reactors. Moreover two additional questions remain unanswered. Namely, what is the real cost of storing nuclear waste and who is responsible for covering the costs of a major accident?

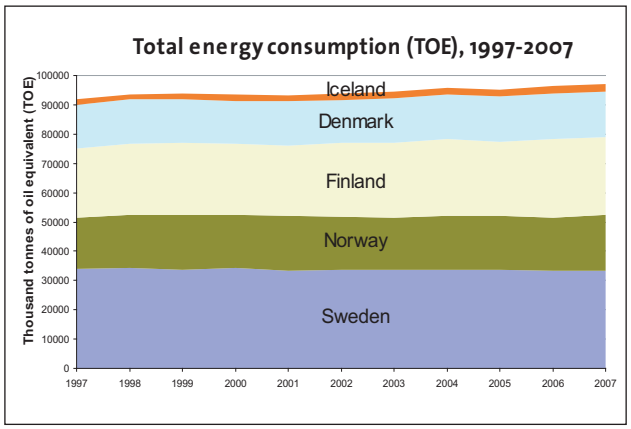
In Finland, a new nuclear construction programme has been up and running since 2002 when the building of a new nuclear reactor (Olkiluoto 3) was approved in order to complement the four already existing reactors in the country. The construction of Olkiluoto 3 has, however, been delayed for three years, and is currently projected to be completed in 2012. In 2010, the Finnish government also preliminarily approved the construction of Olkiluoto 4 while an additional reactor is projected for construction in northern Finland.

This article is based on the energy chapter of
The Regional development in the Nordic Countries
Nordregio Report No R2010:2

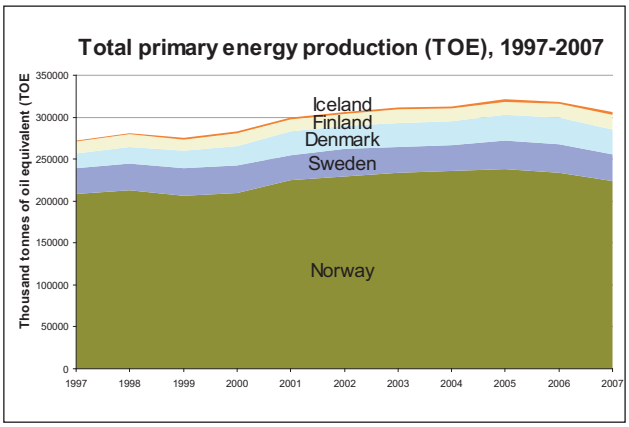
The text is edited by Odd Iglebaek

Information in the section on innovation is taken from: Mads Borup, Per Dannemand Andersen, Steffan Jacobsson and Atle Midttun (2008). Nordic Energy Innovation Systems –Patterns of need integration and cooperation. Nordic Energy Research

