

# Territorial potentials in the European Union

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## Nordic co-operation

takes place among the countries of Denmark, Finland, Iceland, Norway and Sweden, as well as the autonomous territories of the Faroe Islands, Greenland and Åland.

## The Nordic Council

is a forum for co-operation between the Nordic parliaments and governments. The Council consists of 87 parliamentarians from the Nordic countries. The Nordic Council takes policy initiatives and monitors Nordic co-operation. Founded in 1952.

## The Nordic Council of Ministers

is a forum of co-operation between the Nordic governments. The Nordic Council of Ministers implements Nordic co-operation. The prime ministers have the overall responsibility. Its activities are co-ordinated by the Nordic ministers for co-operation, the Nordic Committee for co-operation and portfolio ministers. Founded in 1971.

Stockholm, Sweden  
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Swedish Presidency of the EU

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# Preface

The purpose of EU Cohesion Policy at the European level is to contribute to the Lisbon and Gothenburg objectives for growth, jobs and sustainable development. More specifically, the Cohesion Policy should promote the cohesion of the EU-territory by improving the use of all available resources in Europe's regions. Seen against the backdrop of the deepest global economic slowdown in generations the identification of these regional potentials and furthermore the elaboration of strategies and policies that might enable and facilitate the European regions to fully exploit these potentials is more important than ever.

While this paper aims to identify and discuss some of the most important territorial potentials it is nevertheless restricted by access to available data at the regional level. The paper has been divided into 17 chapters. Each chapter addresses one targeted territorial potential. We begin by focusing on natural and human potentials and follow this with chapters focused more on territorial performance, specifically, on how these resources and assets are utilized in the regions.

The analysis is primarily based on the European NUTS2 regional level. Combining and comparing this heterogeneous set of regions, namely, all those between the most densely populated city regions of Paris, London and Brussels, and the sparsely populated and extended regions of Northern Sweden and Finland is challenging. One potential impact of this variation between the densely and sparsely populated NUTS2 regions may create a visual illusion - some geographically small but densely populated and well-performing regions are almost invisible in the maps while at the same time the geographically larger but sparsely populated regions may have too great a weight on the thematic maps, at least in relative terms. This is important to bear in mind when interpreting the maps.

The Ministry of Enterprise, Energy and Communications in Sweden commissioned Nordregio to produce the study during the current Swedish EU presidency which runs during the second half of 2009. The paper has been specifically produced for the Conference on Cohesion Policy and Territorial Development in Kiruna, Sweden, December 10-11, 2009.

The report's findings are the views of the individual authors alone and do not necessarily reflect the official opinion of the Swedish Government.

The project work group at Nordregio consisted of the following members:

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Stockholm, November 2009



# Summary

## Variations in territorial potentials for growth

In the drive to strengthen competitiveness one of the main challenges facing policy-makers and other concerned actors across the regions of Europe is to identify and mobilise the territorial potentials necessary for the creation of new jobs and sustainable economic growth. Understanding the nature of territorial potentials however requires a detailed knowledge of the economic base of the region involved in addition to the prioritisation and implementation of the necessary policy processes.

The concept of territorial potential has not been explicitly defined here but undoubtedly relates to numerous factors. These factors can be divided into tangible assets, such as natural and human resources, and intangible assets, like organisation, culture, social issues and governance. Together, these factors make up the territorial capital of a region. Un-mobilised territorial capital may be released through policies and actions at various administrative levels.

## Importance of natural resources

Land and natural resources have historically been important determinants of population distribution and wealth. Access to farm land, water, minerals and energy sources are some of the factors that have influenced the distribution of major cities. Today, some 42% of European land is covered by forests or other wooded areas with the highest shares in some Finnish and Swedish regions. About 41% of European land is utilized for agriculture, with the highest shares in certain regions of Italy, the UK, France and Belgium.

From a historical perspective, the exploitation of minerals has been closely linked to the European industrialisation process. Lately, increasing demand from countries like China and India, rising world market prices and the liberalisation of the trade in prospecting rights has successfully opened the way for new investments in mining even in peripheral and regions of low population density, such as that encompassing the Fennoscandian Shield.

In order to better promote sustainable development it is increasingly important to reduce the greenhouse gas emissions causing climate change. This requires policies stimulating energy efficiency, clean transportation and renewable energy production. Between 1997 and 2007 more than half of the EU Member States reduced their levels of such emissions. Some small increases are

nevertheless still being registered mainly in the Southern European countries.

Today, bioenergy, including biomass from agriculture or forestry residue, is the most important supply source of renewable energy in Europe. The second most important source is hydropower. A third rapidly developing alternative is wind power, with the highest potentials in terms of wind speeds found off Europe's North Sea coast as well as along the UK's coast and islands in the North Sea. In 2007, the average share of electricity generated by renewable energies in Europe was about 15%. The level was highest in Norway, Iceland, Sweden and Austria, all of whom generated from 50% up to almost 100% of their energy in this way, mainly due to high hydropower or geothermal (Iceland potentials).

## Increased focus on human resources

The size, structure and competence of the population in a specific territory have a significant impact on the territorial potential. Market size and the potential to attract and keep labour with the relevant competences are two of the most important determinants of growth. Over the next ten years the European population is estimated to increase by about 4 million persons (0.1%). However, the demographic development is expected to result in an older population and in increased competition for labour all over Europe. On a regional level, large disparities will emerge and may increase the already clear polarisation between urban and rural regions. The challenge of an ageing population is likely to be highest in certain regions of Northern Italy, Eastern Germany and in Finnish and Swedish regions outside the major cities.

A mechanism that could be expected to offset the effects of an ageing population is national and international migration. However, migration patterns appear to further strengthen the polarisation between Eastern and Western Europe and between cities and rural areas. Almost 80% of regions with a positive in-migration also had a population increase. On an intra-EU level, the regions attracting the absolutely highest level of migrants were located in France, Germany and the UK, while the level of migration to Romania was lowest. Both Italy and Greece attracted only a limited number of intra-EU migrants although both countries received a remarkable number of migrants from non-EU countries. The small states of Luxembourg, Cyprus and Ireland attracted, in relative terms, most migrants.

Despite the shortage of labour in certain sectors unemployment still poses a significant challenge in many European regions. The average unemployment rate across the European population in 2008 was 7%. In certain groups however the level of unemployment is much higher. This indicates that the challenge remains to better exploit the labour potential by increasing employment among younger persons (aged 15-24 years) and the long term unemployed (over 1 year). Youth unemployment appears to be a problem particularly in Northern Europe, Austria and Switzerland, where overall unemployment is otherwise rather low. Long term unemployment appears to be more of a structural problem, for example, where the supply and demand of specific skills does not match.

Concerning the level of employment among females, workers in the older age brackets (55-64) and immigrant employment, this appears to be related to national policies concerning social welfare systems and integration policies. In Finland, some regions of Northern Germany and in the Scottish highlands, gender differences are only marginal. The level of employment is highest in the Scandinavian countries and the highest level of employment among immigrants is found in Portugal and Sweden. This indicates a potential for many regions to tap into an underutilised labour force.

## Innovation and entrepreneurship as economic drivers

Recent years have seen an increasing emphasis on innovation as a driver for economic and regional growth. Two of the most important assets in stimulating innovation are investments in R&D and in human capital. The European aim is to invest at least 3% of GDP on R&D by 2010. In 2006, the regions that had reached this goal were located in Finland, Sweden, Southern and Eastern Germany, South East England and the regions of Steiermark (AT) and Stredí Cechy (CZ). At least two thirds of these R&D investments are expected to come from private investors. Countries with a high level of private, as well as public R&D investment include Finland, Sweden, Switzerland, Austria, Germany and Denmark. Three out of five companies among the 1000 top R&D investors in Europe came from France, Germany and the UK.

To meet the challenge of a knowledge society and increase labour force qualification levels, many European regions have invested heavily in regional education institutions. In global ranking terms, 40% of the world's top universities were located in Europe. Almost a quarter of the European population of working age had a tertiary level education, with a concentration to city regions in, for example, the UK, Belgium, Norway, Finland and Spain. However, a high level of education may not be enough if a match does not exist between the personal skills of the labour force and the labour demand from the public and private sector. Participation in life long learning is an important instrument helping to improve or develop new

personal skills. On a national level, the highest level of students in both tertiary education and life-long learning is found in the UK, Denmark, Finland, Switzerland and Sweden.

A strong entrepreneurial and cooperative culture is another factor that may stimulate innovation and contribute to the development of high-growth companies and new start-ups. This, however, is difficult to measure using quantitative data.

## Integrating territories

Historically, local factor endowment and geographical specialization have been the drivers for international trade in various sectors, e.g. natural resources, manufacturing products and, increasingly so, also for services. In an increasingly complex world, one region may not itself have access to the diversified resources needed to stimulate innovation and sustainable growth. This may relate to many different types of resources, including natural resources, market size, labour force, competence structures or R&D investments. For the future, this makes it even more important for regions to cooperate, to create competitive, functional regions with a view to solving specific problems. Promoting stronger integration between European regions is one of the objectives of the European Union.

For example, in June 2009, the European Union Strategy for the Baltic Sea region was presented. The strategy is based on the concept of transnational cooperation within macro-regions. By stimulating cooperation between countries and regions with a heterogeneous resource base, the growth potential is expected to increase. Previous studies indicate the potential for successful cross-border cooperation even between regions with socio-economic differences or geographical barriers, such as mountains and seas. Nevertheless, cooperation could be expected to be easier if regions have a shared language, similar culture and a long tradition of cross-border cooperation. In the case of Interreg III A programmes, the highest numbers of cross-border projects were found along the borders of Spain-Portugal, Italy-Austria, Italy-Slovenia and Bavaria-Austria.

To stimulate cooperation across regions, nationally as well as internationally, it is necessary to reduce the barriers to interaction and the movement of goods and people. One important determinant of cooperative potential is accessibility at the regional and inter-regional scale. In general however a growing level of intra-national polarisation can be observed across most European countries, in particular between major metropolitan regions on the one hand, and remote rural territories on the other. This suggests that access to large markets, extensive and diversified labour markets and advanced services, is an increasingly important factor in economic development. The question here is how cooperation between regions helped by appropriate policy measures can compensate



for this disadvantage. In recent years for instance access to Internet communication has facilitated cooperation over large distances. This is something which may have had a positive effect on more peripheral regions.

## Impact on territorial policies

The increasing regionalization of national policy and funding increases the need for strong regional governance and cooperation between different types of stakeholders at the regional level. To develop regional strategies it is

necessary to integrate a number of different policy-fields, such as the labour market, innovation, and energy- and transportation policy.

According to the EU Green Paper on Territorial Cohesion, the territorial diversity of European regions is a vital asset to economic development and competitiveness. However, exploring the territorial potentials of a region requires a process of analysing access to different types of resources, but also a regional process for prioritising and coordinating relevant stakeholders and policy-fields.



# Territorial Potentials

## Territorial capital and potentials

The Territorial Agenda of the European Union<sup>1</sup> states that the diverse territorial potentials of regions for sustainable economic growth and job creation must be identified and mobilised.

The Agenda does not undertake to explicitly define territorial potentials but instead, in the background document for the Territorial Agenda,<sup>2</sup> quotes the OECD report on Territorial Economy<sup>3</sup> where the concept of territorial capital is defined in the following way:

*A regions territorial capital is distinct from other areas and is determined by many factors (which) may include geographical location, size, factor of production endowment, climate, traditions, natural resources, quality of life or the agglomeration economies provided by its cities -- Other factors may be 'untraced interdependencies' such as understandings, customs and informal rules that enable economic actors to work together under conditions of uncertainty, or the solidarity, mutual assistance and co-opting of ideas that often develop in small and medium-size enterprises working in the same sector (social capital). Lastly there is an intangible factor, 'something in the air', called the 'environment' and which is the outcome of a combination of institutions, rules, practices, producers, researchers and policy-makers, that make a certain creativity and innovation possible...*

According to the definition above the potential for economic growth of a given territory depends on the exploitation of its tangible and intangible territorial capital assets. Previously un-mobilised territorial capital may be released through policies and actions at various levels.

This tangible capital is composed of factors like geographical location, access to markets and capital, natural resources such as land, raw materials and energy resources. In addition, the size and skills of the labour force can also be mentioned here.

Examples of more intangible territorial capital assets include culture, social issues and governance including formal and informal rules, creativity etc.

The broad OECD definition of territorial capital draws on discussions undertaken in economics and economic geography for a time-span of more than one hundred years. With the last notion 'something in the air' an indirect link is made to the classical works of Alfred Marshall from the 1920s based on studies of the industrial development of Lancashire where he introduced the famous notion of 'industrial atmosphere'<sup>4</sup>. On the one hand Marshall could identify markets of perfect competition and a fluid diffusion of technological changes but on the other he could also observe certain specificities in the economic processes that were linked to specific territories and which were not directly accessible for producers outside these territories.

With Michael Storper it can be argued that agglomerations and clusters arise because of knowledge spillovers understood as the advantages of 'thick' markets for specialized skills and the many direct and indirect linkages associated with large local markets or demanding customers.

In a broader sense authors such as Paul Krugmann<sup>5</sup> argue that concentrations form and survive because of some form of agglomeration economies in which spatial concentration itself creates the favorable economic environment that supports further continued concentration.

In the European Cluster Memorandum<sup>6</sup> it is stated that innovation is the driver that will shape the European vision of growth, and that clusters can be a powerful catalyst in this process by linking regional concentrations of specialized companies and institutions. Regions that combine risk capital, skills and research excellence with strong cluster portfolios have an opportunity to become innovation hubs.

The importance of agglomeration economies and the implications of having or not having easy access to important European agglomerations have been questioned by some researchers<sup>7</sup> and regional policy makers representing regions outside the Pentagon. It is often argued that even regions of low population

1 Territorial Agenda of the European Union, Towards a More Competitive and Sustainable Europe of Diverse Regions. 2007

2 The territorial State and Perspectives of the European Union, 7 March 2007

3 OECD (2001). OECD Territorial Outlook 2001

4 Storper, Michael (1997). The Territorial Development in a Global Economy. The Regional World

5 Fujita, M., Klugmann, P. and Venables, A.J. (2001): The Spatial Economy. Cities, regions and international trade

6 See: Center for Strategy and Competitiveness (2007) [http://www.clusterobservatory.eu/upload/European\\_Cluster\\_Memorandum.pdf](http://www.clusterobservatory.eu/upload/European_Cluster_Memorandum.pdf)

7 See e.g. Gløersen, E. (2009): The NSPA are looking ahead, Journal of Nordregio, no.3 2009

density without any agglomerations of European scale can nevertheless perform economically far beyond the European average and even above regions more 'centrally' located in Europe.

Agglomerations alone are seen from that perspective, not fully sufficient in themselves to explain territorial variations of economic performance or levels of welfare. That gives territorial policies and other similar instruments a much wider potential and room for action.

## Territorial policies

The purpose of EU Cohesion Policy is to contribute to the Lisbon and Gothenburg objectives for growth, jobs and sustainable development. More specifically, the Cohesion Policy should promote the cohesion of the EU-territory by improving the use of all available resources in the European regions.

In addition to the Cohesion Policy however a number of other policy-fields at European, national and regional level impact territorial development and territorial cohesion. Labour market policy, enterprise- and innovation policy, R&D policies, policies for higher education, energy- and transport policy, maritime policy, rural development policy, urban development and planning together with the provision of public and private services are all important fields of policy which should be integrated into territorial development strategies.

In the EU Green Paper on Territorial Cohesion it is argued that the territorial diversity of the EU is a vital asset. But to turn this diversity into strength it is necessary to address territorial cohesion through a focus on new themes and new sets of relationships binding EU territories together at different levels while also focusing on new forms of cooperation, coordination and partnership.

The European Strategy for the Baltic Sea Region is an example of these new forms of cooperation and coordination in action - in this case at the macro-regional scale.

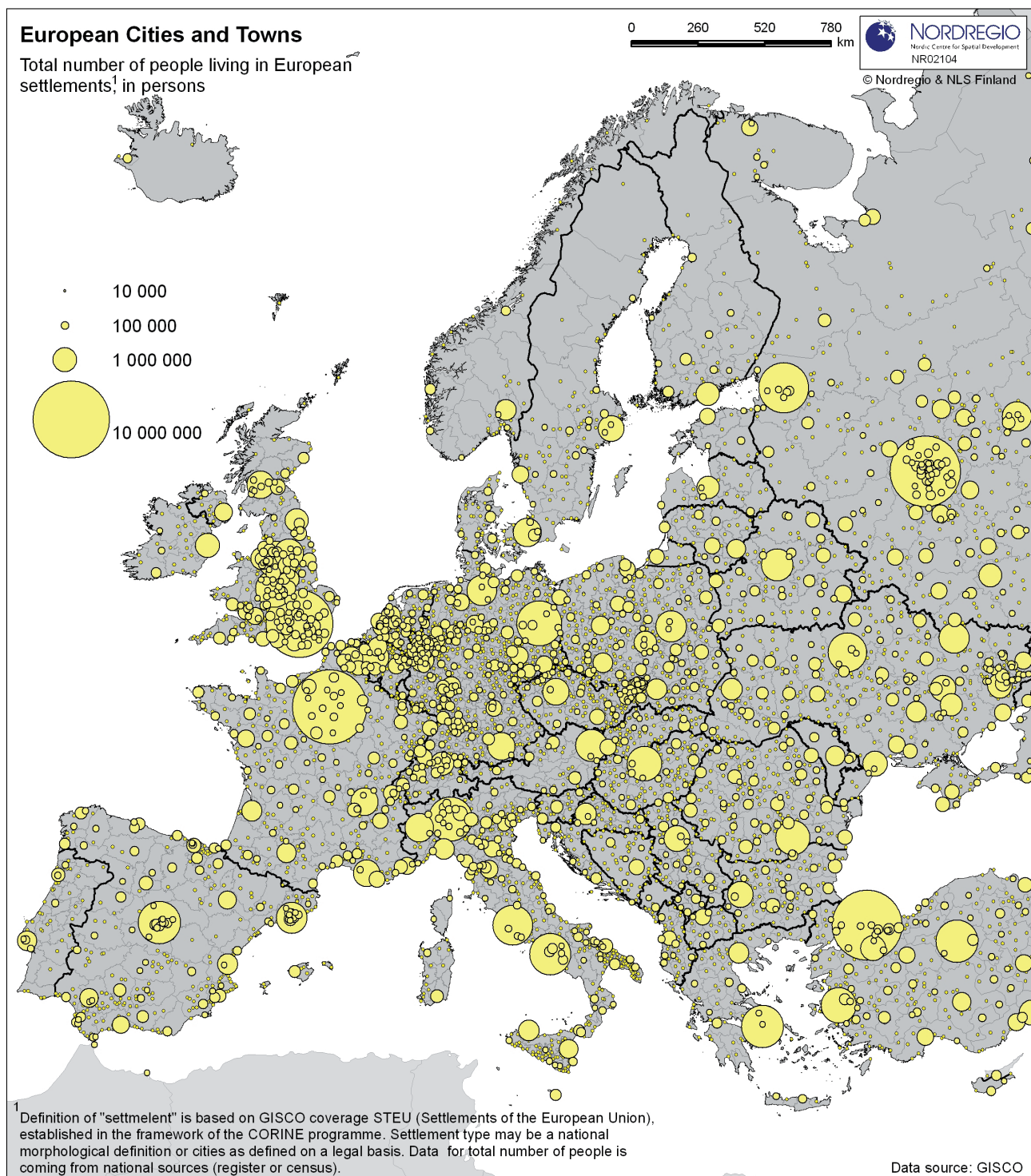
At the regional level the increased regionalisation of national policy and funding increases the need for strong regional governance and cooperation between different types of stakeholders. One of the new themes which should be addressed at the regional level is the shift to renewable energy resources and the development of eco-efficient growth in general because of the local and regional nature of many of these renewable energy sources.

Exploring the territorial potentials of a region thus requires, on the one hand, a process of analysing the access to different types of resources and on the other, the putting in place of a prioritization and coordination process, where the relevant groups of stakeholders and fields of policy are involved.