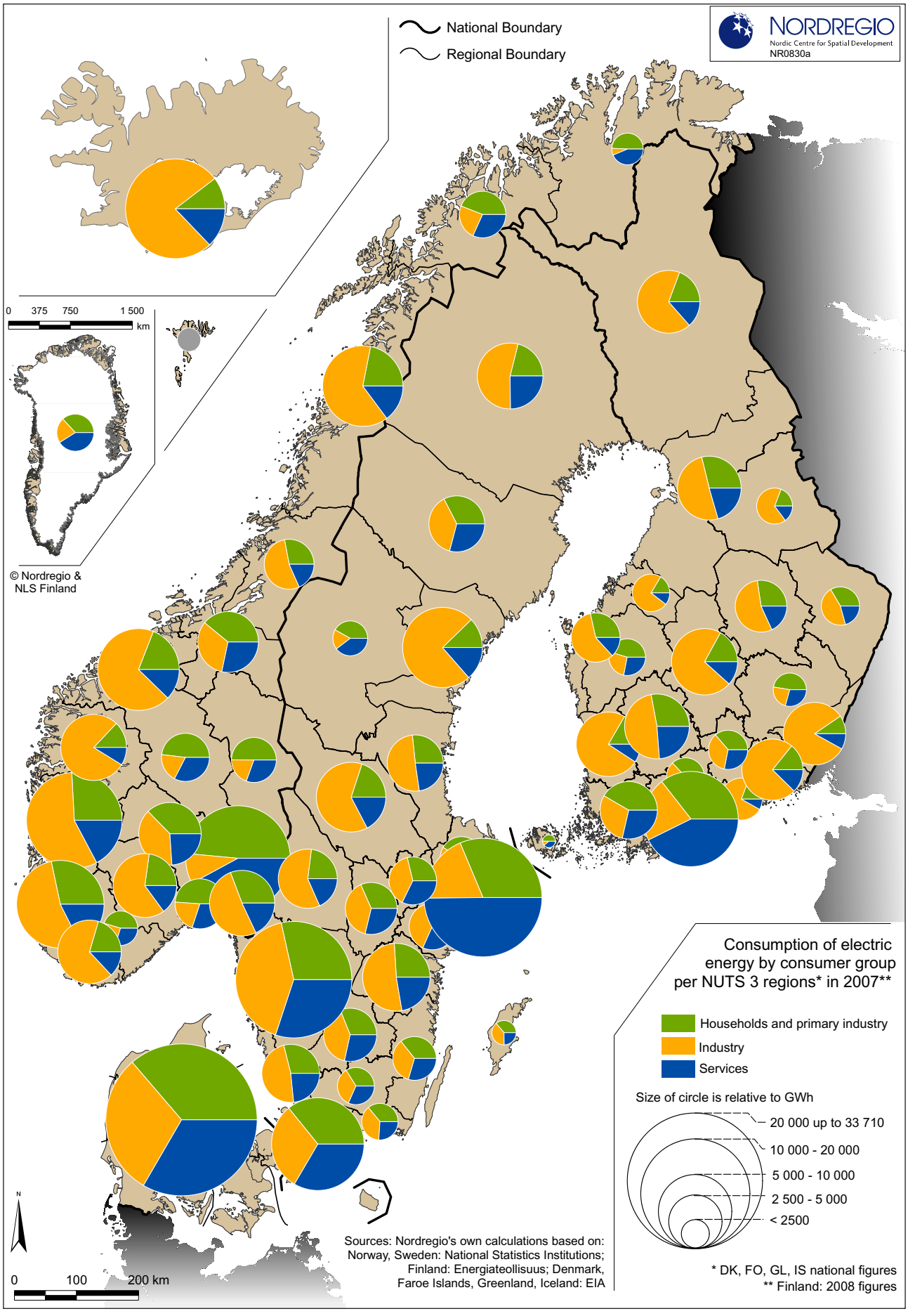
www.nordicenergy.net



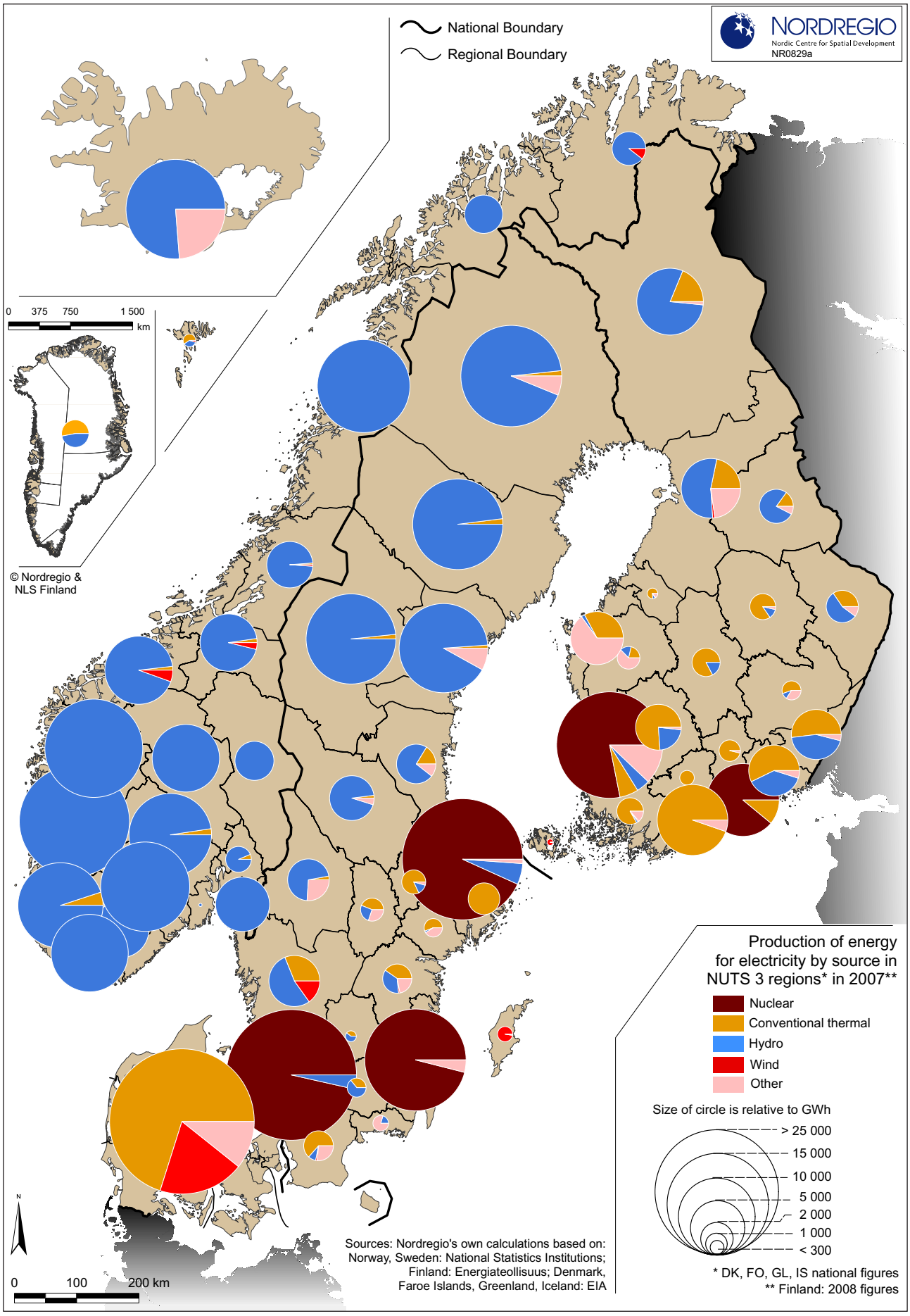
Total energy consumption reported in this graph includes final energy consumption of all products (petroleum, dry natural gas, coal, and total electricity). Values for Greenland and Faroe Islands are too small to be shown in the graph. Source: Eurostat



Total primary energy production reported in this graph includes the production of petroleum (crude oil and natural gas plant liquids), dry natural gas, and coal, and the net generation of nuclear, hydroelectric, and non-hydroelectric renewable electricity. Values for Greenland and Faroe Islands are too small to be shown in the graph. Source: Eurostat, EIA



Map shows consumption of electric energy by consumer group per Nordic NUTS 3 regions in 2007.



Map shows production of energy for electricity by source in Nordic NUTS 3 regions in 2007.

REKENE in a nutshell

REKENE stands for *Regional Trajectories to the Knowledge Economy – Nordic European Comparisons.* The project, with a total budget of over NOK 6 million, ran for three years ending in August 2010. REKENE was a spin-off from the €4 million European project EURODITE.

The main objective of the project was to investigate how knowledge is generated, developed and transferred within and among firms or organisations and their regional contexts in order to gain a better understanding of how policies may be developed and used to facilitate innovation. A specific aim of REKENE was to deliver a policy toolkit regarding *knowledge dynamics*.

The regional level provided a point of departure for the empirical case studies. However knowledge dynamics are not restricted to administrative regions. Instead, knowledge interactions stretch across administrative borders.

The importance a regional context may play is also seen in the concept of *regional trajectories*. These can be seen as paths to move towards a knowledge economy. The paths are developed and changed over time through processes such as investments and decisions made by firms and public bodies, and by changes in the global economy.

Methods and implementation

In the context of the REKENE project, the knowledge dynamics in seven regions in Denmark, Finland, Iceland and Sweden were investigated. In EURODITE, a further 22 regions were studied. The REKENE project was designed to include cooperation between researchers and practitioners. Each region participated with a researcher-practitioner team. This unique way of working has been valuable both in terms of the research process and for working with policy tools. Over the project's duration 18 different partners took part.

In addition, research has been enriched by the *showcases* the project has visited in each region. The participants met with key actors such as innovative firms, regional authorities, cluster organisations and higher education institutions that demonstrated their approach to working with knowledge dynamics. The showcases provided an opportunity for participants to engage interactively in testing, analysing and developing emerging knowledge about knowledge dynamics.

The research work carried out was based on the use of the region, sector, territorial knowledge dynamics, and firm-level knowledge dynamics as 'building blocks'. *Territorial knowledge dynamics* involve knowledge exchange, networks and interactions among actors. Key actors here may include firms, higher educational institutions, chambers of commerce and local and regional authorities.

Knowledge dynamics are multi-scalar and include important interactions at great distances. The *firm-level knowledge dynamics* analysis contributes with depth and detail on how knowledge is developed and transferred at the micro level. The links between firm-level and territorial knowledge dynamics are seen through the interaction among actors.

Results and conclusions

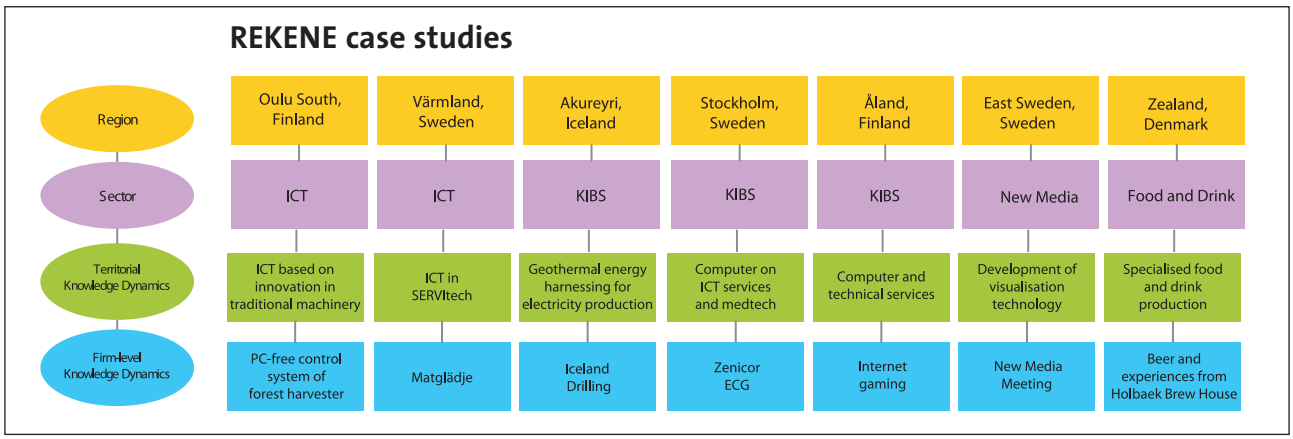
REKENE's main findings can be summarised as follows:

1. Cross-sectoral knowledge interactions are innovative and drive product development. Combinatorial knowledge processes drawing on different disciplines and fields of expertise are at the heart of the processes. Innovations come about not only by adding new knowledge within one's own field of expertise but through interaction with knowledge in other areas of expertise.

There are several interesting examples of cross-sectoral knowledge interactions between, for example, actors within the ICT sector and actors in packaging, machinery and within the health care and medical equipment sectors. Additionally, in the more traditional sector of food and drink, we see how knowledge of brewing is combined with knowledge of marketing or branding in the development of a microbrewery helping it to become part of the 'experience economy'.

2. Knowledge interactions are multi-scalar. All cases of territorial and firm-level knowledge dynamics include extra-regional knowledge interaction. It is evident that a region is not a closed container. Multi-scalar interactions are supported by policy instruments, ranging from cluster organisations to support for organising and participation in various events.

3. Knowledge dynamics include many actors. Many types of actors conduct a variety of knowledge interactions. This supports the conclusion of combinatorial and cross-sectoral knowledge interactions promoting innovation. Public actors, stretching from



the national to the local level, play a role in the generation, development and transfer of knowledge. Multi-actor, public–private endeavours and triple helix approaches have become mainstream policies in many places. Examples of these include innovation platforms, industrial PhDs, science parks and incubators, knowledge brokering activities and user-driven problem solving.

A challenging way of working

The REKENE project has been a rewarding but challenging way of working. To systematically work with teams of researchers and practitioners, and to travel to each of the case study regions to engage with local actors in showcases, has been very stimulating for the research and development of policy tools and for continuous knowledge sharing.

It has, however, proved to be a major challenge to effectively develop these ways of working collectively with participants using numerous different professional languages, and with often dissimilar aims and time horizons. Although, as in the theoretical framework of the project, combinatorial and cross-sectoral knowledge interactions are innovative, and we believe that the project results produced have thus been more creative through this way of working.

Knowledge sharing

True to the spirit of the project, REKENE continued the knowledge sharing goal between researchers, practitioners, representatives from higher education institutions and firms, throughout the project. At the conclusion of the project, a major knowledge sharing event took place in Stockholm 24-25 August 2010. The results of the project were presented and discussed, and policy tools were explored and reflected upon in the workshops.

Some of the showcase firms and actors were also present and provided opportunities for the 'hands on' experiencing of innovations. In addition, three international experts were invited to provide their own input and reflections on the project. These speakers provided perspectives on regional knowledge dynamics from the national, regional and local levels linking their own work with that of the project.

The experts were Janne Antikainen, Ylva Williams, and Karl Ritsch, They have kindly updated their conference presentations to be included here as the short articles reproduced below.

By Margareta Dahlström
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REKENE project manager
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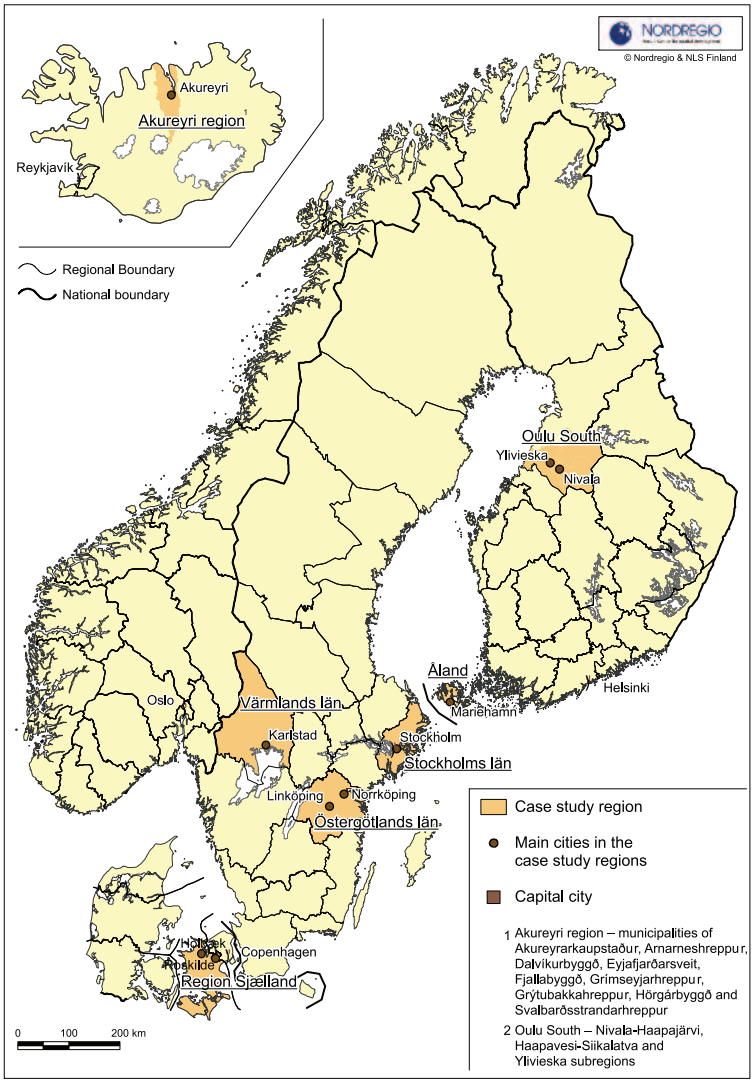


Read more about the project design, participants, case studies and results at the project's home page www.nordregio.se/Rekene/ and in the final report Dahlström, M. and Hedin, S. (eds) (2010) *Regional trajectories to the knowledge economy – Nordic-European comparisons* and in the *Policy Tools* document. These are both available to download free of charge from Nordregio's home page. Read more about EURODITE at the project's home page www.eurodite.bham.ac.uk.

A living city – The Norra Station/Karolinska area, as projected in 2025 (Illustration: Brunnberg & Forshed/Claudius)

Stockholm invests in life Sciences

Sweden has a strong tradition in life science, an industry with a high impact on the country's employment rate and economy. In 2009 life sciences accounted for 20% of Sweden's net exports. Practical examples of Swedish accomplishments in this industry include the pacemaker, the gamma knife, which enables laser surgery, blockbuster pharmaceuticals such as the beta blocker *Seloken*, the anaesthetic *Xylocain*, and *Losec* to treat gastric ulcers, as well as the growth hormone *Genotropin*.