# Spatial Structure in Europe

The European settlement pattern and territorial structure is unique. The spatial structure can be defined by the metropolitan regions, the cities and towns and by the rural areas and those of low population density. It is argued that cities are the key drivers in the economic, social and cultural development of the regions. Though the European network of cities is dense it includes however

only a few very large cities and agglomerations seen in a global context. According to Eurostat's Urban Audit data only 18 European core cities or 56 city regions (larger urban zones) have more than one million inhabitants. At the same time 72% of the European population (EU countries plus Norway and Switzerland) resides in cities with less than 100 000 inhabitants, e.g. small and medium-





sized towns (SMESTO). Furthermore, approximately one fifth of Europe's population is considered to live in rural areas. These figures are not evenly distributed across Europe and thus the density and character of urban and rural areas differs widely.

When looking at the territorial performance and potentials of the European space at the regional level NUTS (Nomenclature of Statistical Territorial Units) regions are used in the various maps and figures throughout this report. NUTS subdivides each Member State into a number of regions, mainly based on the existing national administrative structure, and allows us to make Europe-wide comparisons.

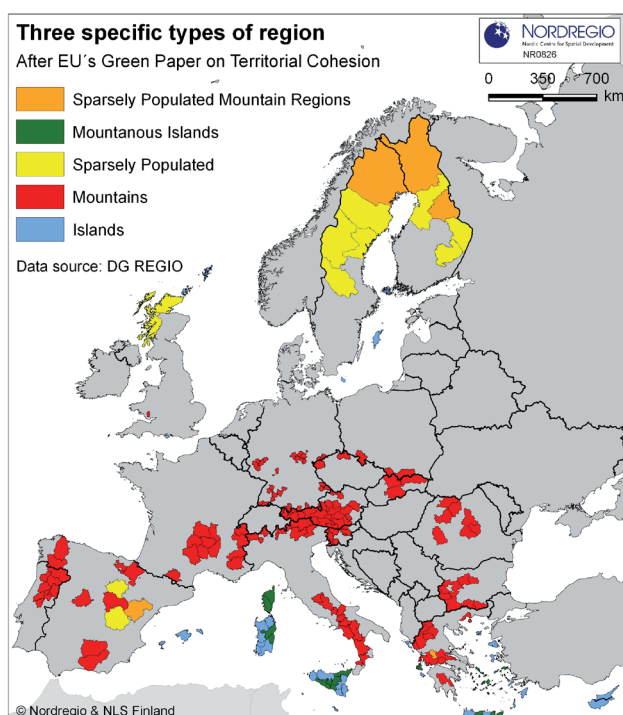
The majority of the regional data is presented on the NUTS2 level though some material is also shown on the lower NUTS3 level. The scale used (NUTS level) will influence the European pattern shown, and therefore it is important to understand the spatial concentration dynamic in the European Union as a background to the analysis presented here.

In 2008, the average population density was 115 persons per km<sup>2</sup> in the European Union. There are, however, striking differences between the EU regions in the spatial concentration of population. Some 18% of the population lives in the most densely populated areas (with more than 1 000 inhabitants per km<sup>2</sup>). In geographical terms this represents less than 1% of the EU's land area. The city regions of Paris, London and Brussels are the densest regions in the EU. In contrast, the EU defines regions with a low population density as regions with less than 12.5 inhabitants per km<sup>2</sup> at the NUTS3 level. These 18 regions (see map on this page) cover 13.8% of EU's land area but only 0.6% of the population lives there.

Since the division of European NUTS regions is mostly based on existing national regions significant differences exist between countries. For example 27.7% of the European population lives in NUTS3 regions with more than one million inhabitants. These 84 European NUTS3 regions vary from capital areas and other main city regions to more rural regions. It is thus important to bear in mind that the territorial performance of one or other indicator varies from region to region. At the same time some geographically small but high performing regions are almost invisible in the maps.

Certain geographical characteristics can be viewed as a handicap to regional development. The Treaty of the European Union points to the sparsely populated, islands and mountain regions as exhibiting natural handicaps. Compared to regions lagging behind, in general these naturally handicapped regions have other and more permanent kinds of obstacles to face than merely economic structural ones, e.g. a lower level of productivity in terms of farming compared to other regions. In addition the high cost of basic public service provision and energy supply is consistently hampers the development of the approximately 200 mountain-, island- or sparsely populated regions<sup>7</sup>. Of course some regions exhibit both natural and structural problems or handicaps, though this is far from being the case for all naturally handicapped regions. In some cases the natural handicap is compensated by specific economic opportunities e.g. natural resources such as minerals or very specific opportunities for tourism. These specific opportunities for tourism could be 'classical' ones such as the opportunity to provide the basic facilities for winter sports. Other more unusual opportunities include the linking of regions with low population densities with, for instance, the specific conditions for the testing of cars on ice or in snow.

Data source: Eurostat, EU's Green Paper, EU DG REGIO

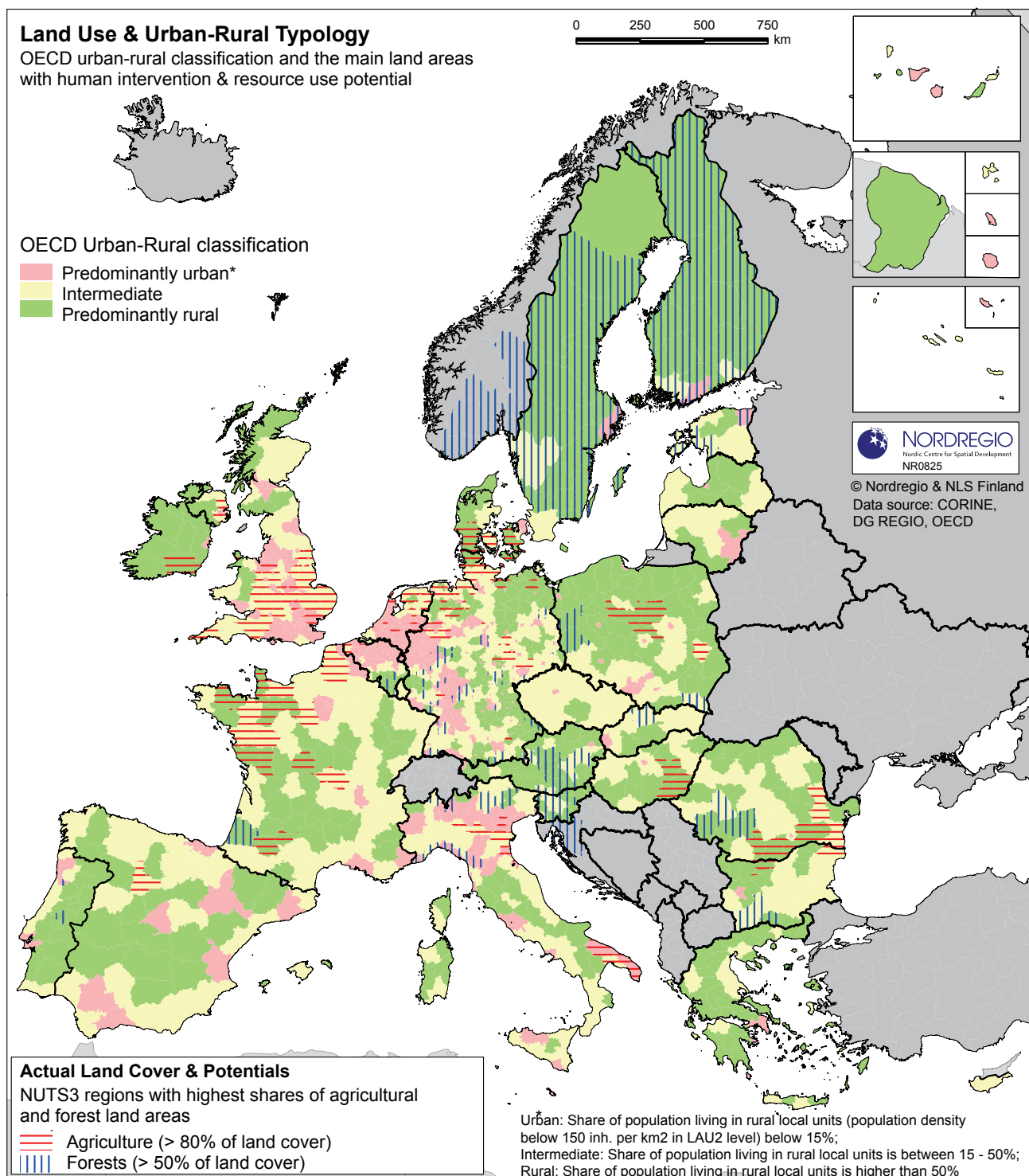


<sup>7</sup> Please see a definition for these regions in Green Paper on Territorial Cohesion  
[http://ec.europa.eu/regional\\_policy/consultation/terco/paper\\_terco\\_en.pdf](http://ec.europa.eu/regional_policy/consultation/terco/paper_terco_en.pdf)

# Land as Potential

From a historical perspective nature or land can be perceived as the basic territorial resource. A certain piece of land can be more or less suitable for farming and it can contain groundwater, mineral or energy resources. Historically, the fertility of land determined the population density and all important cities were situated with direct access to food, water and energy resources e.g. wood.

Today, the most important agricultural regions of Europe can be found often quite far removed from urbanized centres. Factors such as the need for good access to large unbroken fields with minimal slope and a good water balance are important. In the future, access to local and regional natural resources will play an important role as a basis for green growth strategies and the development



of new clean and energy efficient technologies. Biomass from agriculture or forestry can be an important provider of energy suppliers; and access to locally-produced food can be an efficient way to cut down energy consumption. Besides that, nature taken as an asset for recreation and tourism plays an important role in increasing the region's attractiveness.

Based on land cover data, regions with the highest agriculture and forest coverage are shown in the map. Only 4% of the EU's land area is covered by artificial surfaces. In contrast, 180 million hectares, or around 42% of the EU's land cover, is forested or 'other wooded' land plus the utilized agricultural area represents only a marginally smaller land cover pattern with a 41% share. Significant differences exist between the regions. There are 133 European NUTS3 regions with agricultural land cover of 80% or more and 142 regions have a forest share of 50% or more.

In the territorial development context, the agricultural regions previously presented should not however be understood as synonym for rural. Definitions of rural are

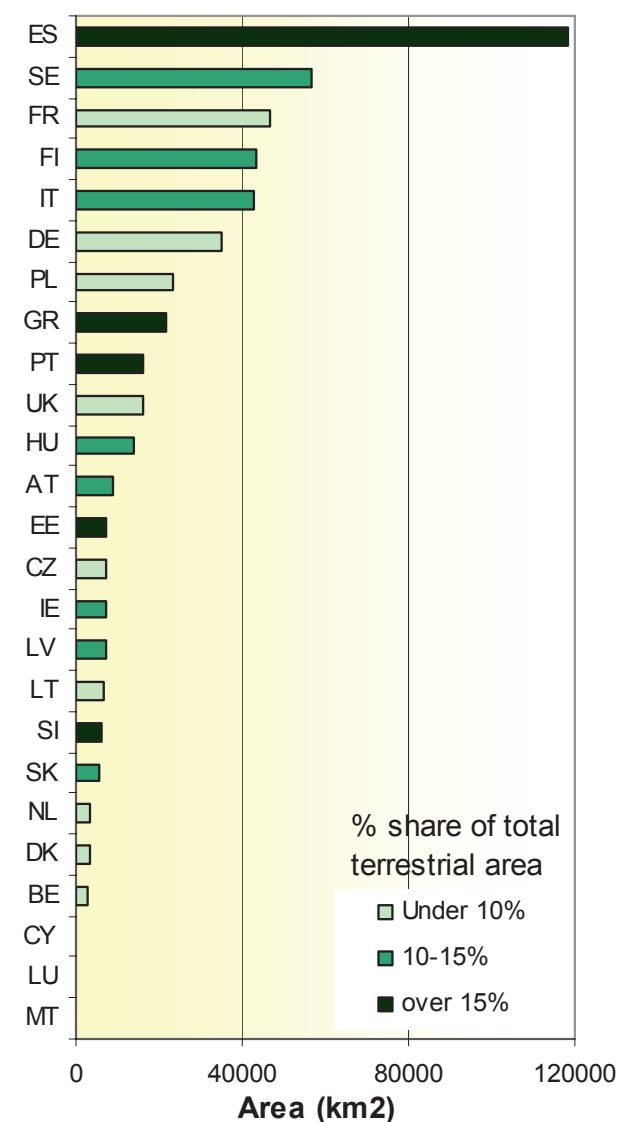
notoriously variable between countries, reflecting different national experiences, environments, and administrative structures and are therefore not clear-cut. In a European context there have been various attempts at regional typologies of the rural, but only one, that developed by the OECD, has been widely adopted as a basis for socio-economic analysis and in the context of rural development policy. The OECD definition of urban and rural areas is based on population density values above 150 inhabitants/km<sup>2</sup> on the local level. Meanwhile the most important agricultural areas in the European Union are located close to rather densely populated areas.

Population density has been actively used as a criterion for structural fund support and as a justification for special arrangements with regard to competition rules. However the relationship between urban and rural areas is also of significant importance. The network of urban and rural areas can e.g. contribute to the quality of life, both for city dwellers living close to rural areas and those rural residents within easy reach of services.

Regions with a higher percentage of forests and other areas in a natural condition in particular have the potential to contribute to themes such as the preservation of natural biodiversity and climate change mitigation. Altogether 12.7% of the EU's total terrestrial area was protected under the Habitats Directive in 2007. The Habitats Directive forms the cornerstone of Europe's nature conservation policy. It is built around the Natura 2000 network of protected sites and the strict system of species protection. All in all the directive protects over 1 000 animals and plant species and over 200 so called "habitat types", such as special types of forests, meadows, and wetlands, etc., which are of European importance. The Natura 2000 network itself is the largest network of protected areas in the world.

Data source: DG Environment, EEA, Eurostat, OECD

### Protected terrestrial area





# Mineral Resources

Minerals and metals are unique and highly important regional resources in a European context.

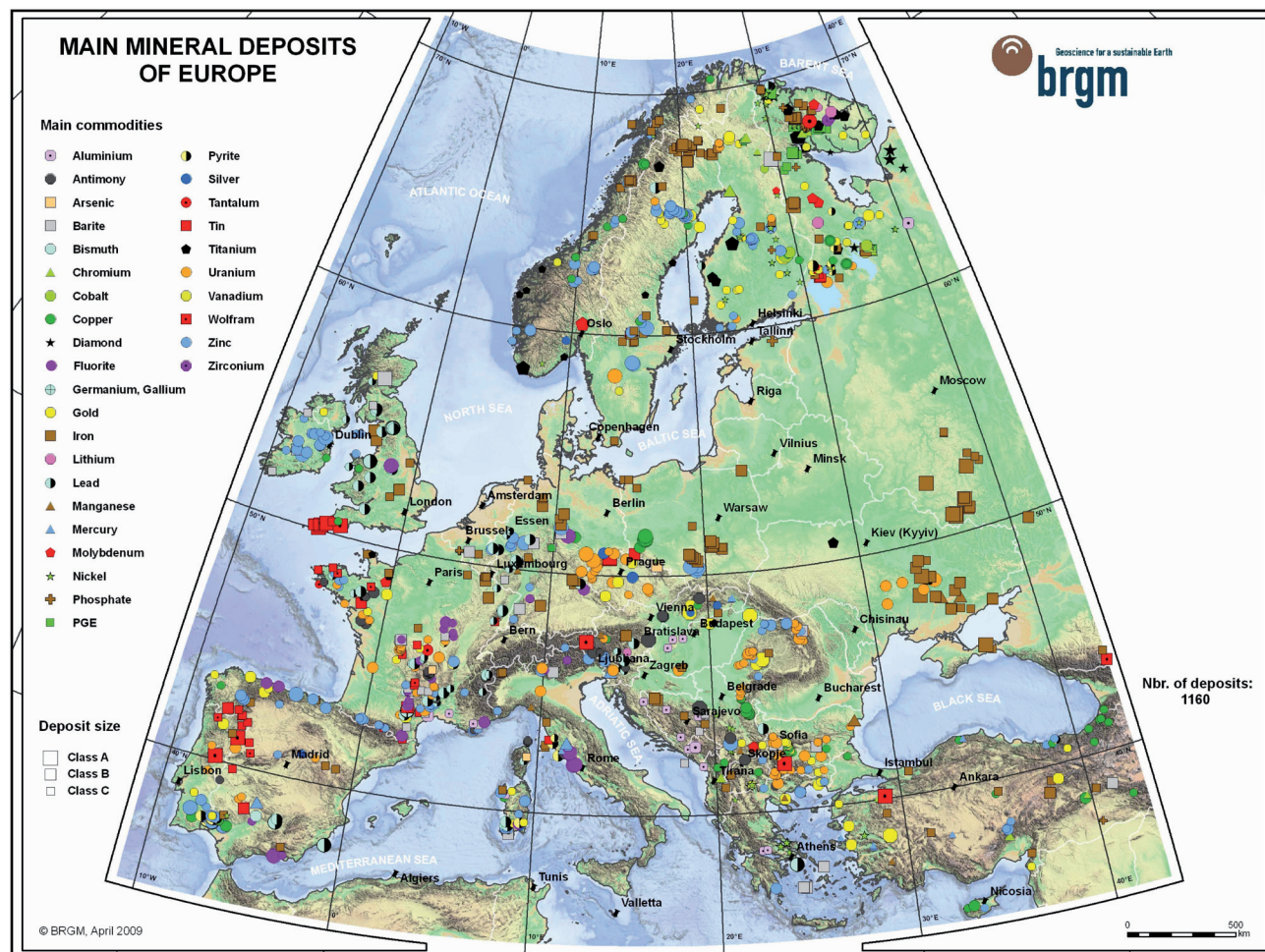
Seen in a historical perspective, the exploitation of minerals such as iron ore is closely linked to the industrialisation of Europe and the United States. In the period after the Second World War many of the mineral producing regions in Europe experienced low economic growth and structural problems because of tough competition from Third World countries and falling world market prices. In recent decades however the global demand for minerals and metals has grown significantly together with world market prices. This growing level of demand is an impact of the rapid economic development seen in countries like China and India but also a result of the still growing global demand for the high quality metals needed for high tech products of all kinds.

Rising world market prices and the liberalisation of the market for prospecting rights has made investment in the

prospecting for and production of minerals much more interesting. This means that new mines are constantly being opened while old mines are revisited and thus regions with mineral resources are increasingly becoming areas of high interest for international risk capital.

For these often peripheral or low population density regions such new inflows of international investment represents at one and the same time a challenge and a unique opportunity for development.

Clear potentials have been identified in the so called Fennoscandian Shield. The greater part of these new mining areas is within what is called the remote Northern Sparsely Populated Areas (NSPA) of Finland, Sweden and Norway. Future plans include doubling the production of iron-ore in Kiruna (Sweden), reopening the iron mine at Kirkenes (Norway) and also opening a completely new iron-mine close to Pajala (Sweden), just a couple of hours up the road from the harbour town of Kalix. Both Sweden



Map Source: BRGM (The French Geological Survey) and "ProMine" Project; April 2009.

This map has been used with permission of the authors.

and Finland are also preparing new mining ventures in respect of gold, uranium and other minerals. Including also Northwest-Russia, there are currently 42 functioning mines in the region and within a few years there could be as many as 68.

The basis for these developments is the enduring richness of the Fennoscandian Shield, which provides a geological structure ripe with assets. A good comparison here is the oil and gas fields below the North Sea. Globally only a few areas (red areas in the map, up-right) such as some parts of North and South America, China, India, Russia, Australia and Southern Africa have mineral potentials like the Fennoscandian Shield (Journal of Nordregio, 2009:3).