The Stockholm/Uppsala region, in particular, represents 54% of the country's life science strength and as many as 15 Nobel prizes have been awarded to researchers from the region. But all eyes are now set on even higher ambitions as the region aims to become the world's most attractive centre for life science by 2025. At the centre of all this activity is the Norra Station/Karolinska area, which by 2025 will have about five billion Euro worth in investments and already has a common brand recognition attached and is now referred to as - *Stockholm Life Solna -Stockholm*.

Though it is based on a concentrated geographical area, *Stockholm Life Solna-Stockholm* is best described as a phenomenon whose strategy rests on the articulation of the three key partner groups: the academic world, industry and health care providers.

Complementary areas, multiplied knowledge

Stockholm Life Solna - Stockholm is a cross-border project in many ways. Firstly, on a local level, with the Norra Station/Karolinska area being one where the cities of Stockholm and Solna meet.

Secondly, in regional terms, with reference to the strong life science muscle at its core (which stretches north to Uppsala, south to Södertälje and west to Strängnäs) and which is exercised by a high concentration of companies, a qualified workforce and a burgeoning research community.

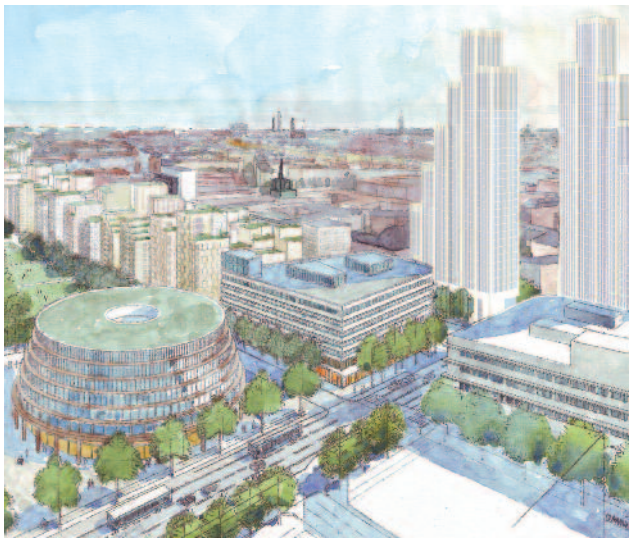
Thirdly, this is also backed up in terms of political commitment, since the project is supported by the different party blocks in a stable fashion.

And lastly, when it comes to its multi-disciplinarity, in terms of the different knowledge areas whose collaboration is making it real – the academic, industry and health care spheres. Facilitating all these interplays is the Stockholm Science City Foundation, an entity commissioned by the three leading universities Karolinska Institutet, KTH Royal Institute of Technology and Stockholm University as well as the cities of Stockholm and Solna and Stockholm County Council. Its mission is to create meaningful cooperation opportunities between the various stakeholders. This way, the Norra Station/Karolinska area will shine even brighter in the eyes of those involved in life sciences across the world, with brand recognition of *Stockholm Life Solna – Stockholm* being a guarantee of excellence.

Work underway

When it comes to establishing *Stockholm Life Solna - Stockholm* as a life science hub, much has already been put in place: within a range of about two-and-a-half kilometres, the area can count three universities, about 47 000 full-time students, 4 000 researchers, a university hospital and 50 to 60 companies with a life science focus.

In 2007, the political powers in both Stockholm and Solna decided to freshen up the area that divided the two cities - and



The New Karolinska Solna university hospital (construction is already underway) (Concept picture: Tengbom/Skanska/Nya Karolinska Solna)

Stockholm Life – Solna Stockholm – the brand which expresses the life science strength of Norra Station/Karolinska

is now destined to unite them. Anyone passing by Norra Station/Karolinska today will note that plenty of activity is already underway. The work to cover the E4/E20 motorway as well as the railway segments has already begun and recently Crown Princess Victoria officiated over the ground-breaking ceremony for the New Karolinska Solna hospital, to be inaugurated in about five years time.

In 2011, the construction of a mall and office spaces by the corner of Solna Bridge and Norra Station Street will begin – as will the construction of one of the two emblematic *Tors torn* skyscrapers, which is destined to house Life Science-related companies. In the following years up to 2018, the other tower (which will accommodate a hotel) and the Karolinska Institutet's Biomedicum centre will be erected. This new infrastructure will be joined by the construction of a number of new accommodation units.

Soft infrastructure

Despite is clear visibility to the naked eye this construction work does not tell the whole story. In parallel to buildings and public transport, a stark focus is being placed on the so-called "soft infrastructure", i.e. the activities and tools which support the stakeholders in the region so that they can reach their goals faster, by helping the corporate world to boost their gains and/or reduce costs and risks. Such is the added value of *Stockholm Life Solna-Stockholm*, which facilitates contacts and information and helps the process of "matchmaking" between different partners so that a fruitful collaboration can flourish.

The more plural this information and knowledge transfer (and creation) are, the faster all parties will be able to adjust to the needs of their partners and clients, raising the value of their own products and services along the way. For example, real estate actors at Norra Station/Karolinska are learning about the infrastructural needs of the life science branch, so as to make their property suitable for such business and, hence, more attractive; Stockholm Science City Foundation is working to open the channels so that the medtech industry can better access the Swedish healthcare sector, making the latter more receptive to testing the latest innovative products which are in the pipeline.

The vision of *Stockholm Life Solna-Stockholm* is that these partner groups are not only closer in space but also share a platform to listen to and express their own ideas and expectations – a process which will grant them an innovation-based competitive advantage.

These cross-sector knowledge dynamics have – already today – a strong expression in the region. By bridging the gaps between the research and the business worlds in a systematic way, these dynamics will become much more meaningful and will, ultimately, make a profound contribution to the way people live.

Each person in the centre

Much of *Stockholm Life Solna-Stockholm*'s value is to focus on the improvement of health and life quality in everyday life in the region. When it comes to healthcare, the New Karolinska Solna university hospital is to operate in a revolutionary way, putting the patient at the centre of gravity of all the different clinical specialties, instead of making him/her transit from one department to another during diagnosis and treatment.

In addition, the North Station/Karolinska area is not an isolated area in the outskirts of the city: it is located one step away from the vibrant urban centre of Stockholm and from the quietness of nature in the Royal National City Park. By 2025, the area will be equipped with not only first-class healthcare facilities, a prosperous business centre and reputed academic institutions, but also with about 5 500 new residential units, schools, cafés, infrastructure for culture and recreation, public transport and other services which will ensure the continuing attractiveness of the area seven days a week, 24 hours a day.

Ylva Williams
CEO, Stockholm Science City Foundation
www.ssci.se

Styria, the Styrian Economy and SFG

Styria, one of Austria's nine provinces, is best known for its innovation capabilities. No other Austrian federal state brings as many innovations onto the market. With a Research and Development quota of 4.3 %, Styria has been exceeding EU targets for many years.

The achievements of the Styrian economy are based on eleven core sectors, which are internationally successful thanks to the existence of top industrial companies, outstanding training and research facilities and exemplary cooperation between the business community and science. These core sectors are:

- Automotive, Mobility
- Energy and Environmental Engineering
- Engineering, Plant Engineering
- Wood, Paper, Timber Construction
- Human Technology
- Creative Industries
- Food Technology
- Nanotechnology and Microtechnology
- Simulation, Mathematical Modelling
- TIME (Telecommunication, IT, New Media, Electronics)
- Materials

Besides research activities at the local universities, a number of notable research institutions have been established, where private sector businesses and scientists cooperate through joint research programmes, aiming at mutually beneficial development at the highest level.