## The Kiruna experience

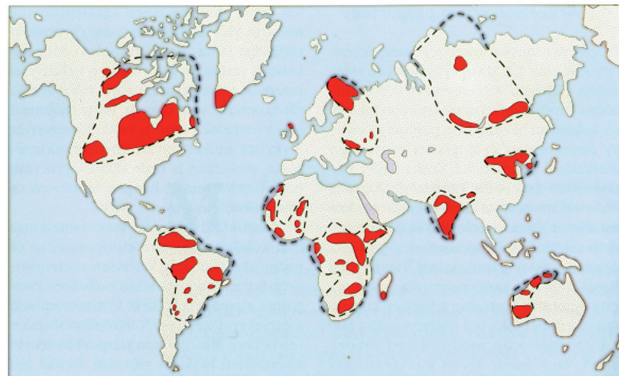
The story of the town of Kiruna is the story of the iron-ore industry in northern Sweden. Natural resources have been there for millions of years. Wood, fish, pastures for reindeer and other husbandry was the starting point. Later value was added through work to produce timber and food. But mining and the production of metals -which can be traced back to the 15th century- brought to Kiruna the possibility for massive expansion, jobs and the growth of the permanent population. Harsh climate conditions and a lack of suitable transportation solutions impeded mining activity until the end of the 19th century. It was only after the improvement of accessibility conditions to the area (after the construction of railways to Norway and southern Sweden) that a massive expansion of the iron-ore industry took place. Today, produced volumes continue to grow and the mine is one of the biggest in the world. Additionally, Kiruna makes use of the conditions offered by its natural location and environment by creating ideal conditions to develop alternative activities such as winter car testing, the ESTRACK Kiruna Station of ESA, the European Space Agency, and the North European Aerospace Test range.

The existence of mineral resources may be a challenge in relation to other potentials such as forestry or tourism. In many municipalities (i.e. northern Sweden, Finland and Eastern Norway) it is the forest areas that have first and foremost generated jobs and incomes for generations. On the other hand the potential for a sector like tourism may be derived from the existence of attractive natural resources such as natural parks or natural environment assets in general.

Most mining projects have major impacts on the landscapes they inhabit. Potential conflicts here concern the use of specific hazardous chemicals in the production process such as cyanide used in the extraction of gold. Various other negative impacts of these new investments could also have some negative influence in terms of

cultural and social aspects.

The new 'mining era' undoubtedly however provides a significant opportunity for those regions best able to cope with such negative impacts and who are also at the same time able to protect and develop other potentials for development e.g. natural resources such as landscapes and natural areas.



*Highly prospective mineral regions, map by: Risto Pietilä (GTK)*

The potential for the continuing and sustainable production of minerals may be further enhanced by a stronger contribution from R&D, innovation and knowledge-base improvement in collaboration with industries and universities as a way of tackling technological challenges while enhancing innovative exploration technologies as well as new techniques and methods of extraction and recycling in both onshore and offshore locations.

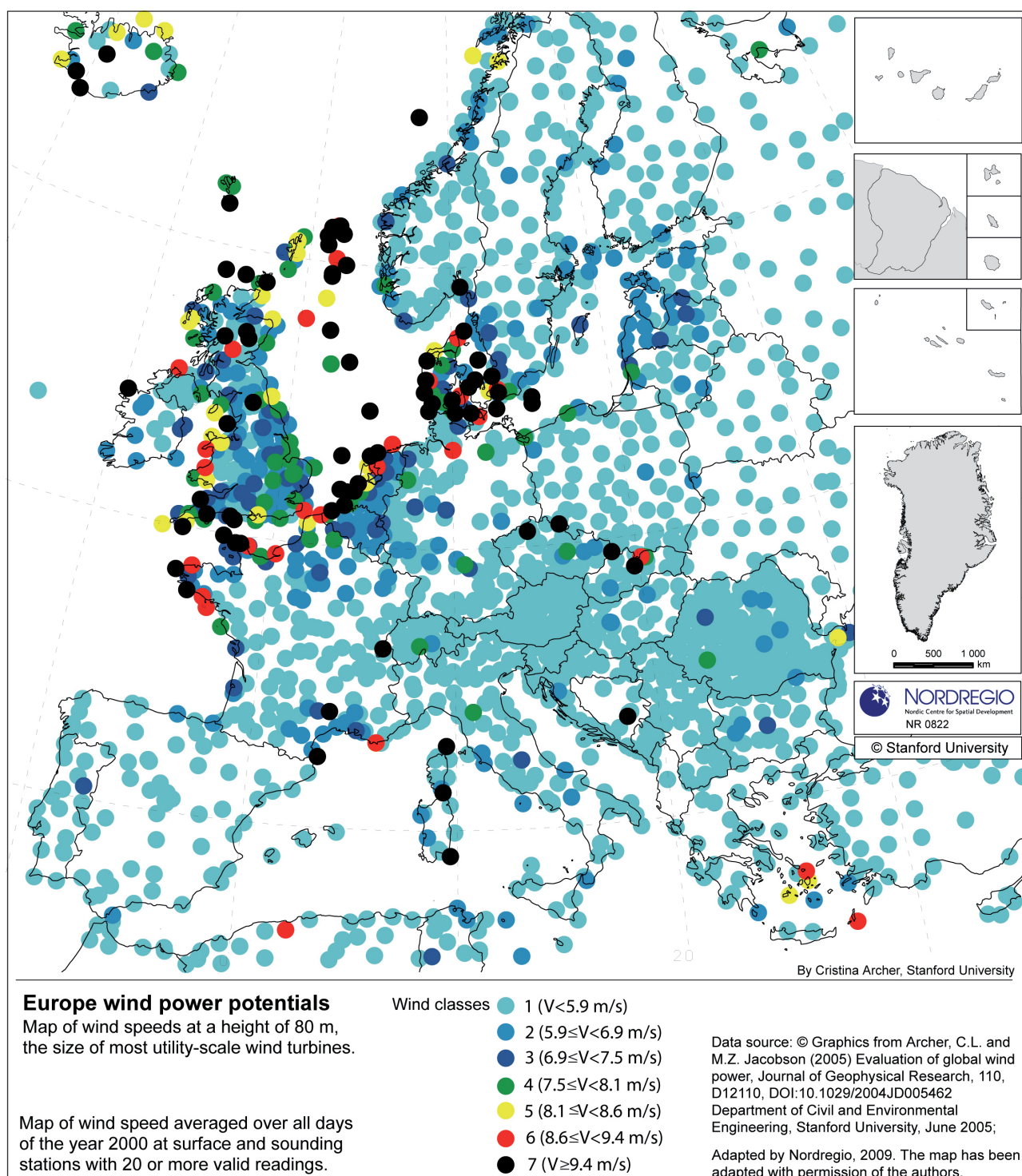
Data Sources: BRGM (The French Geological Survey); ProMine Project, Journal of Nordregio 2009:3, GTK Finland, EU-DG Enterprise & Industry



# Renewable Energy Potentials

Securing both energy availability and a healthy natural environment have a solid place in the discussion of global competitiveness as these factors enable economies to operate in a more productive way by consuming less energy while simultaneously making an efficient and sustainable use of their own natural resources. Energy efficiency and renewable energy are thus pillars of eco-

efficient growth and development. Those also constitute an important opportunity for countries which need to overcome problems of energy dependency. The level of effectiveness has a clear potential to contribute to other themes such as climate change mitigation and the reduction of greenhouse gas (GHG) emissions. Among all of the potentially available renewable energies it is worth



highlighting the emerging growth of wind power generation potential in countries like Denmark and Germany.

Areas with the greatest potential for wind power in Europe (areas with wind classes 5, 6 or 7) include the North-Sea coast as well as the UK coast and islands in the North Sea and even locations in Slovakia, the Czech Republic, Greece, Sicily and Corsica.

In 2007, 40% of all new generating capacity installed in the EU was wind power. Challenges in respect of supply security, climate change and cost competitiveness are increasing support for wind as a mainstream generation technology able to meet a substantial share of Europe's electricity demand. European countries will move at different speeds to incorporate wind into their energy portfolios; however, the changing political will and the improving performance of wind power underline its increasing competitiveness. In the EU, installed wind power capacity has increased by an average of 25% annually over the past eleven years, and in terms of annual installations, the EU market for wind turbines has grown by 19% annually, between 1997 and 2007. (Extracted from EWEA (2009): Wind Energy: the facts).

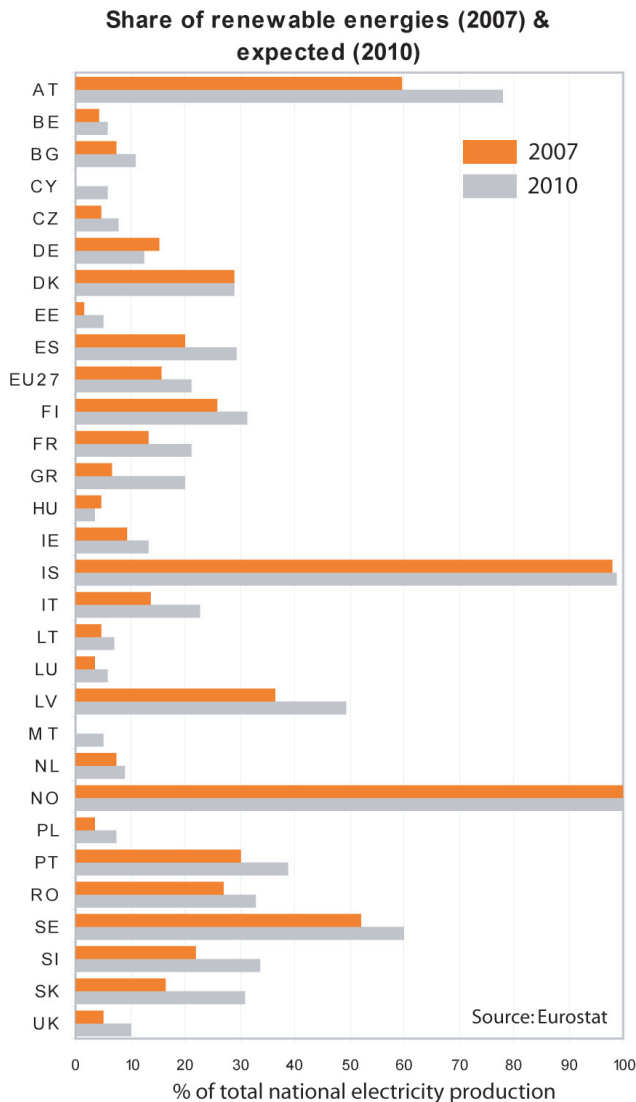
In respect of renewable energies more generally, bioenergy (followed by hydropower) remains the largest source in Europe and has significant potential in terms of making a substantial contribution to the securing energy supply and mitigating climate change as well as an important contributor to solving conflicts between energy consumption and environmental policy. Areas with higher potentials include those with high percentages of forests and industrial wood residues as well as farming areas suited to the appropriate cropping systems. Regions with an already high production of crops normally have the greatest potential in respect of bioenergy. Conflicts may however emerge between bioenergy and food production in individual regions.

In recent years the production of biomass energy has also become an increasingly important part of the agenda. Biomass energy covers purpose-grown energy crops (poplar, willow, etc), a multitude of woody materials generated by industrial processes or provided directly by forestry and agriculture (firewood, wood chips, bark, sawdust, shavings, black liquor, etc), as well as wastes. Altogether, the share of primary energy produced from wood to all products is around 6.6% in the EU27 and varies from 0.0 (Malta) to 86.9% (Latvia). On the EU27 level the share of primary energy produced from wood has increased 2% units in the last ten years. Wood and wood waste is used particularly in household energy consumption.

In general, electricity generated by renewables in 2007 presents clear variations across Europe. In Norway, Iceland, Sweden and Austria renewable sources account for more than 50% and in places up to almost 100% of the total national production (given their significant hydropower

potential and in Iceland from geothermal sources). Other countries with high figures -between 20% and 50% include Denmark, Finland Portugal, Latvia, Spain, Slovenia and Romania.

Data Sources: EWEA; Norden; Stanford University, Eurostat, Nordregio



# Impact of Climate change

Climate change may impact regional development potentials in at least three ways. First, most European regions will experience a rise in temperature combined with – depending on location – more humid or drier weather which again will impact the conditions for farming and other kinds of plant production. A temperature rise might also impact the attractiveness of the region in general. Second, climate change will change the level of vulnerability concerning natural hazards for many regions

e.g. manifest as a higher risk of storms or floods. Thirdly, international agreements and national regulations aiming at the reduction of greenhouse gas emissions might impact the development potential of the individual region. A region able to effectively reduce the negative effects of the climate change thus has a higher potential compared to other regions. The map below summarises the key vulnerabilities of the main bio-geographic regions of Europe.



Source: IPCC, 2007. Climate Change 2007: Synthesis report Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, UK; Copyright EEA, Copenhagen, 2008



As changes vary geographically, the impact on different regions will differ according to the level of vulnerability to climate hazards (some regions being more threatened by droughts, others by floods, etc), so to strategies may vary from region to region. The higher the vulnerabilities, the greater the challenges, efforts and costs for the region to adapt and the lower the comparative advantage in relation to other regions fulfilling their international targets. Climate change scenario results from the IPCC Assessment Report (2007) project an increase between 0.1 to 0.4°C/decade for the annual temperature in Europe during the 21st century as well as a widespread increase in precipitation in the north. It also shows small decreases in the south and small or ambiguous changes in central Europe plus certain increases in the intensity and frequency of summer heat waves across Europe. Opportunities in respect of agriculture may decline because of droughts while in other places the rise in temperature will create new possibilities. Regions in the south and Mediterranean regions will be affected by decreases in hydropower production, biodiversity loss, frequent fires and desertification while regions in central and northern Europe plus Scandinavia will develop a potential for higher forest growth, higher crop yields and higher production of renewable energies (i.e. hydropower or wind).

## Other potentials derived from climate

Climate change effects per se may also bring about new potentials for certain regions in Europe especially in parts of Scandinavia and the Baltic States. Softer weather conditions could bring higher crop yields in Denmark and southern Sweden while the timber line will move north in Finland and Sweden. Warmer temperatures overall may develop further opportunities for other industries such as tourism to benefit associated primarily with longer summer periods, lower energy consumption for heating, and a higher potential for hydropower generation as a result of generalised increments in river flows in parts of central and northern Scandinavia. Even though these “positive” potentials may sound beneficial and may indeed bring some sort of development to the regions mentioned, serious anomalies will still threaten Scandinavia and should not be discarded. These include reductions in the snow and ice coverage, higher probabilities of flooding and higher risks of damage from winter storms.

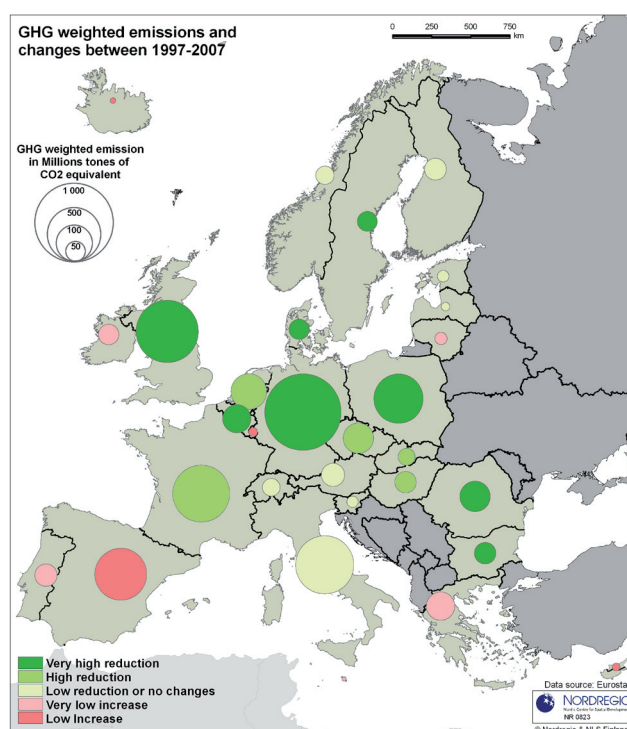
An important contribution to reducing GHG emissions comes directly from efficient clean and sustainable transport means, environmental measures and renewable energy production. The more a region is able to develop policies in these fields, the higher the potential to reduce GHGs and adapt to climate change. The possible consequences of climate change in Europe have stimulated efforts by the EU, national governments, businesses, and NGOs to develop adaptation strategies. The EU is supporting adaptation research at the pan-European level while

Denmark, Finland, Hungary, Portugal, Slovakia, Spain and the UK are setting up national programmes for adapting to climate change.

Plans overseeing the adaptation to climate change have been included in the flood protection plans of the Czech Republic as well as in the coastal protection plans of the Netherlands and Norway. (Extracted from IPCC, 2007)

At the European scale, more than half of the EU Member States (including the biggest producers of GHG gases, the UK, Germany and France) have been reducing to some extent their emission levels during the period 1997-2007. Some increases are still however being registered in Southern Europe (See map below).

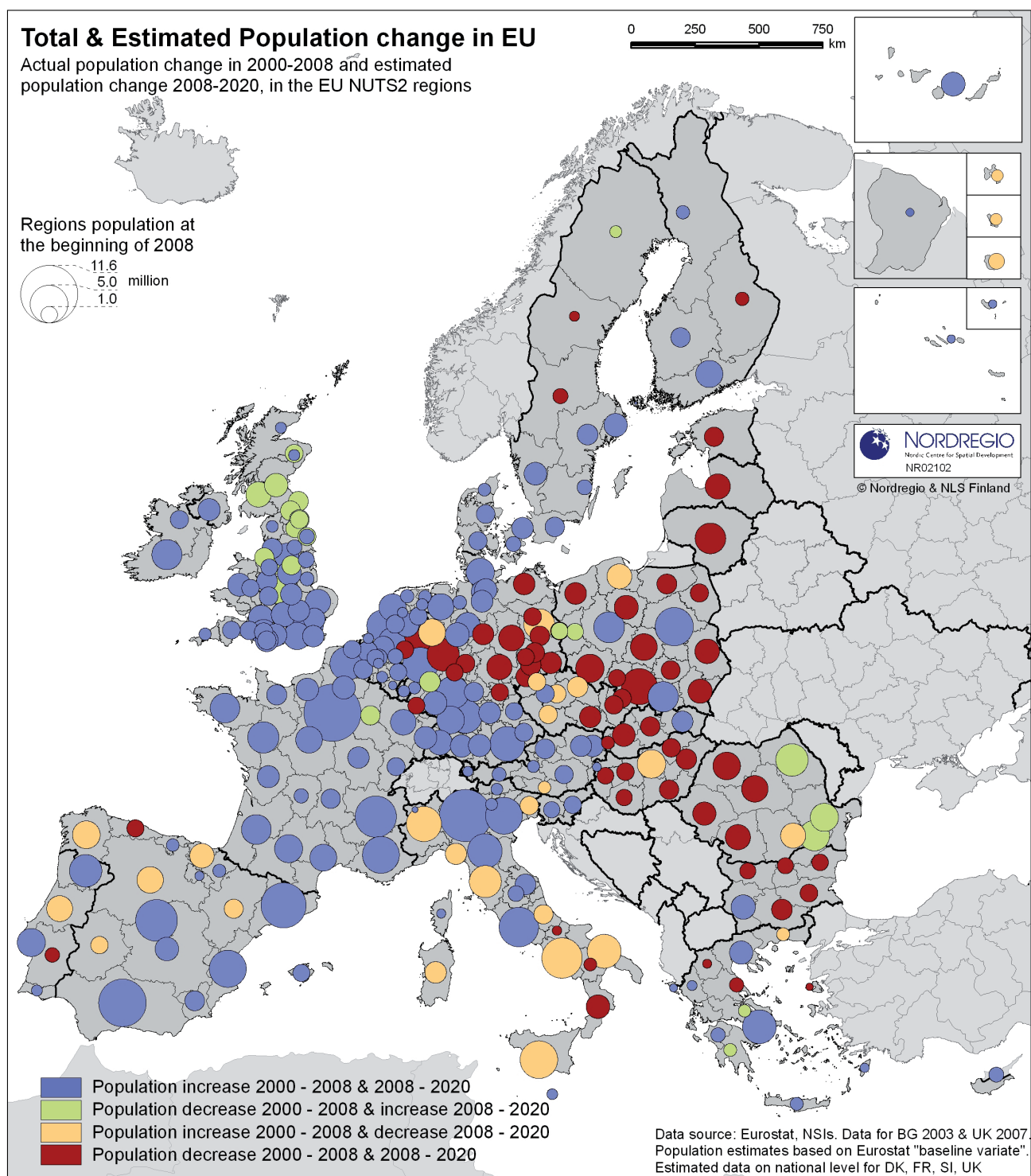
Data sources: IPCC, EEA; Eurostat, DG-Regio, Nordregio



# Population dynamics - Changing & Ageing

The population of a given territory is one of the most essential potentials in respect of the labour force, innovation and creativity. Population can also be viewed in relation to the consumers of public services and of all kinds of other resources. In other words population development helps determine a number of other territorial potentials.