The Styrian Business Promotion Agency, the SFG, is a state-owned company dedicated to strengthening and growing the Styrian economy. The SFG offers companies a variety of services free of charge, ranging from financial consultancy to providing information regarding opportunities for vocational education and training (VET). The SFG provides expertise on commercial property and advice regarding company start-up/relocation, in addition to supporting innovative R&D projects through a series of national and European funding solutions.

Knowledge Anchoring and Territorial Knowledge Dynamics

Compared to those regions studied in the context of the REKENE project, with the exception of the Stockholm region, Styria is relatively large and its economy is very diverse. Nevertheless, Styria has certain sub-regions that are quite comparable to the regions studied in the REKENE project, e.g. the food industry in the south eastern part of Styria or the metals and metal processing industry in the so called "Mur-Murz Furche", a valley approximately 50km north of Graz.

For all core sectors, the acquisition as well as the generation of knowledge within Styria is vital for its economic success. When analysing the mechanisms fostering these processes, one has to consider that the sources of knowledge are different and that a region consists of different sectoral innovation systems such as the life sciences industry or the food sector. However, with the revised strategy for the Styrian economy which is currently being developed, these core sectors will likely be consolidated to three lead-themes: Mobility, Eco-Tech and Health-Tech.

Landscape in Styria Photo: Ewelina Wierzbicka

Styria and the Styrian Economy

Area:	16 387 km²
Population:	1.2 mn
Capital of Styria:	Graz, second largest city in Austria
GDP per capita:	EUR 28 200 (2008)
Unemployment rate:	7.7 % (2009)
R&D Spending:	4.3 % of GRP (2007)

R&D, Higher Education:
Five universities, two Universities of Applied Sciences with more than 40 000 students. 8 out of 20 Austrian Competence Centres and a further 4 Styrian- based Competence centre branches.

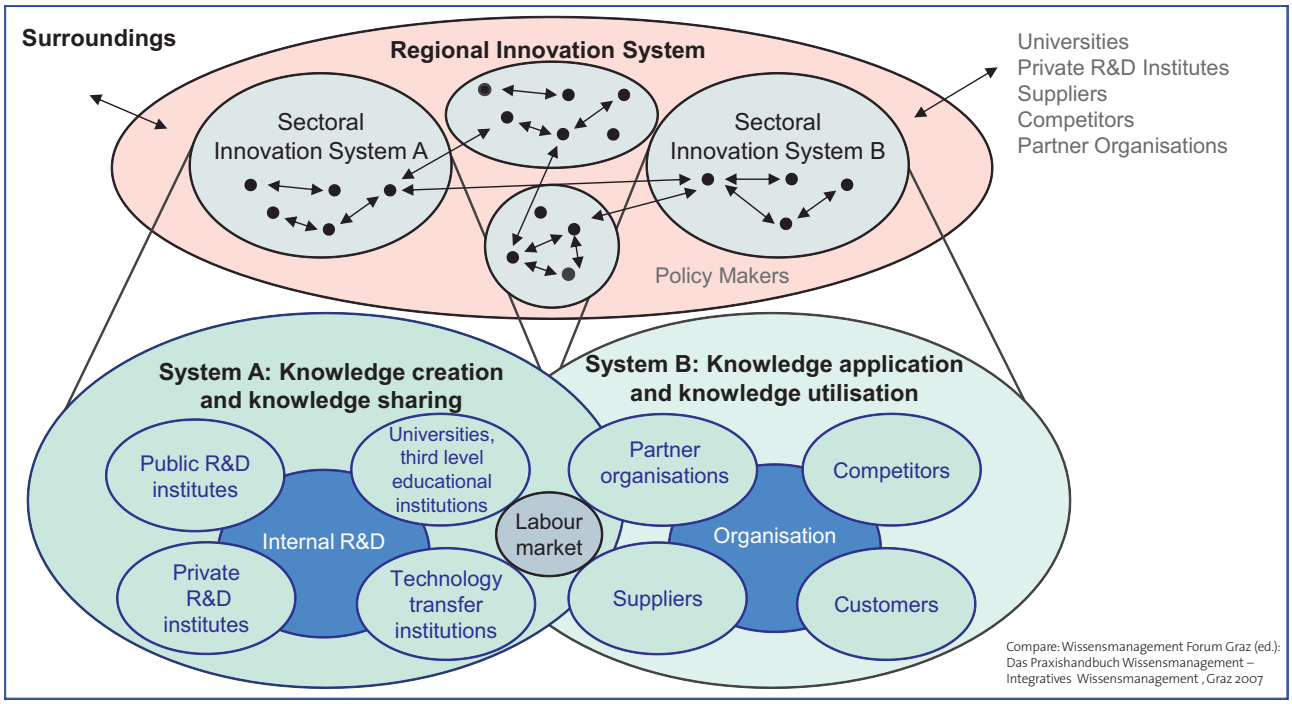


Fig. 1: Knowledge Transfer in(to) the Regional Innovation System

	Cluster & Networks	HEIs	R&D Institutions
Firm level interactions	• Connecting actors – locally, nationally and internationally • Joint training • Joint Projects	• Post graduate education programmes • "Life long learning" • Alumni organisations • Part time education programmes	• (International) Research projects • Conferences and workshops
Workplace or job-related mobility	• Scouting "missions" • Joint exhibition displays	• Mobility of students • Mobility of staff • Part time lecturers • Job markets • Spin offs	• Mobility of research staff • Projects with international partners • Spin offs
Acquisition of codified Knowledge	• Distribution of 'acquired' knowledge	• Studies and publications for educational purposes	• Studies and publications for research activities
Events	• Organising events • Taking part in events	• Organising events • Taking part in events	• Organising events • Taking part in events

Fig. 2: Role of actors within different mechanisms for inflow and recirculation of knowledge

Furthermore, the regional innovation system can be divided into two sub-systems: The system of knowledge creation and sharing and the system of knowledge application and utilisation (see Fig. 1).

Additionally, policy makers are not usually part of these innovation systems but they can provide strong impetus to the system's performance. We, at the SFG, have discovered that an in-depth understanding of the role each and every actor in our regional innovation system plays, is very important in order to derive the right measures to enhance territorial knowledge dynamics (see Fig. 2).

Particularly important for our region are conferences and cluster initiatives. Styria's life science cluster, Human Technology Styria – HTS (www.humantechnology.at) for example was founded in 2004 and currently has 76 partners. The cluster organisation provides various services for its members such as business development, partner search, marketing and advertising, workshops, seminars, information on internal and branch-related topics etc.

Conferences are an excellent opportunity to get interesting "knowledge workers" into our region. This year for example, Graz

University of Technology and the Know Centre Graz organised the I-*Know,* an international conference on "Knowledge Management and Knowledge Technologies" (the biggest in Europe) for the 10th time. This year, more than 500 researchers and practitioners met to discuss technological aspects of knowledge management.

Firm Level Perspective

When talking about knowledge dynamics and interactions from a firm level perspective, we have to discuss the roles of different actors. Private companies are usually the main actors, providing primarily synthetic knowledge, R&D and production infrastructure, and bear the responsibility for economic success. Public actors act mainly as potential customers, financiers and contact brokers, and are sometimes partners in projects.

Higher Education and R&D Institutions are a hotbed of innovation; they mainly provide analytical knowledge, well trained staff and an R&D infrastructure. Clusters and Networks generally provide the services listed above, but most importantly, they act as contact brokers.

Knowledge Dynamics, Policies and Tools

When developing appropriate tools for harnessing knowledge dynamics in regional development, it is very useful to firstly consider the tasks, as stated in the final report of the REKENE project. Perhaps of greater importance, however, is primary consideration of the goals (see Fig. 3).

The goals are set on different levels and require specific tasks for their accomplishment. As regards the tasks, varying responsibilities for execution have to be considered, requiring strong and multifaceted interactions within regional innovation systems.

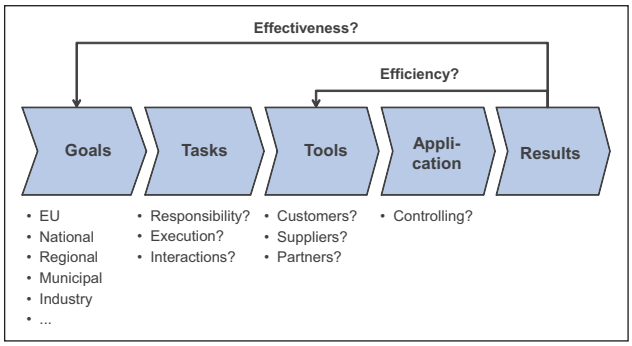


Fig. 3: From goals via tasks and tools to results

In the application of the tools a customer-focused approach seems to be most suitable here, while bearing in mind the importance of "suppliers" and partners. Finally, controlling and observing the results achieved by applying the tools leads us to two fundamental questions:

• Have we applied, and more specifically developed, the right tools to achieve our goals?

• Have the tools which were selected or developed been efficiently applied?

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Towards flexible structures

The key driver in regional development policies for two decades has been knowledge and 'know-how' based development built around regional strengths and competences. Each and every region has a long tradition – a genotype – of its development. Regions are born, grow and are layered during various phases of growth in trade, industry, public and finally private sector services.

One cannot have an influence on tradition but one can set the conditions for future development. The classic challenges to knowledge and development dynamics have been organisational thinness, often in the case of ex-rural areas; lock-in structures, often the case in industrial areas; or fragmentation, often the case in metropolitan areas. Local context, the unique setting of actors and unique dynamics lead to the need for tailored policies, indeed, as the OECD puts it "one size does not fit all".

In addition to endogenous factors key features for urban regions now include the ability to be involved in networks and to be regenerative. Locking into one structure has turned out to be sub-optimal. Networks provide the possibility to deepen specialisation and the division of labour between urban regions. Structural changes will inevitably come - the challenge is to prepare actors in urban regions to be able to adapt to change and to find their locus in globalisation (i.e. international competition), not to maintain current fixed structures.

Building networks and clusters has two territorial dimensions: one taking place within functional urban areas and regions and the other taking place in the 'spaces' between them. Integrating regional activities while maintaining sufficient European and national co-operation presents one of the greatest challenges to innovation-driven networking and cluster policy. Building networks and links between cities and regions challenges the traditional understanding that geographical proximity is a critical condition in forming a cluster.

In promoting competitiveness and innovativeness physical geography seems to matter either a lot or not at all. Building clusters is no longer only about local development or linking areas within an urban system. When building networks and clusters we are looking for similarities in terms of economic and competence orientation and then complementarities and thus an effective division of labour *within* that particular cluster. Links between urban areas and regions have been built primarily within national contexts since the early 1990s. It is now time to build networks and clusters internationally and thus to break hierarchies.

There is, however, no size-determination in building clusters: small and medium-sized cities and rural areas are very important especially in applying knowledge but also in innovation. Smaller regions are often more efficient and regenerative. By networking, the mass of regions is increased; economies of scale and of scope as well as synergies are created. All cities and regions must be afforded the possibility of being part of a network. The aim here is to promote the strengths and specialisations of smaller centres encouraging cooperation between such centres and ensuring that the network coverage is expanded to encompass all regions.

The general orientation here for the last two decades, in terms of development activity, has been 'bottom-up' and actor-based. The role of national players has however changed in recent years: they are increasingly now part of the bottom in the bottom-up development process – instead of being mere top-down dictators or part of the 'up' in the bottom-up process. In other words, instead of the hollowing out of the nation state, one can generalise that national players now have a major strategic role to play in helping to facilitate networks.

We are then on the way towards 'a geography of infinite possibilities' based on flexible structures. As such, it is up to capable regions to learn from networks and re-deploy this knowledge into regeneration processes, or should it in this context be called '*REKENEration*'.

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Polycentricity and metropolitan planning

Polycentricity was one of the key concepts coined by the European Spatial Development Perspective (ESDP) in 1999 and subsequently followed-up by the Territorial Agenda (TA, 2007) in order to provide a framework for strategic planning at the transnational level.

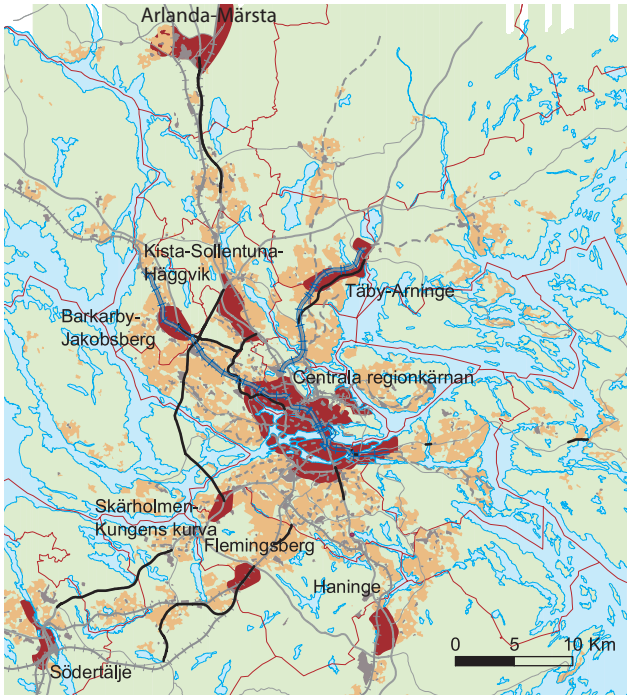
In recent years, however, the concept of polycentricity – and its inherent expectations, diverse understandings and interests – can also be seen to have increasingly trickled down to the regional level, in particular with a view to guiding spatial development 'within metropolitan areas', which we in the following call 'intra-metropolitan polycentricty'.

No grand theory

In a literal sense, the term 'polycentric' indicates that a spatial entity consists of multiple centres. The term does not however clarify what kinds of centres (centres of a transport axis, for housing, certain economic activities such as retail, industries etc.,) are in focus here, so that various notions and starting points are conceivable when discussing polycentricity with spatial planners and policy makers.

The available literature pinpoints what we already know and what is difficult to assess or even to measure. There is however little hope any time soon for the emergence of a grand theory explaining, specifically, what intra-metropolitan polycentricity is and how it differs from monocentricity.