Over the next forty years up to 2050 the European population will grow older and the labour force in general will shrink. At the regional level however considerable disparities will emerge, some regions will experience a dramatic loss of people while others will experience population growth partly due to the existence of a younger



and more fertile population and partly to immigration from other European regions and other parts of the world.

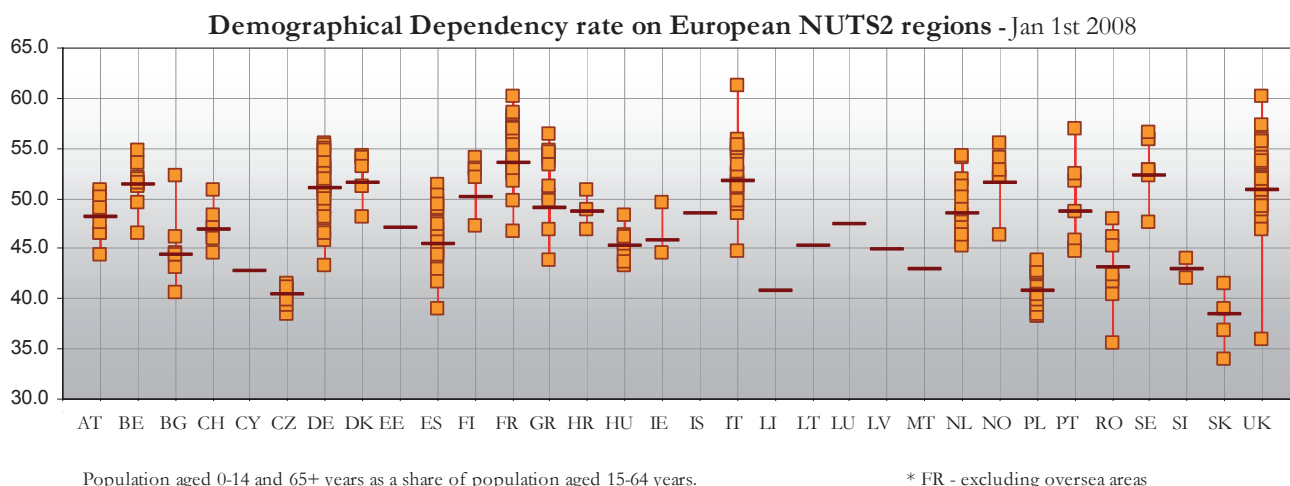
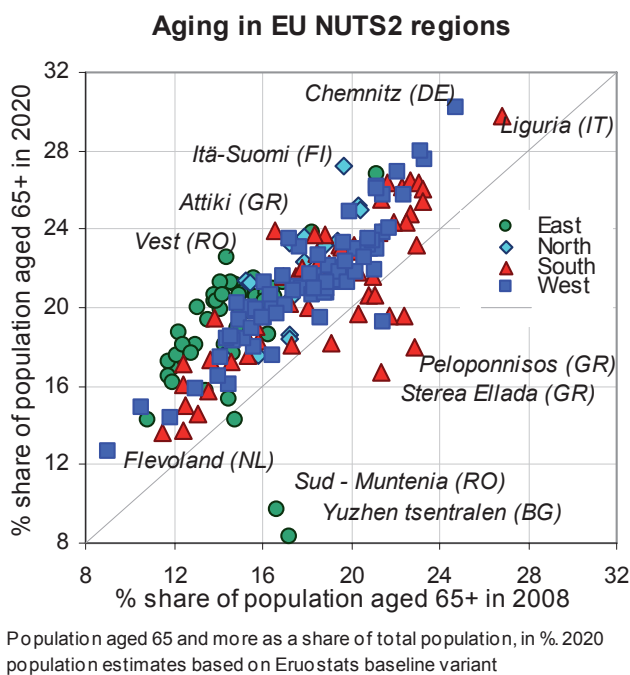
Over the next ten years it is estimated that the European population increase will slightly smooth, being annually around 0.1% on average. Based on Eurostat's baseline variant the total population of the EU27 will be around 496 million in 2020, a little over 4 million more people than today. The main growth regions are expected to be the western Netherlands, Ireland and the small member states of Cyprus, Luxembourg and Malta. The total population is expected to decrease in relative terms most in the Baltic States.

Not only is the total population of the EU increasing but the share of elderly population in particular. The European population in general is oldest in the Mediterranean and youngest in Ireland. On average, 17% of the European population was aged 65 years or more in 2008. Over the next ten years the share of elderly people in Europe is estimated to increase 3.5% on average. The relative change in the number of elderly people is estimated to increase most in Finland and the Czech Republic. By 2020 ageing will constitute a special challenge in Northern Italy, Eastern Germany and in Finnish and Swedish regions outside the major cities. In Bulgaria, Greece and Romania ageing is mostly a regional problem. These countries contain both regions with the highest and lowest shares of elderly people in 2020.

The demographical dependency rate refers to population aged 0-14 and 65+ as a share of working age population 15-64 years. On the national level, one third of the European countries have more than one dependant person per two working aged persons. Considerable regional differences however exist. This growing age dependency rate has for a number of years now been seen as a severe obstacle to future economic growth potentials in the mass media and in the broader political debate at the national level. Notwithstanding this however it should be borne in mind that the age dependency rate has been rising for decades and that the growing dependency rate has been matched by the growing productivity of the labour force.

Moreover, the ageing population per se is not the problem; even if it has dramatic consequences in depopulating local communities, where the major challenge is to maintain basic public services. The current group of elderly people is both healthier and wealthier than those of previous generations and can thus be seen as having the potential for new economic activities within i.e. housing, services, healthcare and tourism.

Data Sources: Eurostat, National statistical institutions, Nordregio.

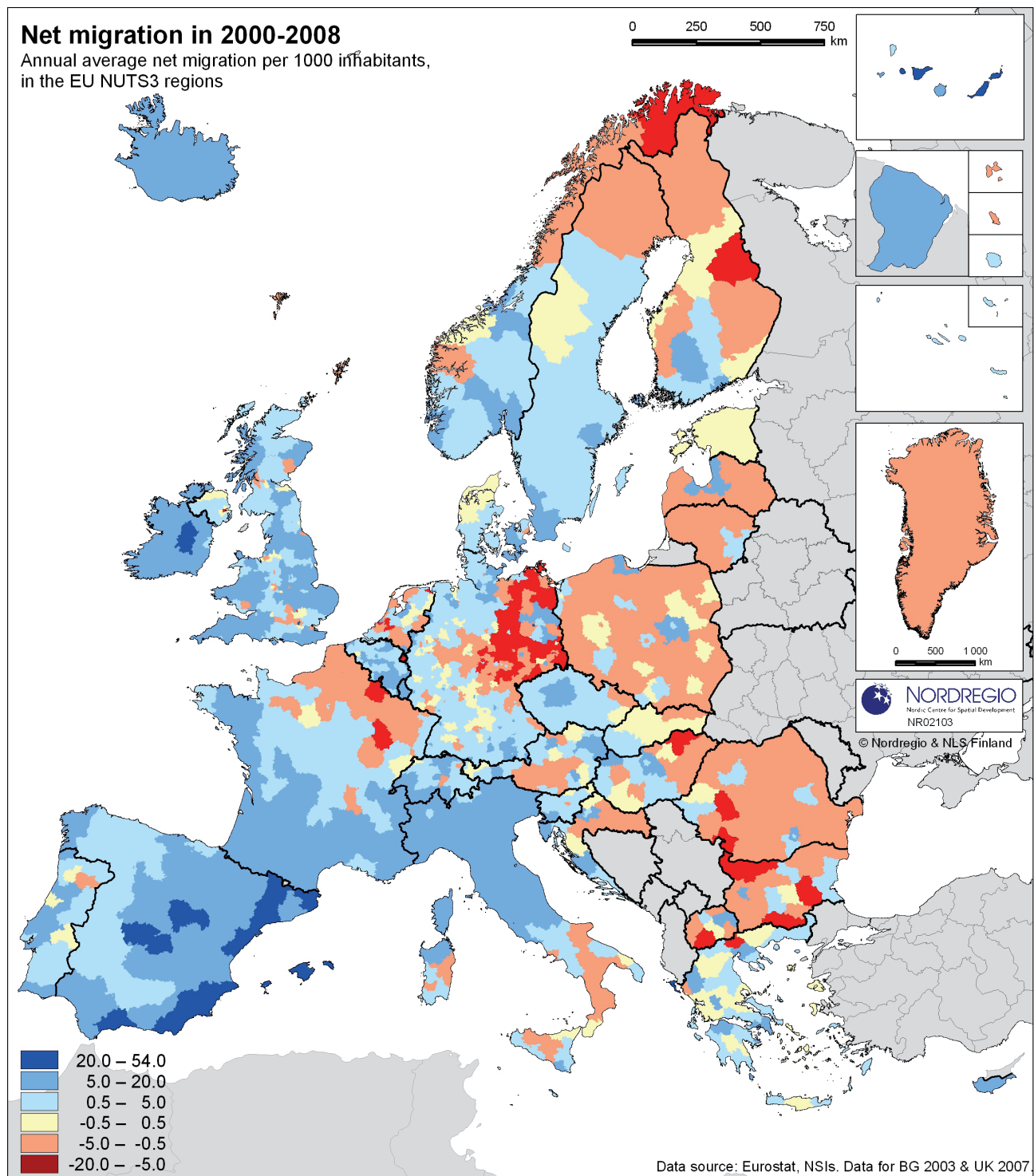




# Population dynamics - Migration

Migration can be interpreted as an indicator of how regions are exploiting their potentials in the sense that migration is undoubtedly related to the attractiveness of the region concerned and its ability to attract new residents and to replenish its labour force with new recruits.

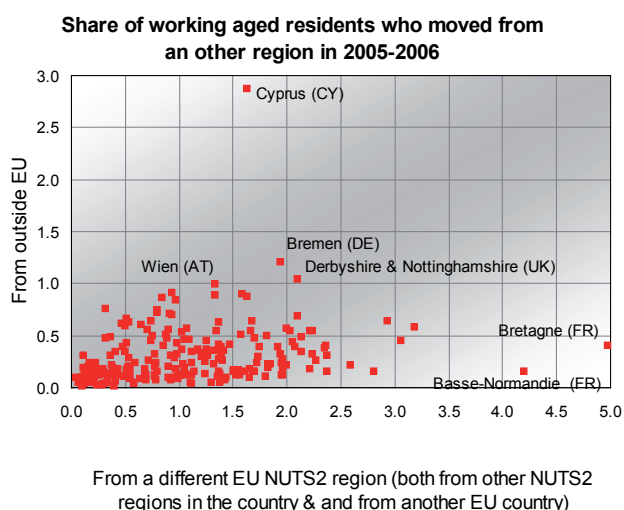
The total population change is a result of two components, natural population change and net-migration. On the European level 2/3 of the regions had a migration surplus and 40% a natural population increase. In approximately 30% of European regions both of these components are positive. Migration seems to be



the more dominant factor for population increase. Almost 80% of the regions with positive in-migration also had a total population increase. In 2000 European regions the total population is decreasing even though net-migration is positive. These regions are mainly located in Eastern Germany, Greece and Portugal, i.e. in regions with very low birth rates.

At a general level a spatial polarisation is visible in relation to net-migration, both between Eastern and Western Europe and between the metropolitan and the more rural and peripheral regions. In-migration is highest in some Spanish coastal regions and around Madrid, in 8 of these regions annual in-migration is over 3%. The highest out-migration regions are in Eastern Germany.

The figure below illustrates the regional dimension of labour mobility in the EU. It shows the share of the working age population who changed their region of residence permanently within the period 2005-2006 in relation to the EU's internal labour mobility (both from other NUTS2 regions in the country and from another EU country) and from the non-EU countries.

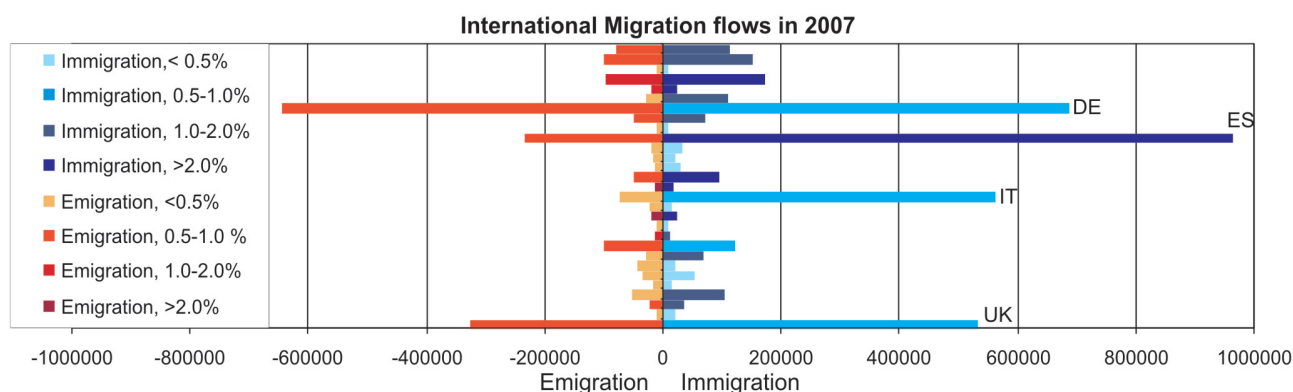


In an intra-EU context the working age population who changed their region of residence was less than 1% of the EU's total working age population. The regions which attracted the highest shares of working age residents were

located in France, Germany and the UK. The lowest scores can be found in Greece, Italy and Romania. On average, more than 85% of the EU's internal labour mobility was movements between regions of the same country with only 14% between countries. The share of arrived non-EU working age residents was 0.3% of the EU's working age population. These people moved mainly to the same top regions as intra-EU migrants but also to regions in Cyprus, Spain and Lithuania.

The major problem with this indicator is the fact that it only illustrates in-migration and therefore it is not possible to know how long these working age migrants stay in the region. The mobility of people in the European space shows quite a different pattern when talking about migration in terms of absolute and relative flows. The total international migration flows on the national level are shown in the figure below. The length of the bars indicates the total number of immigrants and emigrants and the colour indicates the emigrant's share of total population. In 2007 the European population increased in total by 1.9 million because of immigration. In absolute terms Spain, Italy and the UK received most immigrants although the total flow of international migrants was highest in Germany. Compared to total population the highest migration surplus took place in Spain, Luxembourg and Ireland. In all the European Island states, in Belgium and in Switzerland the relative migration flows are remarkable – both immigration and emigration are at a high level, explained by tendencies to 1) work in these countries for a limited time period and 2) to study abroad because of limited domestic education possibilities.

Data Source: Eurostat, Nordregio, EU DG.Regio

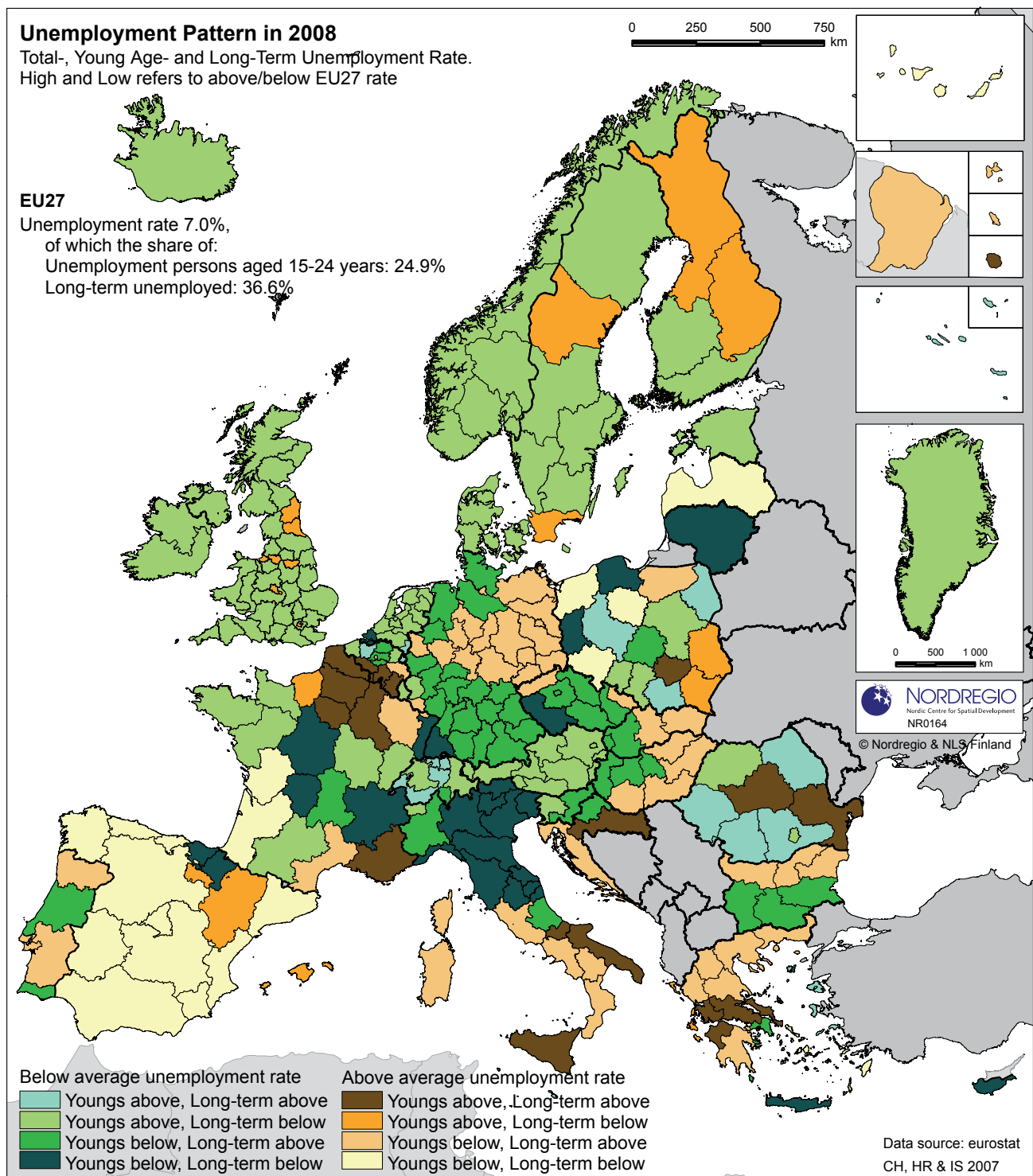


# Unemployment as a challenge

The unemployment rate indicates the efficiency of the regional labour market. In an efficient labour market the supply and demand of labour is relatively balanced. The regional challenge is to reach a level of unemployment that secures a dynamic labour market, without creating social or economic problems. Without a minimum of unemployment, companies may have problems expanding

in times of prosperity. On the other hand, in times of recession, unemployment is likely to hit certain groups harder than others.

In 2008, the average unemployment rate of EU was 7%. Significant differences however exist not only between the regions and countries but also between different groups.



Below, regional youth and long term unemployment has been compared to the average level of unemployment in Europe. A high level of youth unemployment indicates a mismatch between the labour market and the educational system. This is the situation in Northern Europe and in Austria & Switzerland where overall unemployment is otherwise rather low.