What is clear however is that there are different dimensions associated with the notion of intra-metropolitan polycentricity along with the observation that our metropolitan areas today have seen very different development-paths and dynamics (due to varying historical, geo-political and socioeconomic circumstances) which results in various challenges in terms of physical planning but also in the development and growth of appropriate governance systems.



Polycentric Stockholm with eight sub-centres and the main city centre. Source: *Regionplanekontoret*

Hence the notion of intra-metropolitan polycentricity must be related to the specific context-sensitivity in which our metropolitan areas are embedded.

Four different dimensions

Due to these variations one can argue that the concept of polycentricity in general entails (at least) four dimensions each of which should be carefully distinguished when discussing it. The *analytical-descriptive* dimension should be mentioned first, i.e. to describe, measure and characterise the current state of a spatial entity by pinpointing how far a country or a metropolitan area can, for instance, be said to be 'polycentric'.

Secondly, the concept can be understood in a *normative sense* which could help for instance in re-organising the spatial configuration of such an entity (i.e. either to promote/create polycentricity or to maintain/utilise the current polycentric setting).

Thirdly, when talking about spatial entities one needs to clarify their *spatial scope* (e.g. the city-level, the city-regional, the mega-regional level or even the national or transnational level).

On closer inspection, the concept also challenges our understanding of centres within metropolitan areas as it can be related to either their roles or functional ties (i.e. their inter-relations) or their specific morphological forms (i.e. the structure of the urban fabric as it is illustrated in red on the map below). This differentiation between a *functional and* a *morphological understanding* of polycentricity constitutes the fourth dimension.

The work of the METREX Expert Group

On the initiative of the Office of Regional Planning of Stockholm County Council an Expert Group on intra-metropolitan polycentricity (IMP) was set up within the METREX Network of European Metropolitan Regions and Areas. The Expert group, whose work was supported by Nordregio, worked together for a period of about 18 months and have just published their findings in a report.

The spatial planners in the Expert group from twelve metropolitan areas across Europe (see map below) explored three thematic strands deemed to be closely related to the concept of polycentricity *within* metropolitan areas. These were a) *Metropolitan Governance and the Implementation of Plans and Policies*, b) *Urban Sprawl and Climate Change Response* and c) *Economic Competitiveness and Functional Labour Division between Centres*.

The central objective of the Expert Group was to identify major challenges, to reflect current methods, practices, routines and debates and to share lessons and experiences with regard to the performance, applicability and implementation of the concept of polycentricty in the respective metropolitan areas represented in the group.

Generating a mutual level of understanding

One of the Expert Group's major concerns was the generation of a mutual level of understanding in respect of the specific and highly context-sensitive polycentric setting of each of the twelve metropolitan areas. As a consequence of this discussion within the group twelve brief portraits, one for each of the participating metropolitan areas, were elaborated.

Based on these portraits, the understandings that emerged from the academic debate on the notion of intra-metropolitan polycentricty (IMP) and on discussion within the group, five basic characteristics (socio-economic dynamic, policy response, functional territorial layout, spatial scope and governance system) for the differentiation of intra-metropolitan polycentricity (IMP) were identified.

This allowed us to develop three typologies for the respective metropolitan areas represented by the Expert Group. These typologies proved useful in categorising their different qualities in order to understand these polycentric metropolitan areas as dynamic systems and, most importantly, to make it easier to undertake meaningful communication about them. See table 1 to 3 on page 26.

The policy response is certainly of central importance here, since it indicates the overall strategic direction of the metropolitan area at hand in this respect.

The two Nordic examples (Stockholm and Helsinki) are both growing metropolitan areas in terms of population and jobs, and as such both experience growing demand for housing and work places. The concept of polycentricty shall consequently help to create or develop further 'new centres' as nodal points for urban development. This emerging structure shall also be supported by a corresponding transport system.

Within the Expert Group, however, a small majority exists who use the concept of polycentricty rather to maintain or better utilise the existing polycentric structure through better cooperation and the coordination of policies between the different centres or cities respectively with the aim of encouraging positive synergies.

Major conclusions from 12 metropolitan areas

The major conclusions of the work of the Expert Group have been derived from the inputs generated by its members through a number of questionnaires and mutual discussions in the course of five workshops. This means they are solely based on the spatial planners' perceptions, reflections and experiences. In total there are four central messages that this international Expert Group want to address, which can be understood as a commonly shared baseline in respect of 'intra-metropolitan polycentricity' (IMP):

1) There are **a number of key preconditions for the application of IMP**, such as to understand that IMP is a long-term strategy, which means that the involved stakeholders need to be patient. There is also a clear need to understand market mechanisms better, particularly their potential territorial impacts as being a key driver for creating or maintaining polycentricty within metropolitan areas.

In addition, commonly shared views in respect of key terms and concepts are required as well as better tools to communicate intentions in relation to what IMP is expected to deliver. In line with this the stakeholder's mental maps have to be enlarged in order to understand our polycentric metropolitan areas as networking urban configurations as well as the essential interplay between different levels (e.g. municipal / city-regional / national).

2) **The capacity of the governance system matters.** There is a need for clear strategies and solid instruments to manage the different interests/agendas/territorial logics of the many stakeholders involved. Since IMP is not only a spatial concept; it also entails a specific governance capacity and response. It requires cooperation, coordination and mutual understanding at different levels. Here it is essential, however, to ensure that the entire metropolitan area develops consistently according to 'one single IMP concept'.

3) **IMP can help to combat urban sprawl and thus to respond to climate change in a positive manner.** Here there are three key issues to be considered: A further densification of some specific and carefully selected centres in accordance with the development and protection of the green structure ('polycentric compactness').

Secondly, higher densities must be linked with higher centralities (e.g. in terms of urban amenities, labour opportunities). Thirdly, as a kind of backbone for this picture, a polycentric transport system has to be developed that corresponds to the shape of the urban fabric and to the level of demand in terms of accessible centres along with solid transport axes and nodes in order to generate a reliable and efficient transport system that covers the entire functional metropolitan area.

4) **IMP can help to promote economic competitiveness and target-oriented labour divisions between centres.** In this sense it can be supportive in reconciling competitiveness and territorial cohesion policies within metropolitan areas while at the same time minimising agglomeration disadvantages (such as congestion and high land rents) through the decentralisation of economic activities. But if political and organisational coordination is lacking, IMP can lead to increasing transaction costs.