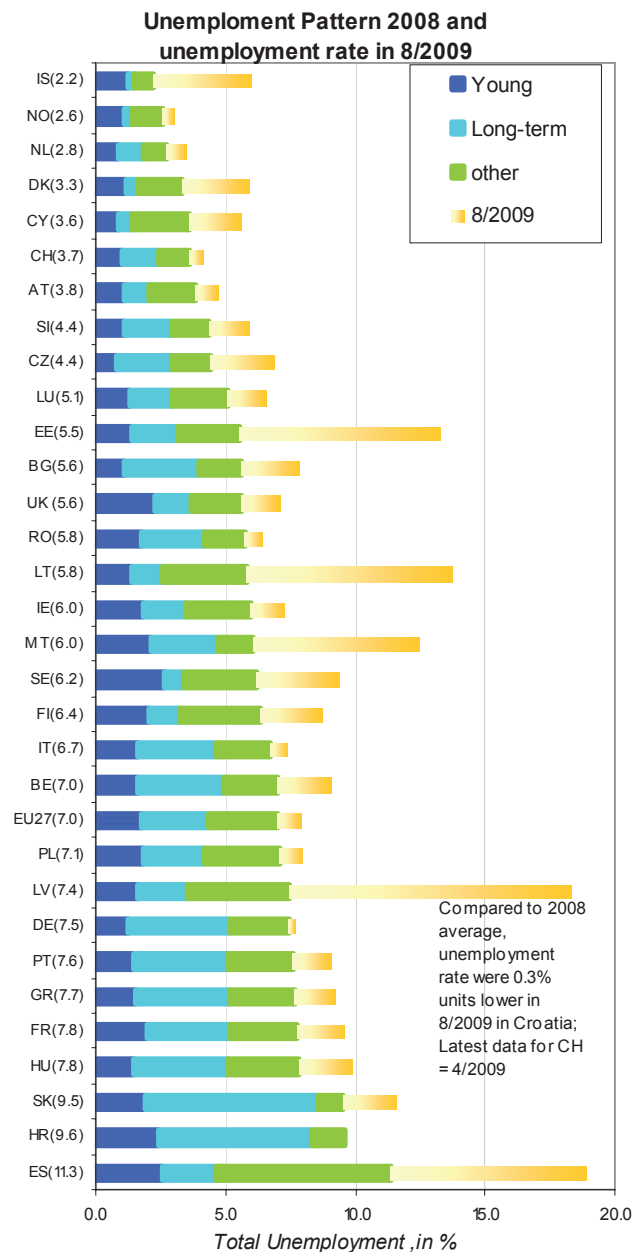
The long-term unemployment rate refers to people who have been unemployed for more than a year. This situation is common in the regions with structural problems, e.g. where personal skills and available jobs do not match, mostly in the Central and Southern Europe. In Spain, unemployment in general is high, but may be explained by a high share of seasonal employment in certain sectors, such as tourism and agriculture. In 2008, the unemployment level was lowest in Northern Italy, where overall unemployment and its components were all under the European average. This may indicate a shortage of labour.

Youth and long-term unemployment reflects different patterns. There is a clear correlation between the general and long-term unemployment, e.g. long-term unemployment is relatively higher in regions with high overall unemployment, e.g. in Slovakia and Croatia. The absolutely and relatively lowest long-term unemployment rates can be found in North-West Europe. In contrast, youth unemployment is relatively speaking highest in these regions. The relatively lowest level of youth unemployment seems to be in the Czech Republic.

As indicated above, unemployment levels are strongly influenced by the economic situation. During the period 2003-2005 the European unemployment rate was around 9%. From the beginning of 2006 unemployment decreased rapidly. Between the summers of 2007 and 2008 European unemployment reached a minimum around 7%. However, due to the emerging economic crises in the fall of 2008 the European unemployment rate rapidly increased, indeed all the way back to the level of 2003-2005. Its further development during the autumn of 2009 will be crucial. During previous crises, the unemployment figure seems to have followed broader economic developments by half a year – hence unemployment is generally termed a ‘lagging’ indicator.

On the national level it is clearly visible that the ongoing economic crises have impacted the various European countries rather differently. From 2008 to August 2009, the highest increases in unemployment rates were in the Baltic States, Malta and Spain. In Iceland however, in relative terms, the unemployment rate has increased most though it remains at a modest level still when compared to the European average.

Data Sources: Eurostat, National Statistical Institutions, Nordregio



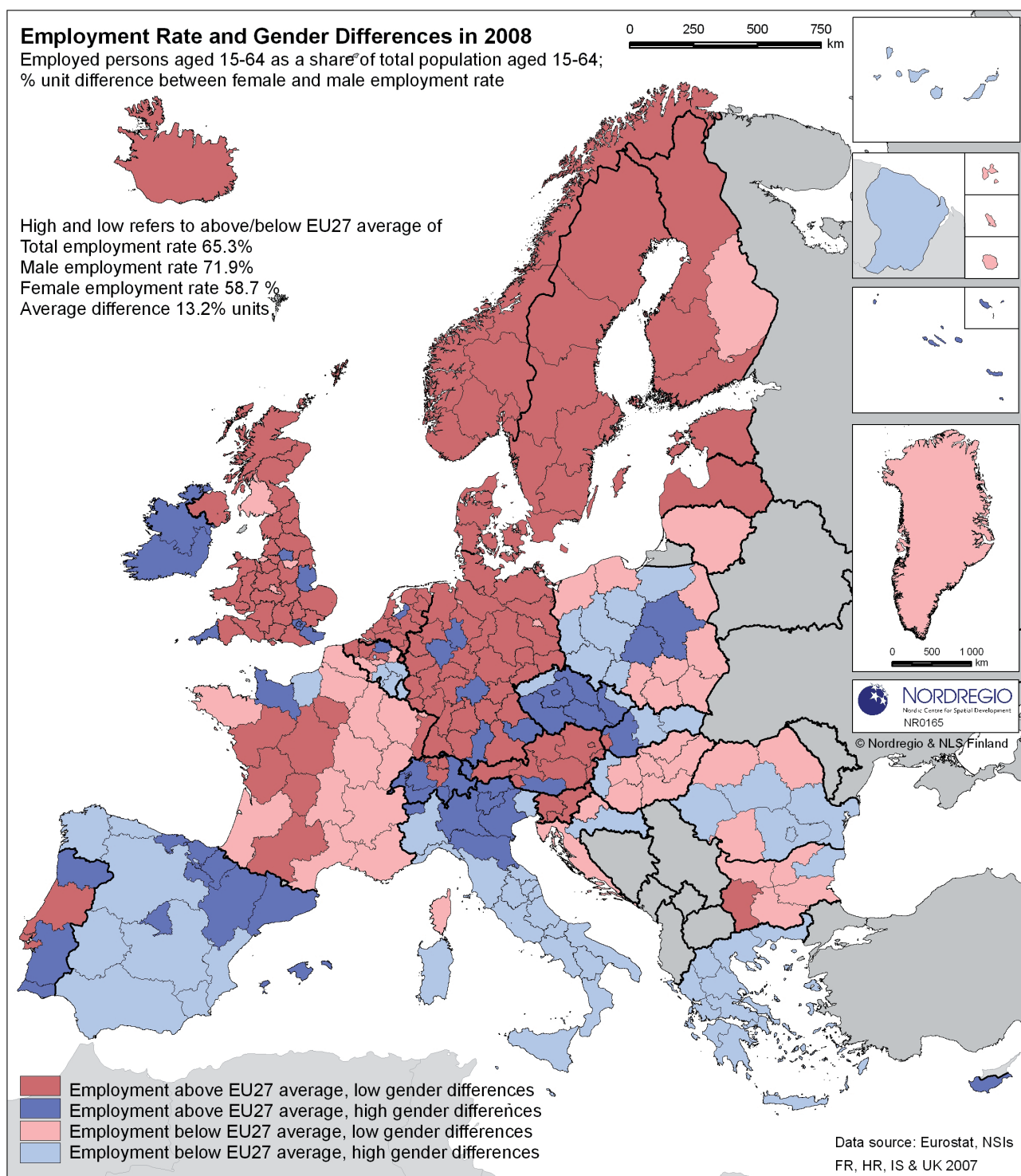


# Labour Market Potentials

Restricted access to labour remains a growth obstacle for many regions particularly in times of strong economic development. As such it is important to make use of the human resources available. The employment rate does not indicate only the number of jobs related to the population aged 15-64 but also how well the available human resources are utilised in conducting ongoing economic activity. This,

in turn, is influenced by regional differences, e.g. in culture and social welfare systems.

The Lisbon Strategy, the European Unions action and development plan for economic growth and competitiveness, sets specific targets for employment by 2010; an overall employment rate over 70%, female



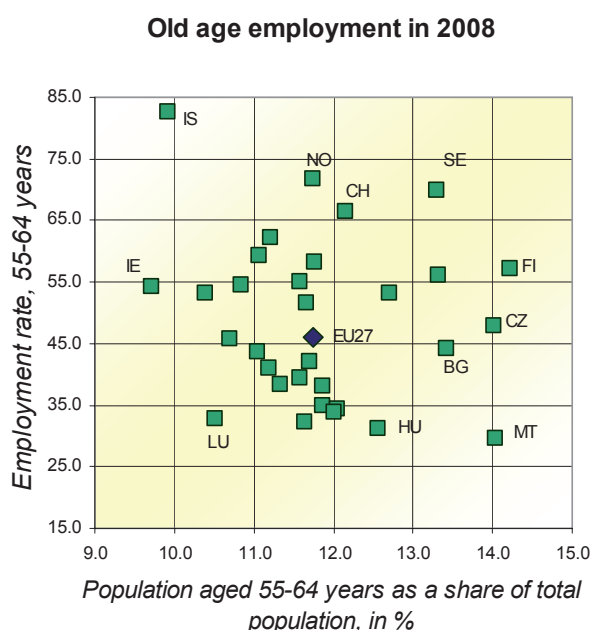


employment rate over 60% and an employment rate among older workers, e.g. aged 55 to 64, over 50%.

In 2008, one third of the European regions had reached the overall goal of 70% employment, 57% the female employment goal and 45% the employment goal for older workers. In this sense, it is clear that unused labour force potentials exist in Europe. In the graphic reproduced below, regional performance in comparison to average employment in the EU is presented from a gender perspective.

On a national level, the overall employment rate is over 70% in seven Northern and Central European countries, with Denmark and the Netherlands at the forefront. On a regional level, the highest rates can be found in Northern and Eastern Scotland, the Åland Islands (FI) and in some Swiss regions. The lowest employment rates can be found in Southern Italy and in overseas areas, where the role of the informal economy is still high.

The highest differences between male and female employment rates can be found in Malta, Southern Italy and in some Greek regions, with a gender gap of up to 30 percentage points. The most balanced situation can be found in Finland, in some city regions in Northern Germany and in the Scottish highlands, where the gender differences are only marginal. There is a clear south–north polarisation here, which may have several explanations, from the social welfare systems, e.g. access to childcare and parental compensation systems, to more subjective reasons related to labour culture and female involvement.

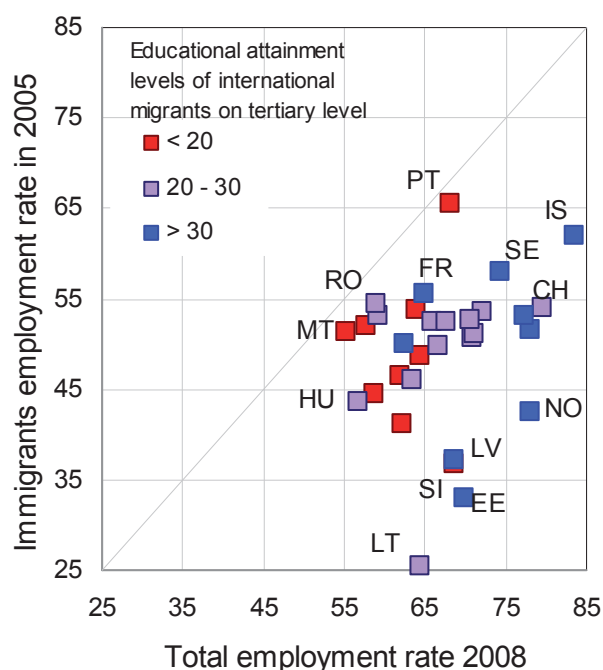


On the other hand, the high share of female labour force participation in Northern Europe compared to the countries of Central and Southern Europe implies that the Northern countries cannot compensate for ageing by increasing female participation in the labour market in the way that many other European countries can.

In a similar way, the employment rate among older workers does not only reflect the potential of using this experienced age group, but also the impact of the national pension systems. On national level, employment among older workers is highest in the Scandinavian Countries. On regional level, some Swiss regions and rural regions in the UK score well. The lowest employment rates among older worker can be found in the small states of Malta and Luxembourg, and in some Hungarian, Polish and southern Italian regions.

The employment situation among persons with an immigrant background provides another illustration of the regional use of labour force potentials. All EU countries have an overall employment rate over 50%, but the employment rate among immigrants is seldom above 50%. The immigrant's employment rate is highest in Portugal and Sweden and lowest in the Baltic States. Surprisingly, the level of tertiary education of international migrants does not seem to affect the employment situation very much.

Data Sources: Eurostat, National Statistical Institutions, Nordregio

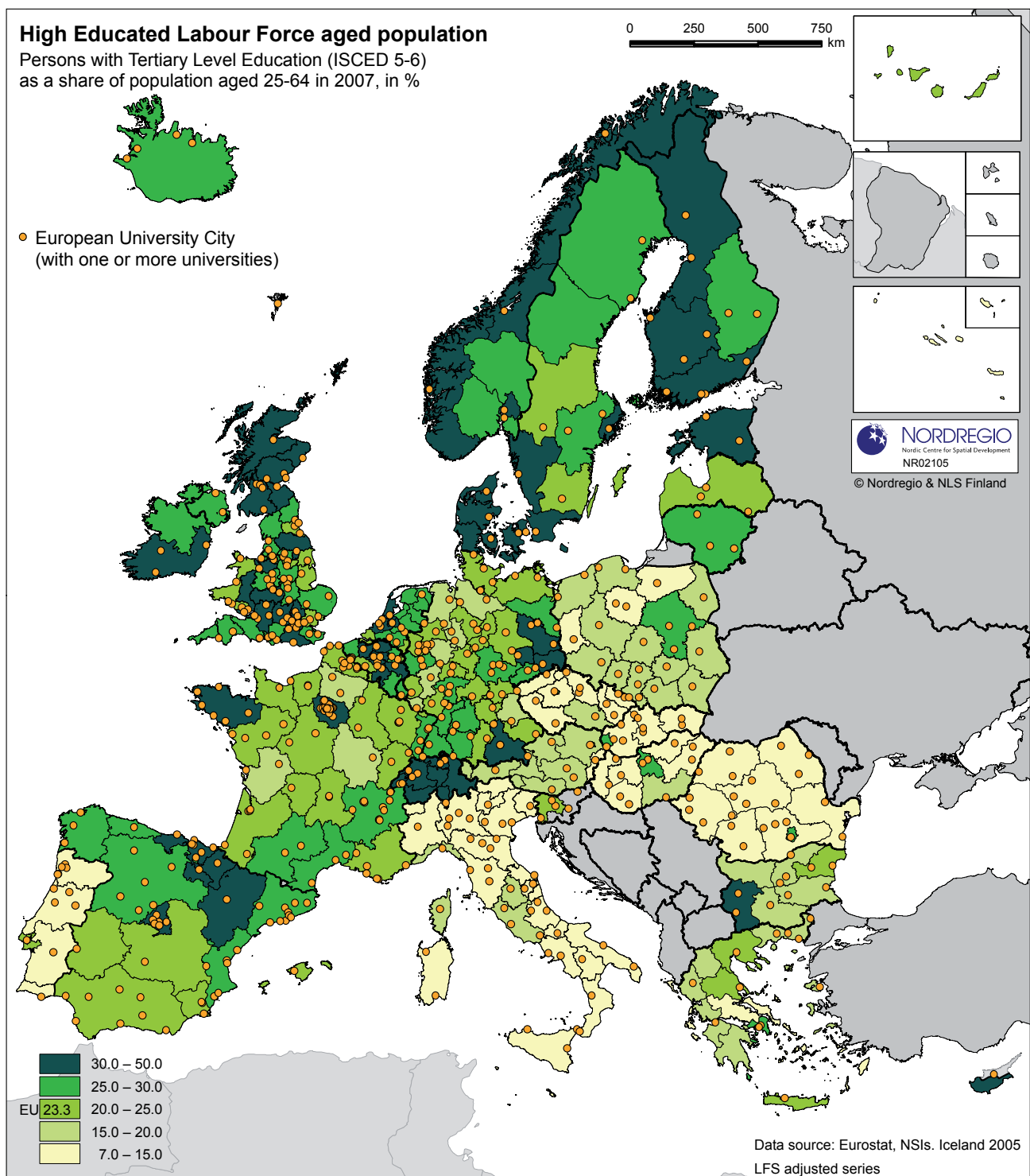


# Labour Force Qualifications

The EU Green Paper on territorial Cohesion states that the competitiveness and prosperity of territories increasingly depends upon the capacity of the people and businesses located there to make the best use of all their territorial assets. Therefore the level of education and the quality of

the entire educational system are crucial elements in any calculation of territorial potential.

On average, 23% of the European working age population have a tertiary level education. At the regional

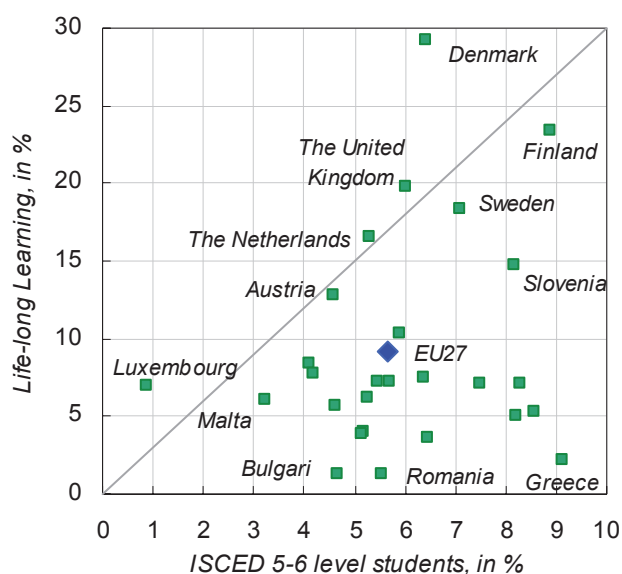


level the tendency is that the most tertiary level educated dense regions are the main European city regions. Notwithstanding this however it is also the case that regions with low population densities in Northern and Western Europe also tend to have a remarkably high level of tertiary education.

At the European level around 50% of tertiary level educated people are female. Significant differences however exist between countries. Around the Baltic Sea and especially in the Baltic States the share of highly educated females is overrepresented (over 60%) whereas in the Central European countries of Switzerland, Germany and Austria only around 40% of highly educated persons are female.

The number of students in tertiary level education may indicate the level of reproduction and development in respect of the labour force qualifications.

18.5 million persons studied in a European high education institution in 2006. The highest share of tertiary level students compared to population age 15-64 could be found in Greece followed by Finland and the Baltic States. The lowest shares of students were in Luxembourg, Malta and Cyprus -all being small states where a significant number of nationals pursue tertiary level education abroad. At the regional level the highest shares of tertiary level students can be found in some Eastern European city regions such as Bucuresti, Prague and Bratislava and in some Greece regions.



Tertiary level students (ISCED 5-6) as a % share of population aged 15-64. Life-long learning : Persons aged 25-64 participating of in education and training as a population aged 25-64. Both in 2007

In order to maintain labour force qualifications at a high level and up-to-date the level of life-long learning, defined as the share of adults aged 25-64 in education and training, is a useful indicator. Approximately 9% of the European labour force aged population currently participates in education and training activities. The span

between the various European countries is again however quite significant. In Denmark and Finland there were over 20% of the relevant age group participating in education and training activities whereas only approximately 1% participate in Romania and Bulgaria.

There are approximately 800 cities in Europe containing one or more university or higher education institution. This remarkable pattern of knowledge production can act as a series of bridges between research and business while in addition the universities and higher education institutions supply the labour marked with an educated labour force. Therefore universities and higher educations institutions can play a crucial role in regional innovation systems.

#### Top 20 European Universities

| Score | University                       | Country | World Rank |
|-------|----------------------------------|---------|------------|
| 1     | University of Cambridge          | UK      | 4          |
| 2     | University of Oxford             | UK      | 10         |
| 3     | University College London        | UK      | 21         |
| 4     | Swiss Fed. Inst. of Tech. Zurich | CH      | 23         |
| 5     | The Imperial College, London     | UK      | 26         |
| 6     | University - Paris 6             | FR      | 40         |
| 7     | The University of Manchester     | UK      | 41         |
| 8     | University of Copenhagen         | DK      | 43         |
| 9     | University Paris 11              | FR      | 43         |
| 10    | Karolinska Institute             | SE      | 50         |
| 11    | Utrecht University               | NL      | 52         |
| 12    | The University of Edinburgh      | UK      | 53         |
| 13    | University Zurich                | CH      | 54         |
| 13    | University of Munich             | DE      | 55         |
| 15    | Technical University Munich      | DE      | 57         |
| 16    | University of Bristol            | UK      | 61         |
| 17    | University of Heidelberg         | DE      | 63         |
| 18    | King's College London            | UK      | 65         |
| 19    | University of Oslo               | NO      | 65         |
| 20    | Ecole Normale Supérieure         | FR      | 70         |

Based on 2009 Academic Ranking of World Universities by Center for World-Class Universities, Shanghai Jiao Tong University

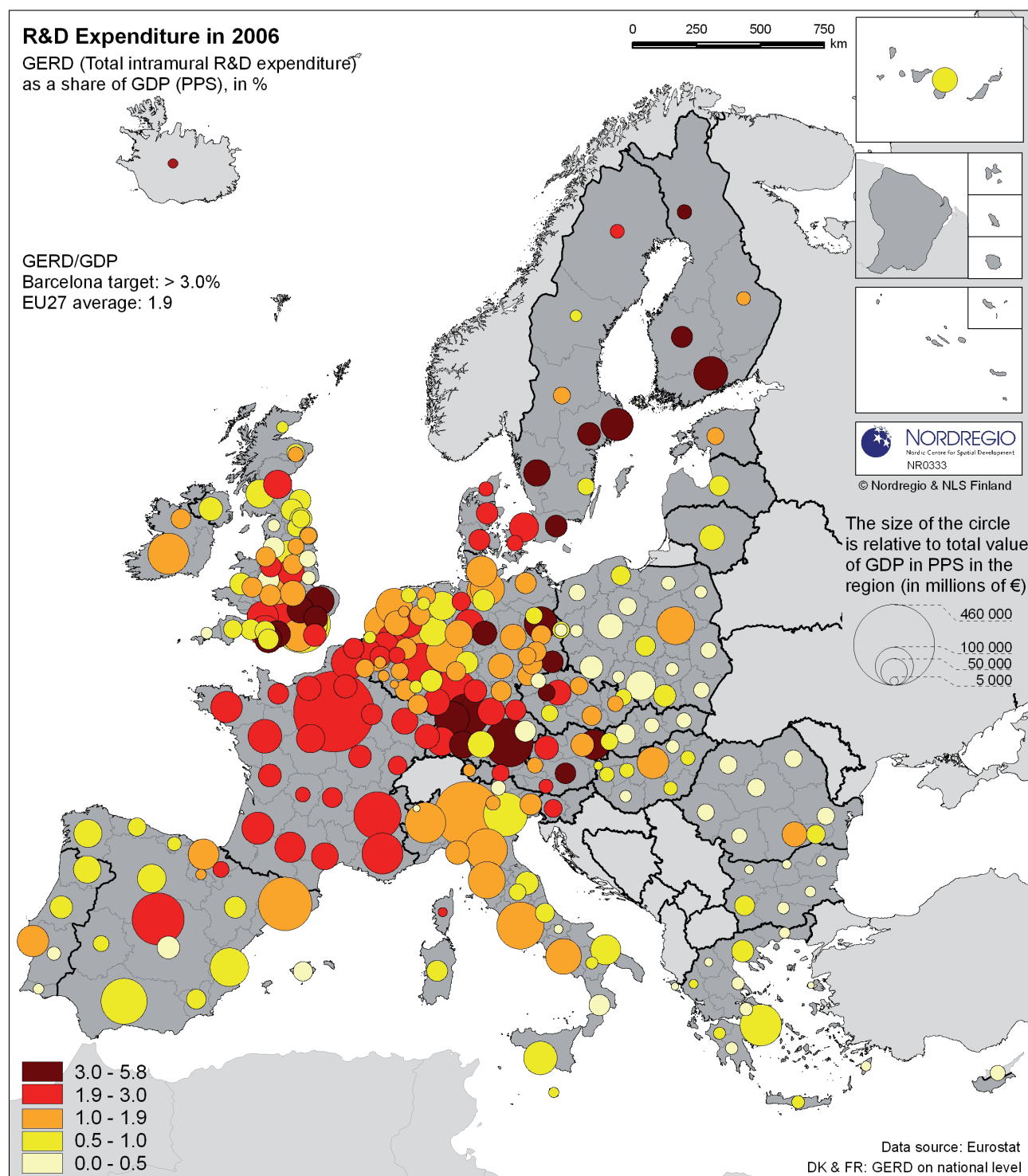
Measuring the quality of institutions conducting research and higher education training is a challenging task. The Centre for World-Class Universities of Shanghai Jiao Tong University however provides one of the most cited works in this field. In this ranking 40% of the World's top 500 universities are European. At the European level the top 20 universities are shown in the accompanying table. In terms of overall ranking ARWU (Academic Ranking of World Universities) classifies universities in some key fields and subjects. When looking at the world's top universities in the fields of natural sciences, technology and medicine, the Universities of Cambridge & Oxford, University College London and Karolinska Institute (SE) can be seen as world leaders in their fields.

Data Sources: Centre for World-Class Universities of Shanghai Jiao Tong University, Eurostat, National statistical Institutions, Nordregio.

# Research and Development Potentials

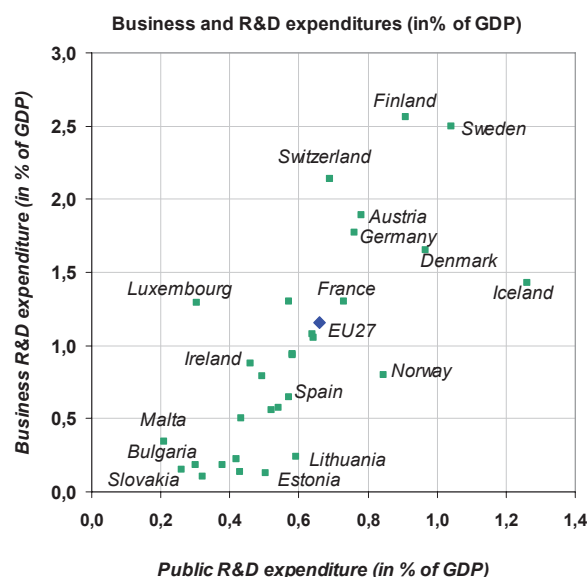
High levels of business and public expenditure in research and development (R&D) is one of most important preconditions for innovation. R&D investments may be interpreted as an indicator of the willingness to continually revise and create new products or solutions to new challenges.

In Barcelona in 2002 the aim of spending at least 3% of GDP on R&D by 2010 was added to the Lisbon Strategy. Of this, two thirds was to be financed by the business sector. According to latest data, only Finland and Sweden of the EU countries have reached the level of 3% or more R&D investments as a share of GDP (GERD). Together with Austria, Belgium, Germany and Luxembourg these





six EU countries are also the only ones where the Business enterprise sector finances over two thirds of GERD. At the regional level the picture is slightly different. Altogether, there are 21 European NUTS2 regions with a R&D level of 3% or more. These regions are found around Finland and Sweden, in Southern and Eastern Germany, South-East England and the regions of Steiermark (AT) and Strední Čechy (CZ). In Pohjois-Suomi (FI), Stuttgart (DE) and Västsverige (SE) the level is even over 5%.



Source: European Innovation Scoreboard Database, 2008

R&D is conducted by many different actors, e.g. universities, companies, state agencies or specialized institutions. Together, these actors create a research environment with a potential to contribute to innovation. A partial correspondence exists between public and privately funded R&D on the national level. A high level of public R&D-expenditures, measured by GERD as a share of GDP, clearly responds to a high level of private R&D-expenditure. In regions with low public R&D-expenditures, the pattern is less clear. Overall, the Nordic countries, as well as Switzerland, Austria and Germany, have figures well above the average EU level.

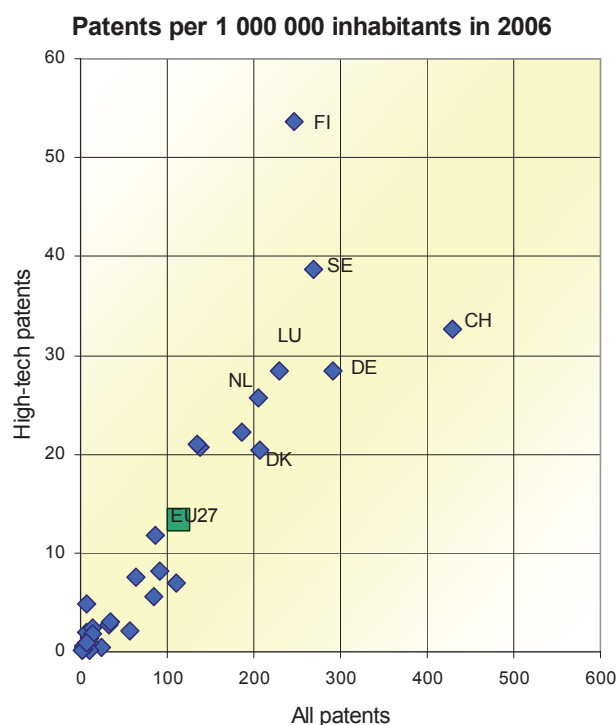
| Company              | ICB Sector                     | R&D Investment<br>in 1000 € |
|----------------------|--------------------------------|-----------------------------|
| Nokia (FI)           | Telecommunications equip.      | 5281.0                      |
| Volkswagen (DE)      | Automobiles & parts            | 4923.0                      |
| Daimler (DE)         | Automobiles & parts            | 4888.0                      |
| Sanofi-Aventis (FR)  | Pharmaceuticals                | 4563.0                      |
| GlaxoSmithKline (UK) | Pharmaceuticals                | 4419.4                      |
| Robert Bosch (DE)    | Automobiles & parts            | 3560.0                      |
| AstraZeneca (UK)     | Pharmaceuticals                | 3448.6                      |
| Alcatel-Lucent (FR)  | Telecommunications equip.      | 3368.0                      |
| Siemens (DE)         | Electrical components & equip. | 3366.0                      |
| BMW (DE)             | Automobiles & parts            | 3144.0                      |

At the company level the EU Industrial R&D Investment Scoreboard presents information on 2000 companies from around the world reporting major investments in R&D. Around 1000 of these are companies whose registered offices are in the EU. Altogether these 1000 EU companies invested 126 billion € in R&D activities in 2007. Three out of five companies came from France, Germany or the UK, representing a total R&D-investment of 88 billion

€. The dominant sectors here were automobiles & parts, telecommunications equipment and pharmaceuticals. The highest performing 27 individual companies among the top R&D investors invested over one million euros each in R&D activities. In the table below, the European top 10 R&D investors are listed.

The output from R&D investments can be measured e.g. in terms of employment and patents. In total, approximately 3.4 million persons in the EU work with research and development activities. The number of patents gives an indication of a country's inventive activity and capacity to exploit knowledge and translate it into potential economic gains. Since patents are often related to the location of the headquarters, rather than the actual place of invention, only the national figures are shown in the figure below, which illustrates the total number of patent applications and high-tech patent applications sent to the European Patent Office – EPO related to total population in the country. In general the European patenting activity is highest in relation to all and high-tech patents in Germany, Luxembourg, the Nordic Countries and Switzerland.

Data source: Eurostat, The 2008 EU Industrial R&D Investment Scoreboard [http://iri.jrc.ec.europa.eu/research/scoreboard\\_2008.htm](http://iri.jrc.ec.europa.eu/research/scoreboard_2008.htm)



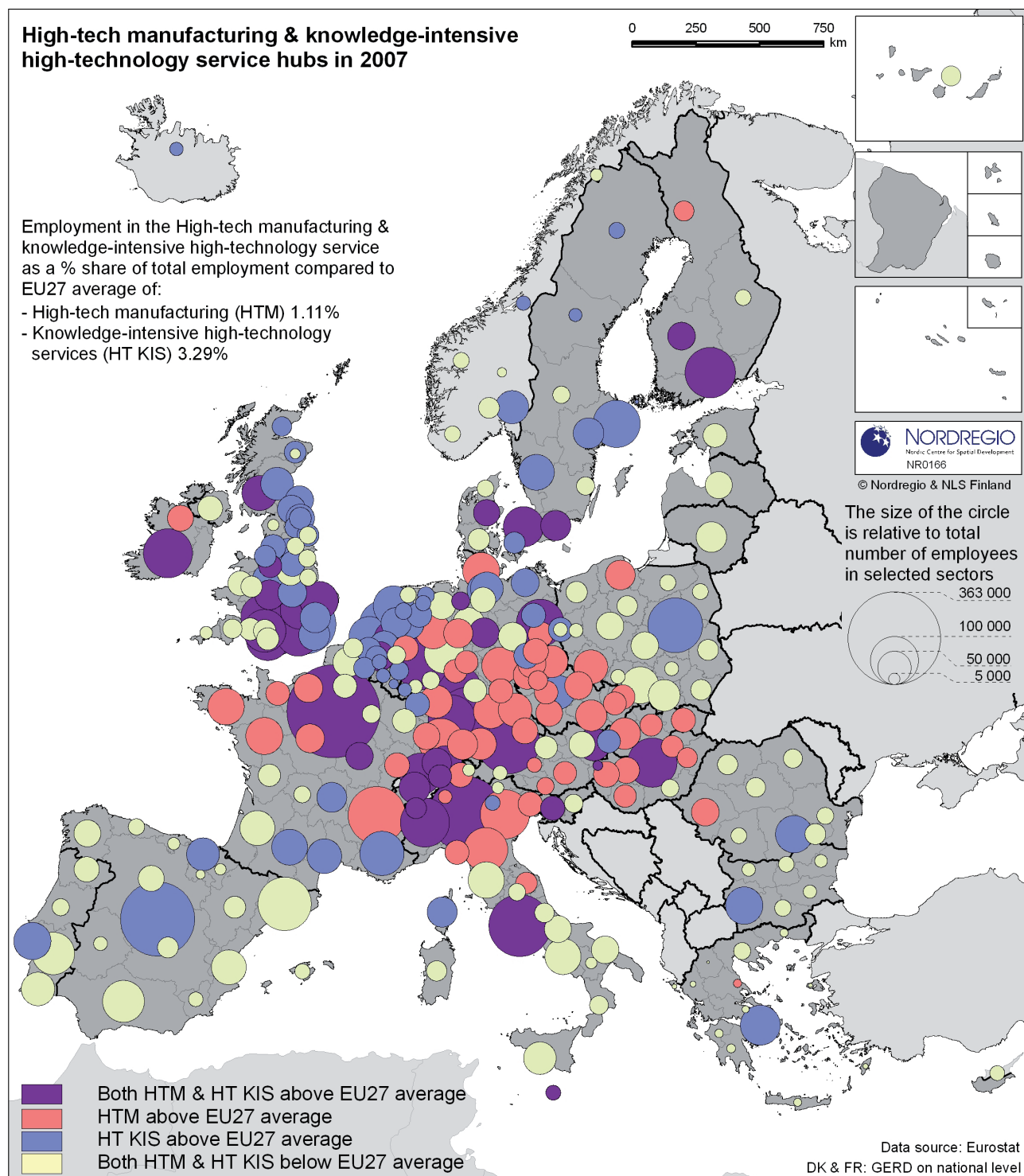


# High-tech & knowledge intensive labour

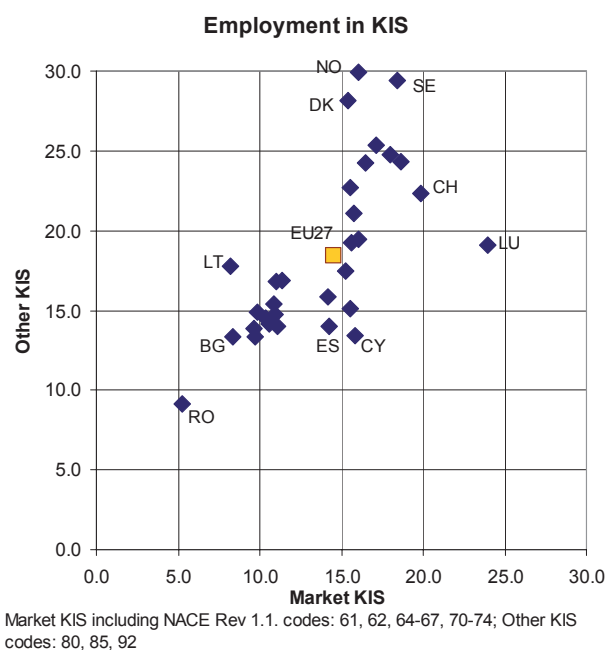
The share of employment in knowledge-intensive industries may function as an indicator of regional competitiveness and can be perceived as an important regional potential.

In order to identify potential hubs in Europe, employment related to high-tech manufacturing and knowledge-intensive high-technology services has been

mapped. These sectors are labour-intensive; employing a total of 9.6 million people or 4.4% of the EU workforce. High-tech innovation poles of scale, with extensive employment in both sectors, are found in numerous North and Central European capital regions and in some regions in England, Germany and Switzerland. The highest intensity is found in South-East England (NUTS1)



and Etelä-Suomi (FI). High-tech manufacturing hubs are concentrated in Central and Eastern Central Europe, with the highest intensity in some German and Hungarian regions. High-tech related service regions are found in numerous capital regions and in many regions in Northern Europe.



Knowledge-intensive high-tech-nology services are part of a wider field of knowledge-intensive services (KIS). This branch contributes to innovation processes by providing services, products or processes both to the manufacturing and service sectors. In general, knowledge intensiveness indicates the vital importance of knowledge, creative problem solving and abstract thinking. Also the role of professionals and special 'know-how' is often stressed. There are two main types of knowledge and competence intensive services, market services and other - more welfare-related -services. Market KIS refers to knowledge-intensive market services (e.g. water and air transport, real estate activities, renting of machinery and equipment without operators) including financial intermediation and high-tech services. Employment in these sectors is, in relative terms, highest in Luxembourg, Switzerland and in the northern European countries. Other KIS refers to education, health & social work and to recreational, cultural and sporting activities. Employment in these sectors is relatively highest in north European countries. This part of KIS is, in general, more important in terms of employment. In Cyprus, Italy, Luxembourg and Spain, the level of employment in both KIS sectors is low.

The new approaches to economic policy have increasingly stressed clusters as a potential asset for competitiveness. Clusters can be understood as regional concentrations of specialized companies and institutions that are mutually dependent through multiple linkages and spill-over's, providing an environment conducive to innovation and knowledge development.

In a European context there have been multiple efforts to quantitatively identify and profile clusters. The major challenge concerns difficulties in identifying linkages and dependencies between various stakeholders. Therefore, focus has often been laid on agglomerations, rather than on clusters per se. Still, agglomerations of knowledge and competence within a particular field, e.g. high-tech manufacturing, research and development activities together with advanced services, are important resources to many clusters. It is however important to stress that high performing clusters are not always of a high technology character.