The full report can be downloaded at:
www.eurometrex.org/Docs/Expert_Groups/Polycentricity/METREX_IMP_final_version.pdf

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Policy Response *Socio-Economic Dynamic*	**Creating polycentricity**	**Maintaining polycentricity**
Growth	Stockholm Region Helsinki City-Region Warsaw Metropolitan Area	Emilia-Romagna Veneto Region Île-de-France
Steady	Naples Metropolitan Area Sofia Metropolitan Area	Metropolitan Region Rotterdam - The Hague Frankfurt Rhine-Main Tri-City Agglomeration
Shrinkage		Metropolitan Region Central Germany

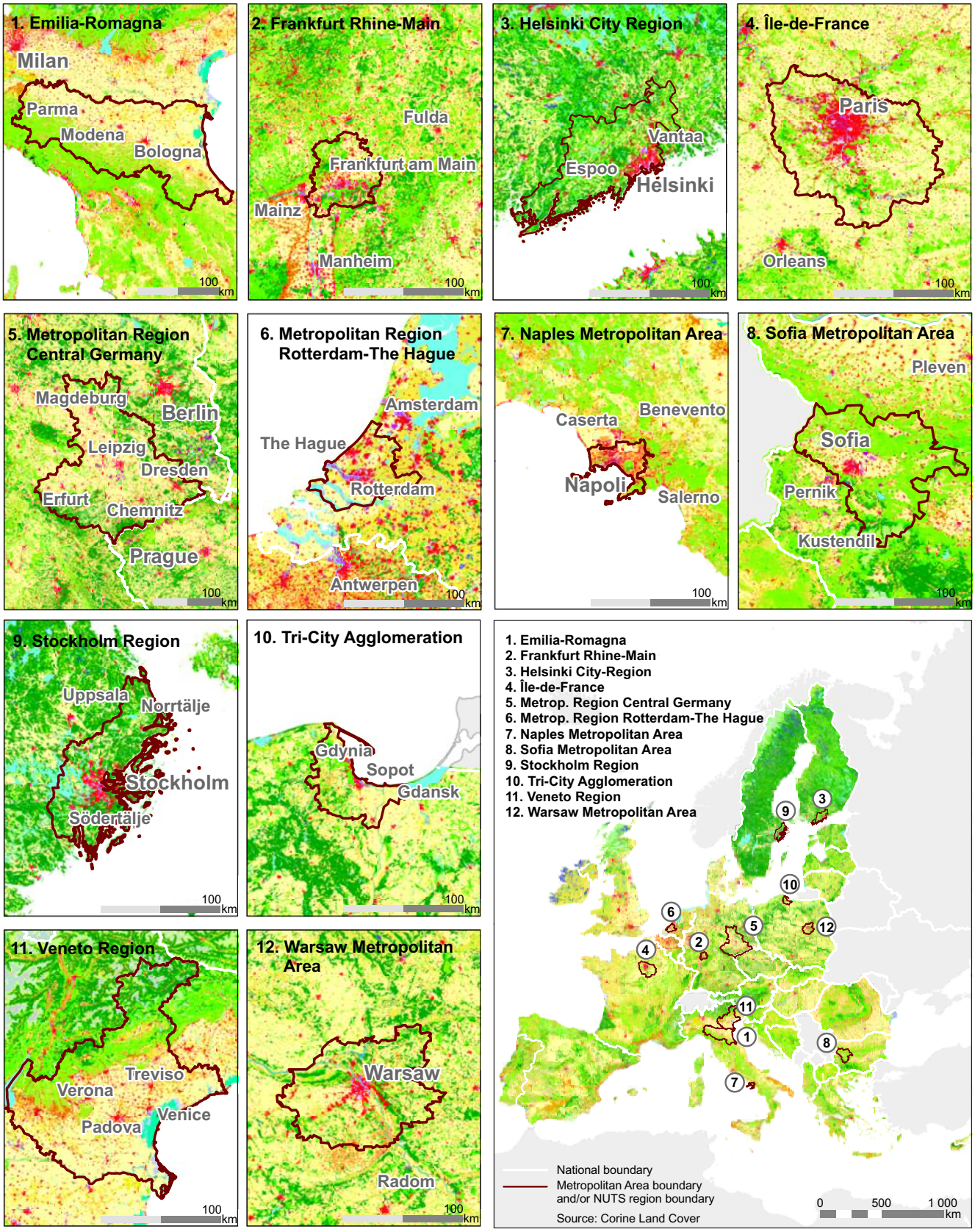
Table 1: Socio Economic Dynamic and Policy Response

Spatial Scope *Functional Territorial Layout*	**City-regional**	**Mega-regional**
one dominant core with a strong hierarchy: → predominately radial relations	Stockholm Region Helsinki City-Region Sofia Metropolitan Area	Île-de-France Warsaw Metropolitan Area
one dominant core with a moderate hierarchy: → criss-cross relations of different scope and intensity	Naples Metropolitan Area	Frankfurt Rhine-Main Emilia Romagna Veneto Region
high degree of balanced polycentricity between the main (two or more) cores: → weak hierarchy, larger in-between areas without strong centres, almost balanced criss-cross relations	Metropolitan Region Rotterdam - The Hague Tri-City Agglomeration	Metropolitan Region Central Germany

Table 2: Functional Territorial Layout and Spatial Scope

Type A	**Type B**	**Type C**
Metro Governing Body – 'Considerable' Powers Frankfurt Rhine-Main Île-de-France	Metro Governing Body – 'Limited' Powers Stockholm Region Naples Metropolitan Area Veneto Region Sofia Metropolitan Area Emilia-Romagna Warsaw Metropolitan Area	Negotiated Alliances – 'non-Binding' Helsinki City-Region Metropolitan Region Central Germany Tri-City Agglomeration Metropolitan Region Rotterdam - The Hague
Key characteristics: • municipalities are important players in spatial planning • but the regional plan and corresponding regional institutions are 'powerful' tools in promoting and creating intra-metropolitan polycentricity	**Key characteristics:** • i.e. regional plan existing, but of a rather indicative and advisory nature • municipalities remain the 'only' strong type of player	**Key characteristics:** • voluntary collaboration • forming strategic alliances to activate synergies between centres

Table 3: Three different Governance Systems emerge from our twelve metropolitan areas



Design: José Sterling

ESPON

Transnational perspectives on spatial planning - Experiences from the Nordic-Baltic countries

Nordic-Baltic ESPON Conference for planners and Policy-makers

3 - 4 February 2011

Transnational approaches have grown in importance in relation to spatial planning and territorial development policy. This is clearly visible in the rise in cross-border and transnational cooperation in the planning and policy arena across Europe. As an important facilitator the ESPON 2013 Programme supports these activities *"by (1) providing comparable information, evidence, analyses and scenarios on territorial dynamics and (2) revealing territorial capital and potentials for the development of regions and larger territories contributing to European competitiveness, territorial cooperation and a sustainable and balanced development"*

In order to evaluate the relevance of the ESPON results for the Nordic-Baltic countries the NORBA project, in cooperation with Nordregio, will arrange a "lunch-to-lunch" conference in Stockholm, 3-4 February 2011. Targeted participants include policymakers and planners at the national, regional and local levels, as well as researchers, primarily from the Nordic-Baltic countries.

The conference focuses on two elements. Firstly, the findings of ESPON projects of particular relevance for the Nordic-Baltic countries. And secondly, on a discussion of the changing nature and role of planning in the Nordic-Baltic countries. In addition, information will be provided, in cooperation with the ESPON Co-ordination Unit, on how to access and utilise the information produced by the ESPON 2013 Programme.

The key themes to be discussed:

- The Nordic-Baltic countries in light of ESPON findings
- ESPON in evidence-based spatial and territorial policy in the Nordic-Baltic countries at the macro-regional, national and regional levels
- Europeanisation processes in spatial planning in the Nordic-Baltic countries: similarities and dissimilarities
- Messages of the ESPON scenarios concerning the Nordic-Baltic countries – from the metropolitan centres to the Northern Sparsely Populated Areas (NSPA)

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Swedish website: www.infra.kth.se/svenskecp
Norba website: www.rha.is/norba

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