### The Danish high-tech wind power cluster

Denmark displays a significant level of performance with regard to wind energy generation. It is actually one of the four worldwide leaders along with Germany, Japan and the United States. Its case is remarkable considering the size differences in terms of population, area, economy, and other important indicators in relation to the other three countries. Regarding high-tech innovative solutions to wind power technologies, Denmark has developed 181 examples of patents between 1995 and 2005 thus highlighting the long-standing Danish tradition of performance in this technology class. According to the OECD patents database (2008) Denmark has become a worldwide leader along with other outstanding innovative regions such as Tokyo (JP), New South Wales (AUS) and other European regions such as Schleswig-Holstein and Weser-EMS (DE) in this field.

Extracted from: *Nordic Globalisation Barometer 2008*

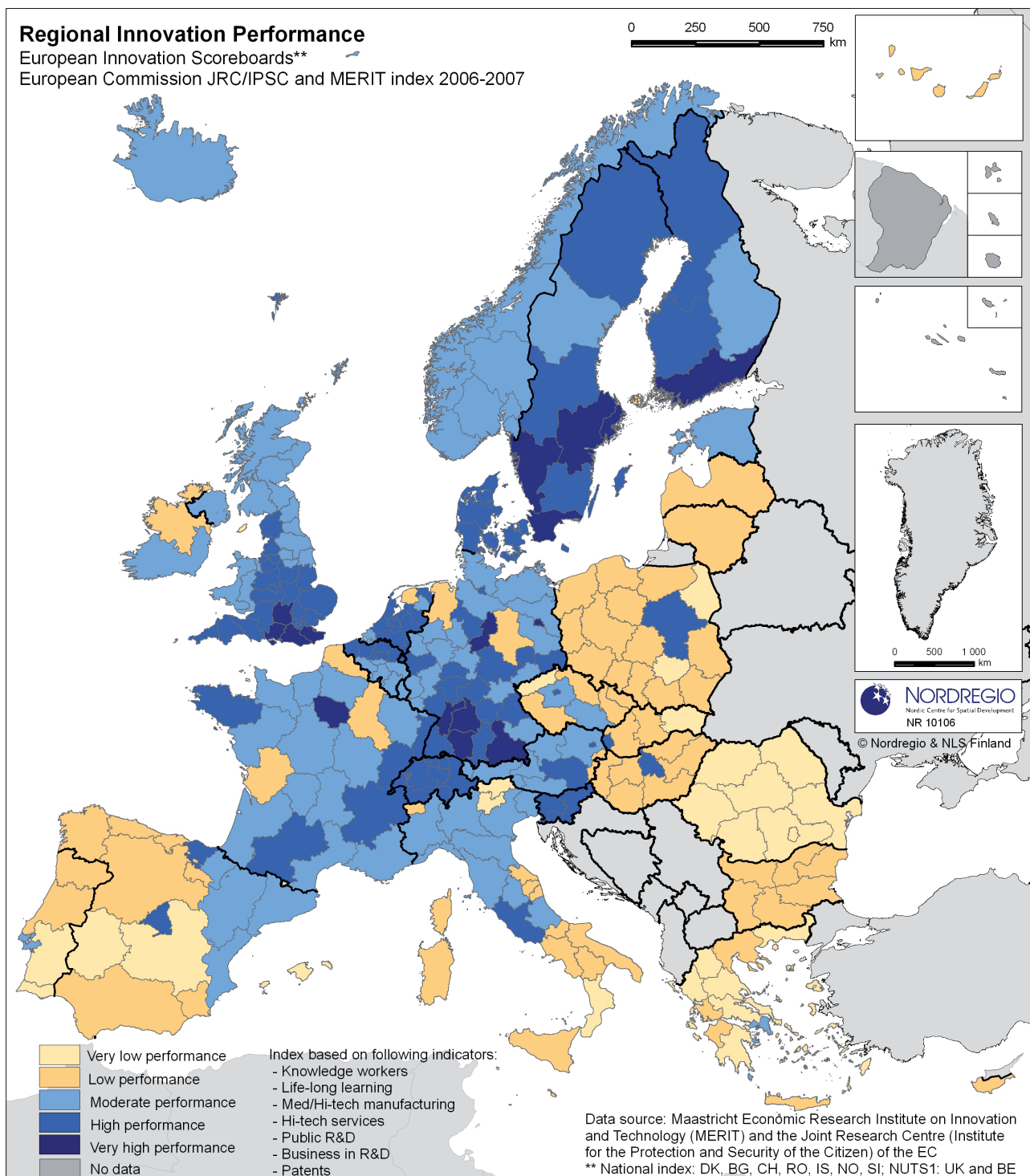
National and regional policies for cluster development may be of significant importance, particularly for small or medium-sized firms. Participation in clusters may provide the critical mass of public and private recourses required for innovation and competence development to compete in a global economy.

Data Sources: Eurostat, Norden

# Innovation and entrepreneurship

In recent years increasing emphasis has been placed on innovation as a driver of economic and regional growth. Innovation concerns the transformation of resources, e.g. R&D-expenditures and human capital, into commercialised products (goods and services), processes and procedures. Innovation may be anything from an improved technical

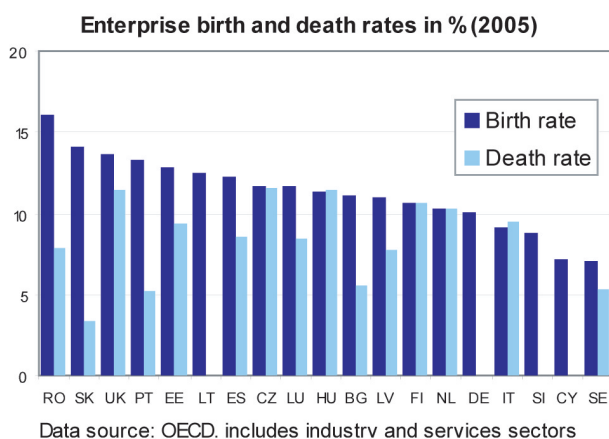
product to a complex system of solutions, creating new markets or improved productivity. Examples of sectors where new systems solutions may have a strong future impact are health care and energy. Most innovations are created in cooperation between actors in the private and public sector. Focus has often been on R&D-based, high



tech innovations, but lately interest in service innovation has increased.

Regions or countries with high innovation scores have a higher capacity to “develop and advance further” (IFIA, 2006), showing higher levels of motivation, stimulation and adaptation to societal and technological changes. Regions with innovation potential also have better conditions and abilities to develop effective solutions to emerging global challenges. Regional and national innovation potentials are summarized by the European Innovation Scoreboards (EIS), including indicators in the fields of knowledge creation, intellectual property & capital, and high-tech & manufacturing assets among others. The map below shows the results of the EIS for European regions in 2006-2007.

The top regions, with high scores are found in Sweden (Stockholm, Västsverige, Sydsverige and Östra Mellansverige), Germany (Oberbayern, Karlsruhe, Stuttgart and Braunschweig), Finland (Etelä-Suomi), and France (Île de France). Regions in Greece, Portugal, Romania and Spain display much lower performance levels. In general, capital city regions have a higher innovation potential. This may be explained by higher density and access to a critical mass of various resources. A diversified business sector, higher R&D-expenditures, a concentration of the knowledge labour force, educational services, qualified human resources and higher levels of entrepreneurship all of which are considered key features contributing to increases in the potential for innovation. Sweden, Switzerland, Finland, Denmark, and Germany appear as innovation leaders, with EIS scores well above that of the EU27 average while other countries like Estonia, Spain, Italy, Malta, Hungary and Slovakia are trailing, with scores below that of the EU27 average.



Human resources are also crucial to innovation and economic growth. Human resources supply the labour market with advanced knowledge, one of the cornerstones for innovation. According to the OECD, human capital has become as important as financial capital for innovation in the new economy, where knowledge is the source of wealth creation. Two of the most relevant indicators in defining human capital are the percentage of the population with a tertiary level education and participation in lifelong

learning. Combining both indicators, countries with higher figures include the Nordic Countries, the United Kingdom and Switzerland.

Entrepreneurship is another important driver of innovation, economic growth, productivity and employment. Entrepreneurship is an important policy area for stimulating innovation capacity. Both entrepreneurship and innovation share in common the characteristic challenge of introducing something ‘new’ to the market. Entrepreneurship contributes to a dynamic innovation process, by stimulating the introduction and dissemination of ‘new’ innovative products and processes throughout the economy, through new or existing companies. The existence of a strong national and regional entrepreneurship culture signifies a higher potential to create high-growth entrepreneurs and new start-up activities. The figure shows that there are more enterprise start-ups (births) than deaths in EU Member States for which data is available. In general, birth rates are higher than death rates at national levels with some exceptions (Hungary and Italy).

## The Nordic innovation capacity

The Nordic countries are world leaders when it comes to integrating technology into everyday life and business models denoting a higher capacity in the area of ICT. Regarding knowledge creation, significant investment in research and development have contributed progressively to the improvement of the framework conditions and performance of this activity. With regard to human resources the region faces a challenge where competition will be increasingly based on the individual's skills, experience and talent. Improvement in these fields will continue in the future. Finally, the region presents an innovation potential in supporting a more growth-oriented entrepreneurial culture by improving general framework conditions for entrepreneurship and faces a challenge in formulating a Nordic-embedded entrepreneurship policy able to commercialise high-growth entrepreneurship.

Extracted from: *Nordic Innovation Monitor*, 2009

The employer enterprise birth and death rates are compiled as the number of births and deaths of employer enterprises, as a percentage of the population of active enterprises with at least one employee. These indicators are an essential measurement of entrepreneurial activity (OECD).

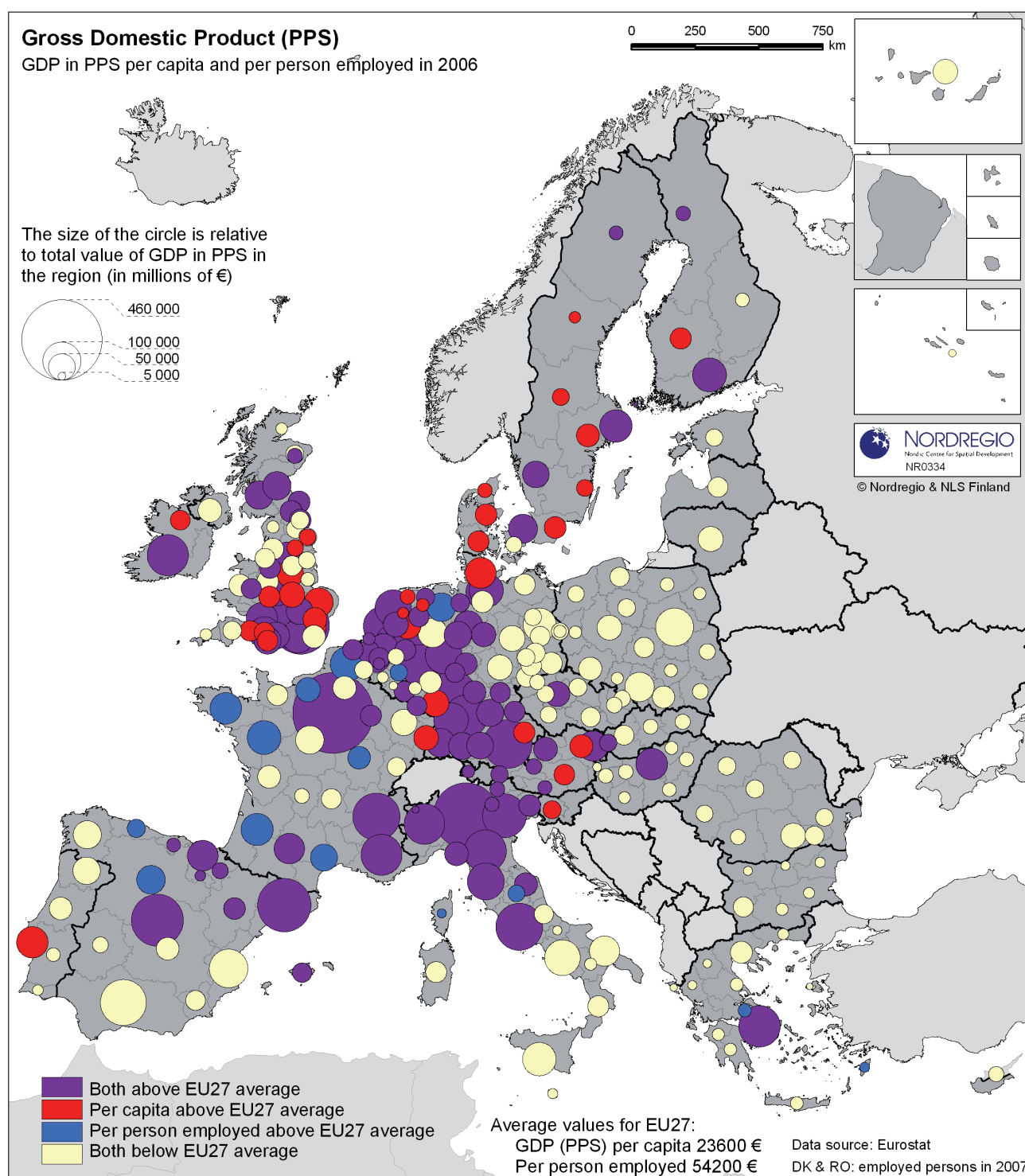
Data Sources: European Innovation Scoreboards, Nordregio, OECD, Norden, IFIA



# Economic Performance and Productivity

Economic performance, measured as GDP per capita at current market prices in purchasing power standards, gives an indication of the value of all market and some non-market goods and services produced within a region. The level of productivity, in turn, sets the sustainable level of prosperity that can be earned by an economy. In other words, more-competitive economies tend to be able

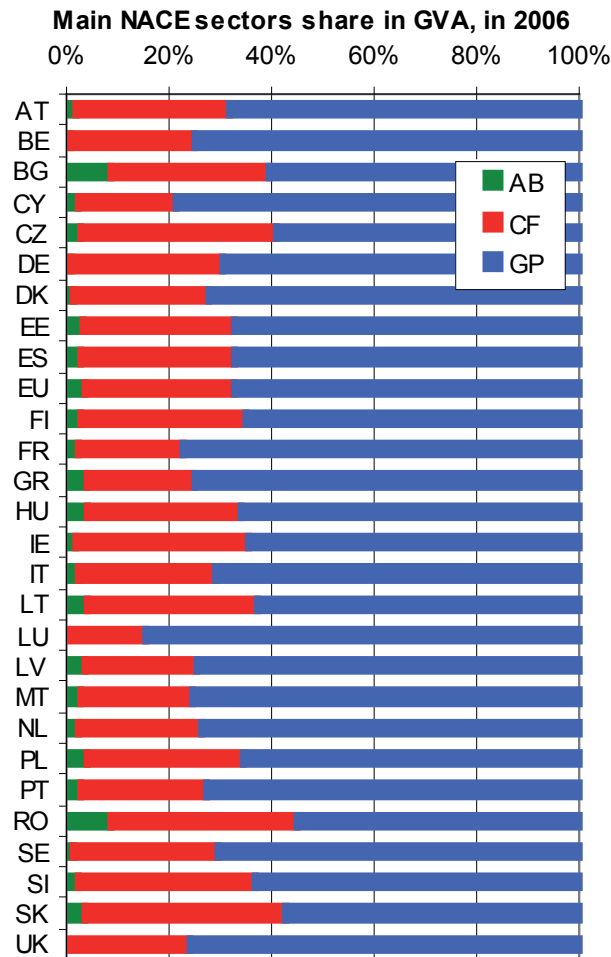
to produce higher levels of income for their citizens. A high level of productivity, measured as GDP per person employed, assumes an efficient use of available resources in economic activities. With a strong economic performance, the potential for regional investments in, for example, physical infrastructure, R&D, competence development and social welfare systems, increases. This may give further





potential to strengthening the human and physical capital for future regional development

In terms of economic performance, significant differences exist between European regions. GDP per capita is highest in central and northern European, and particularly in capital regions. Numerous smaller regions in these parts of Europe however also score well. Most eastern European regions and some southern European regions outside the main cities are located at the other end of the scale.



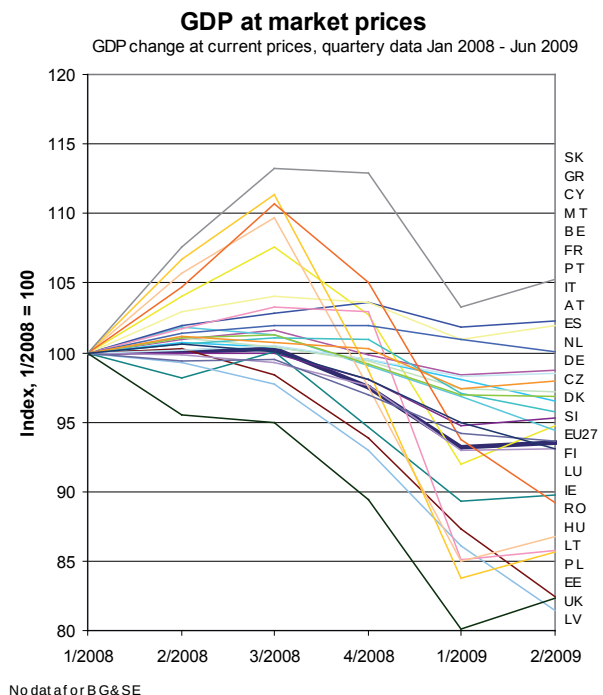
When looking at productivity this basic pattern is repeated. Both in terms of economic performance and productivity, the European city regions of inner London, Brussels and Luxembourg are in a class of their own, followed by Paris and Hamburg. However, there are some notable exceptions here. A significant number of regions outside the main city regions in northern Europe and Austria have a lower productivity than the EU average. In France, however, the employment rate is rather low but productivity is among the highest in Europe. This may be an outcome of the regional industry structures. Global challenges have resulted in rationalizations of traditional manufacturing industries. For regions dominated by these sectors, employment may have diminished, resulting in a high level of productivity per employee. In other regions, due to an expanding services sector, with increased employment and a lower level of efficiency, measured by traditional standards, the level of productivity per

employee may be lower.

Excluding taxes and subsidies on products from GDP, we may use the Gross Value Added (GVA) to measure the value of goods and services produced in a specific area or sector of an economy. GVA is a useful tool to describe the economic base in the region. In the table the GVA by main economic sector is presented.

On average 3.4% of the EU's GVA comes from primary production though in Bulgaria and Romania the share is almost 9%. Overall, 29% of European GVA comes from manufacturing activities, but in the Czech Republic and Slovakia the share is nearly 40%. In total, 67% of European GVA comes from services, with Luxembourg being the most service-oriented country with an 84% share.

In the period 2000-2008 the annual European GDP growth has been 1-3%. The increase took place in all EU countries, despite a rather unstable development of Malta. Due to small market size. The turning point for GDP growth is clearly visible in the quarterly GDP figures in the EU countries from the last 18 months.



In the western and northern European countries GDP growth was rather stable during the three first quarters of 2008. From the last quarter of 2008 to mid 2009 GDP decreased by an of average 5 percentage points. In the Czech Republic, Hungary, Lithuania, Poland and Romania GDP grew rapidly the three first quarters of 2008 and from the last quarter of 2008 it decreased rapidly. In Estonia, Ireland, Latvia and the UK GDP began to decline at a steep rate already from the beginning of 2008. In Cyprus, Greece, Malta and Slovakia GDP has fluctuated but the situation in the second quarter of 2009 was in general better than in the first quarter of 2008.

Data Sources: Eurostat, Nordregio

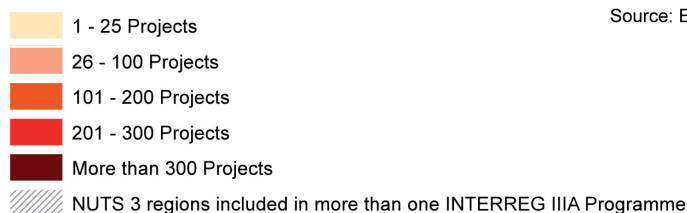
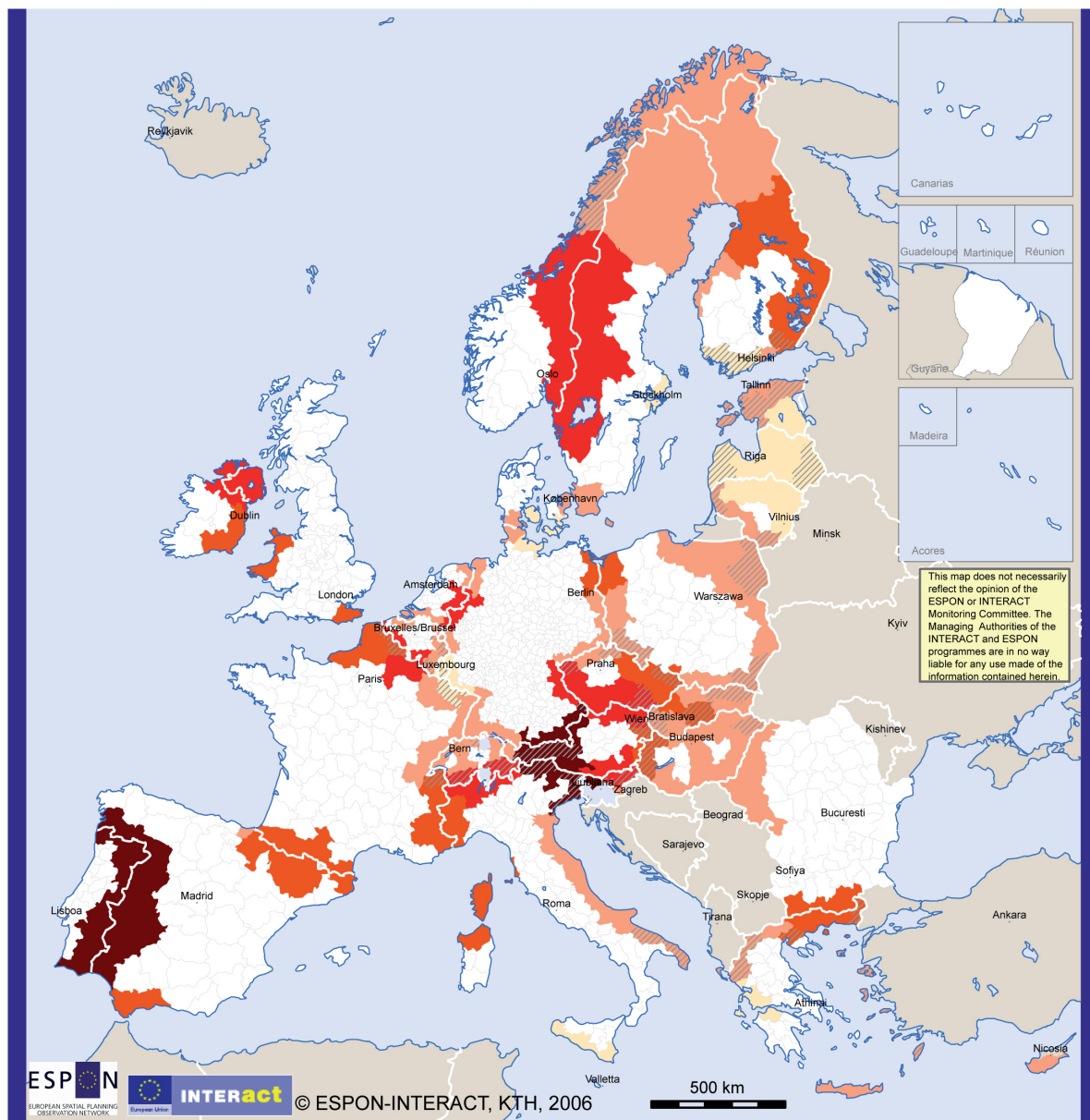
# Territorial cooperation

Cross-border co-operation may reduce the barriers that borders represent to the movement of goods and people and interaction across borders in a wider sense. Over the centuries the European territory has been transformed through a vast number of new demarcations and re-demarcations of the nations. An often unintended

consequence was that previous functional regions were divided and cities lost important parts of their hinterlands.

In the Proposal for a Council Decision on Community Strategic Guidelines on Cohesion, the aim of the new

## Intensity of Projects per INTERREG IIIA Programmes approximated to NUTS 3 regions



© EuroGeographics Association for the administrative boundaries  
Source: ESPON-INTERACT INTERREG IIIA Project Database, 2006

Map Source: ESPON-Interact Cross Border Cooperation; the map has been used with permission of the authors.

European Territorial Cooperation policy is to promote stronger integration of the territory of the Union in all its objectives. Territorial cooperation may be seen then as a means to define, coordinate and implement a variety of common actions oriented to the fulfilling of specific common challenges and needs by exploiting its joint opportunities on the bases of cooperation and integration. In so doing, regions with a higher intensity of cooperation projects tend to overcome common problems in a more efficient way while also compensating for their weaknesses in respect of critical factors or issue areas such as services, infrastructure, innovation or labour markets. Territorial cooperation should be thought of then as the spatial dimension of European integration.

#### Territorial Cooperation Intensity - Top programmes

| <u>Interreg IIIA Programmes **</u> | <u>Countries</u> | <u>CBC projects</u> |
|------------------------------------|------------------|---------------------|
| 1 Spain - Portugal                 | ES - PT          | 556                 |
| 2 Italy - Austria                  | IT - AT          | 449                 |
| 3 Italy - Slovenia                 | IT - SI          | 420                 |
| 4 Bavaria - Austria                | DE - AT          | 372                 |
| 5 Ireland-Northern Ireland         | IE - UK          | 293                 |
| 6 Bavaria - Czech Republic         | DE - CZ          | 276                 |
| 7 Austria - Slovenia               | AT - SI          | 267                 |
| 8 Italy - Switzerland              | IT - CH          | 243                 |
| 9 Sweden - Norway                  | SE - NO          | 226                 |
| 10 France/Wallonia - Flanders      | BE - FR          | 216                 |
| 11 Austria - Czech Republic        | CZ - AT          | 209                 |
| 12 Austria - Hungary               | AT - HU          | 193                 |
| 13 Slovakia - Czech Republic       | SK - CZ          | 186                 |
| 14 Czech Republic - Poland         | PL - CZ          | 171                 |
| 15 Mecklenburg Vorpommern-Poland   | DE - PL          | 152                 |
| 16 France -Spain                   | ES - FR          | 150                 |
| 17 Greece - Bulgaria               | GR - BG          | 130                 |
| 18 Alcotra (Italy-France)          | IT - FR          | 125                 |
| 19 Islands (Italy-France)          | IT - FR          | 113                 |
| 20 Ireland - Wales                 | IE - UK          | 108                 |

 CB regions with high asymmetries or economic disparities

*Based on ESPON-Interact KTH database on Interreg III A, 2006*

*\*\* Programmes from Interreg III-A included in Interreg IV-A*

The European cross border co-operation activities may take place either on internal or external border regions. The internal border NUTS3 regions are eligible for cross-border cooperation under the Structural Funds 2007-2013. External NUTS3 border regions are eligible for cross-border cooperation under the Instrument for Pre-accession Assistance (IPA) or the European Neighbourhood and Partnership Instrument (ENPI).

Cross border areas with higher potentials for territorial cooperation might include those with a long historical tradition of cooperation as well as a high intensity of projects with regard to previous programming periods. That is the case for Interreg A programmes such as Spain-Portugal, Italy-Austria, Italy-Slovenia, Bavaria-Austria, Ireland-Northern Ireland, Bavaria-Czech Republic, Austria-Slovenia, Italy-Switzerland, Sweden-Norway, France-Wallonia-Flanders and Austria-Czech Republic.

Another issue which might generate a greater potential for territorial cooperation is the existence of socio-economic asymmetries between participant regions or countries. The ESPON 1.1.3 project on "Enlargement and

Polycentrism" hypothesised that large economic disparities in GDP per capita between cross-border regions in the enlargement area provided significant potential for change and territorial cooperation and integration within them. The ESPON-Interact study on Cross Border Cooperation proved that in fact large economic disparities within territorial cooperation programmes do not seem to be either an impetus or a barrier to the intensity of project cooperation. Cooperation indeed exists among cross-border regions where only one of the regions exhibits significant economic strength. (Green Programmes in the table).

That situation is visible along regions with borders between Old and New Member States (Convergence or Phasing-in regions next to Competitiveness & Employment regions) but also in Interreg A programmes involving Convergence regions in the Old Member States.

Intense territorial cooperation potential exist then regardless of cross border asymmetries by involving both disparate territories in terms of socio-economic indicators and third countries, as long as challenges and priorities remain common and relevant themes are addressed.

### The EU Macro regional strategy

The launching of the European Union Strategy for the Baltic Sea Region (EUSBSR) in June 2009 saw the commencement of the first application of a macro-regional strategy within the context of European Union cooperation. The elaboration of macro-regional strategies makes it possible to promote the territorial dimension of EU policies and cooperation via the more effective coordination of existing resources. A macro-region may be seen as a means to define, coordinate and implement a variety of common actions oriented to fulfil particular macro-regional common challenges and/or needs by exploiting its joint opportunities on the bases of cooperation and integration between all actors involved (regions, state, non-state, public, private, entrepreneurs, citizens, political and societal stakeholders, etc). A macro-regional strategy may also successfully undertake actions with the support of a common network of thematically oriented organisations, stakeholders able to cover a sufficient number of activity fields. Macro regions may exist regardless of strictly defined boundaries and potentially involve disparate territories in terms of socio-economic indicators and third countries as long as the challenges remain common and relevant themes or topics are addressed

Data Sources: ESPON-Interact on Cross Border Cooperation; ESPON 1.1.3 Öresund Committee, Nordregio



# Accessibility

Accessibility is not an issue of transport networks alone. Policies targeting increased accessibility in terms of territories cannot be constrained by the sector instruments of transport policy. When defining accessibility it is important to define the object, the purpose and the means, in other words the ‘what’, ‘why’ and ‘how’ driving the need for increased accessibility. Accessibility reflects the territorial potential through two main dimensions: 1) opportunities and activities (economic, industrial, etc) to be connected with; and 2) efforts to do so in terms of means, time, and distance and thus, cost.

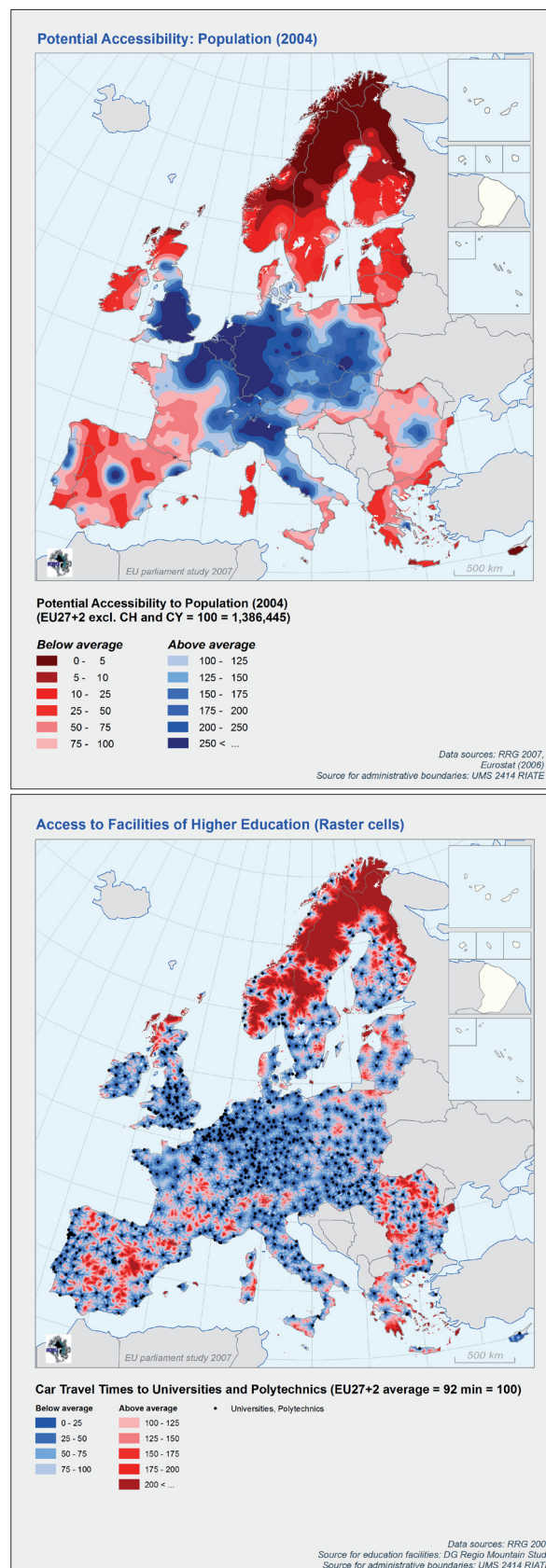
Regions successfully able to increase their accessibility potential are those able to determine accessibility measures that reflect the specific needs of each region’s activities and/or industries taking into account the geographical location of the markets they target, focusing also on existing infrastructural obstacles to industrial and economic development. Accessibility indicators are also useful for assessing the position of a specific territory in the European space.

In combination with an assessment of the service provision levels in each region and of the accessibility challenges faced by the local activities and industries, these indicators can help in the design of new policy responses customized to each territory.

Areas with some relevant concentration of population tend to have a concentration of activities (economic, industrial, etc), more services and infrastructure and therefore higher levels of accessibility to them. The top map above illustrates potential accessibility to population at the EU level. It shows favourable values around major European urban agglomerations as well as central Europe and the ‘Blue Banana’ (Europe’s most densely populated area).

Accessibility indexes may however vary depending on the particular factors to be analysed, such as: i) ‘what’ to reach (i.e. accessibility to -higher education, hospitals, employment, etc); ii) the means employed to do so (road, rail, sea, air); and iii) the scale used for the analysis (local, regional or continental). The second map shows one example of local accessibility indicators measuring the travel-time to facilities of higher education by car in Europe.

Different values in that map are produced and favourable figures are now shown around centres hosting universities, polytechnics or other educational institutions,



Source: RRG Spatial Planning Database.

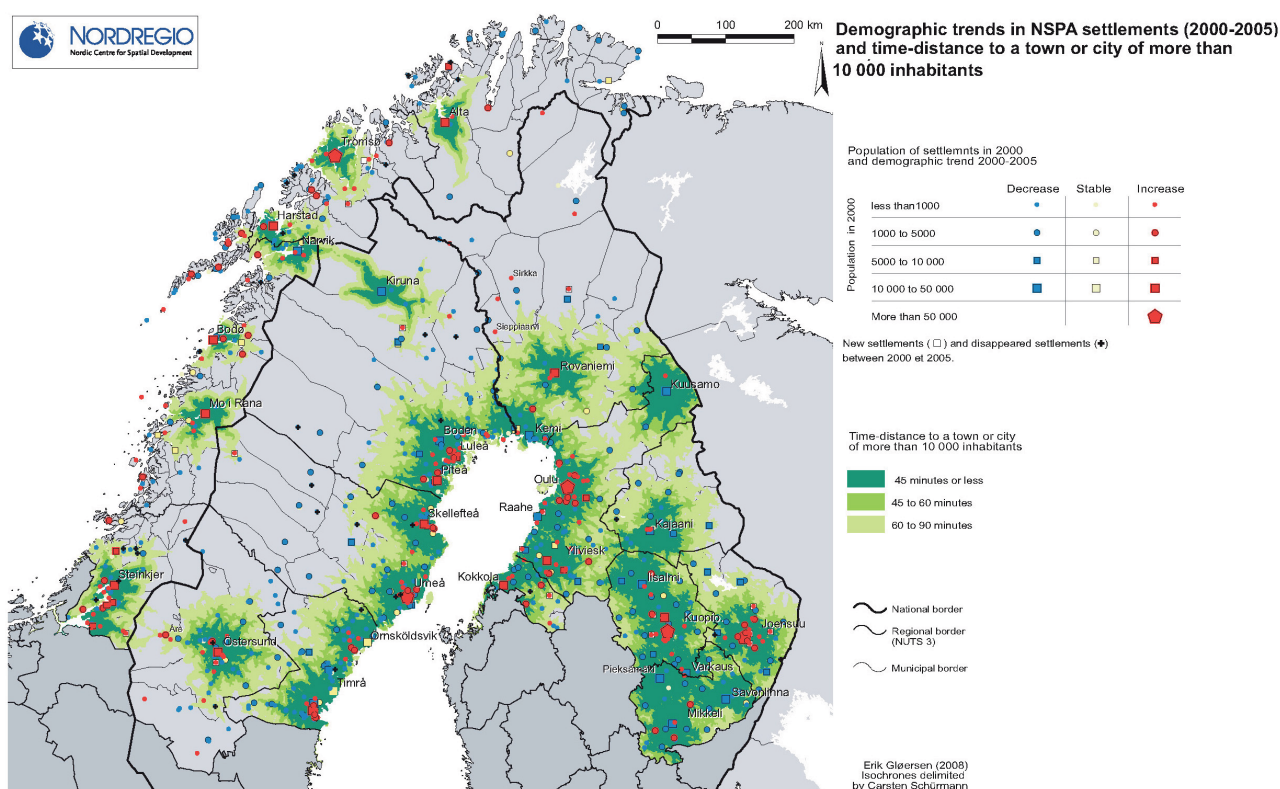
showing different results and patterns.

Accessibility potentials at the European level are attached to those competitive and sustainable functional regions which have a satisfactory level of access to services and balanced regional economies. The regions either have an endogenous population potential which is sufficient to develop diversified and robust functional economic areas or they have successfully integrated with neighbouring areas. However, local and regional accessibility values are also distinct from European accessibility indexes, and are therefore more relevant for European positioning than for regional economic development.

One regional example (the Northern Sparsely Populated Areas –NSPA- of Sweden, Norway and Finland) can be used to explain this situation. Indicators of potential accessibility at a European level show a poor level in the NSPA when compared to the rest of Europe; it is only by shifting the scale of analysis to a regional one that new potentials, not identifiable within the context of large-scale pan-European accessibility indexes at the European scale, can be highlighted. Population centres invisible in the European indexes emerge giving new results and stimulating possible new potentials.

An example of this is presented in the map below which shows the combination of accessibility by road to population centres over 10 000 inhabitants in relation to demographic trends at a regional scale. This brings to light the existence of ‘clusters’ of settlements with population increases and adequate accessibility to main population centres. This, combined with activities in some of these areas (R&D, mining, high-tech, etc) gives an idea of future potentials as a result of the concentration of population, economic activities and high accessibility. Accessibility measures then can help in the identification of potentials for further integration between areas with complementary profiles, especially in peripheral regions such as the NSPA's.

Data Sources: RRG, Nordregio, EU Parliament study 2007





# Abbreviations

|        |                                                                                                                             |
|--------|-----------------------------------------------------------------------------------------------------------------------------|
| ARWU   | Academic Ranking of World Universities                                                                                      |
| EIS    | European Innovation Scoreboards                                                                                             |
| ENPI   | European Neighbourhood and Partnership Instrument                                                                           |
| ESDP   | European Spatial Development Perspective                                                                                    |
| ESPON  | European Spatial Planning Observatory Network                                                                               |
| EUSBSR | European Union Strategy for the Baltic Sea Region                                                                           |
| GERD   | Gross Domestic Expenditure on R&D                                                                                           |
| GDP    | Gross Domestic Product                                                                                                      |
| GHG    | Greenhouse Gases                                                                                                            |
| GVA    | Gross Value Added                                                                                                           |
| HTM    | High-Tech Manufacturing                                                                                                     |
| IPA    | Pre-accession Assistance                                                                                                    |
| KIS    | Knowledge-Intensive Services                                                                                                |
| LAU    | Local Administrative Units                                                                                                  |
| NACE   | Nomenclature Generale des Activites Economiques dans l'Union Europeenne / General<br>Name for Economic Activities in the EU |
| NSPA   | Northern Sparsely Populated Areas                                                                                           |
| NUTS   | Nomenclature of Territorial Units for Statistics                                                                            |
| PPS    | GDP per capita in Purchasing Power Standards                                                                                |
| R&D    | Research & Development                                                                                                      |
| SMESTO | Small and Medium Sized Towns                                                                                                |



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