ESP**O**N

EUROPEAN UNION

Co-financed by the European Regional Development Fund

Inspire Policy Making with Territorial Evidence

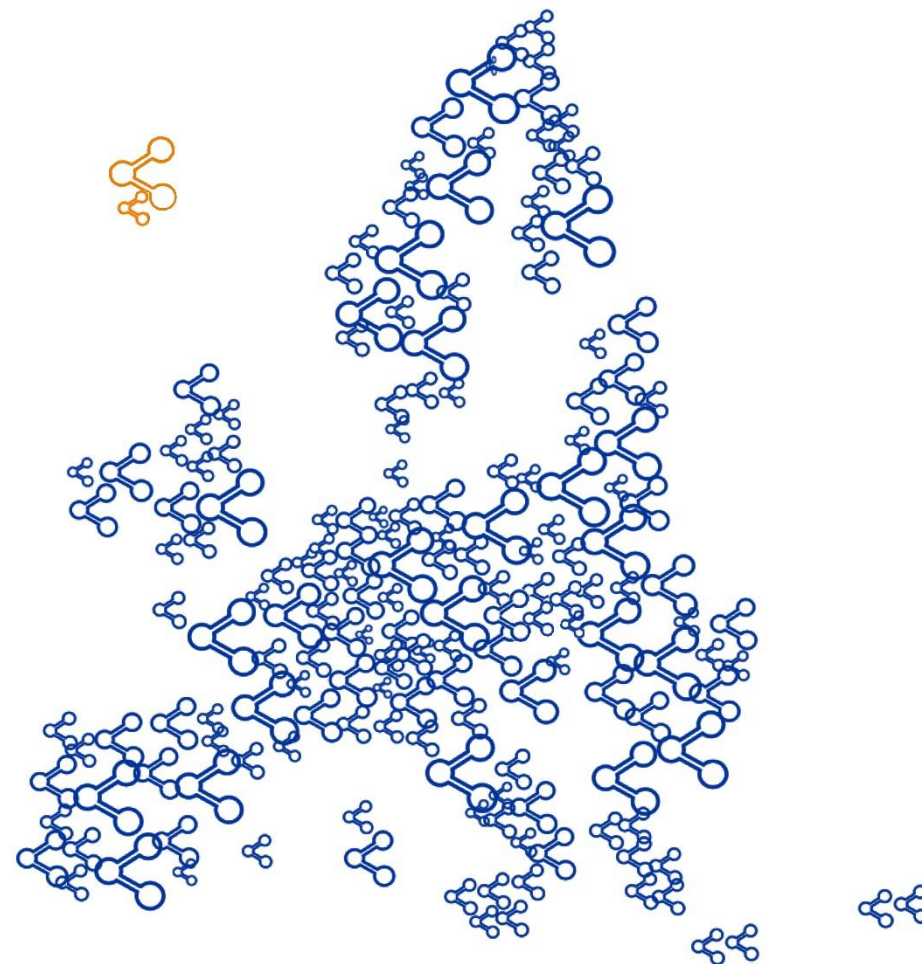# Territorial patterns and relations in Iceland

Population

Climate change and sustainable use of resources

Accessibility

Economy and entrepreneurship

Interactive version: www.espon.eu/iceland

Introductory remarks

The content of the following overview is a summary of research results from different thematic applied research projects under the ESPON 2020 programme. As a consequence, most indicators and analyses are not based on most recent data but represent the data availability at the time when the research was undertaken. Only in a few cases, for some rather basic indicators that could easily be reproduced, more up-to-date information was used.

It is therefore important to note that this overview is mainly a collection of available findings with different time stamps and not an up-to-date, comprehensive analysis. Its main goal is to showcase the wide range of ESPON research and, by zooming-in on a specific country, to raise interest for the scientific results at a more national and even regional scale.
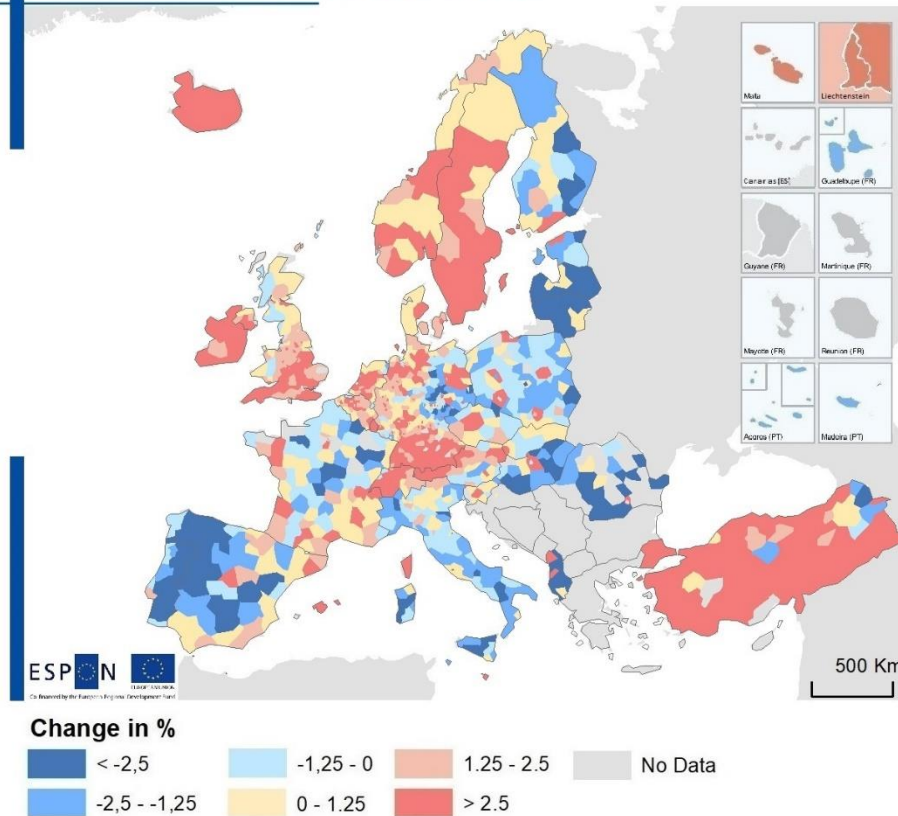
Population

Demography

Net migration

Higher education

Population development

Iceland is among the countries in Europe with the highest population growth between 2015 and 2019. This was also a period that showed growth in tourism in Iceland. In the years following the credit crisis of 2008, there was a negative net-migration rate from Iceland, but the growth in tourism from 2015-2018 reversed this situation.

Iceland has among the highest education levels in Europe and, in this regard, has a similar position as parts of Scandinavia and the UK. The population projection from 2014-2030 expects a modest growth in Iceland (0-10%) as a whole. However, this growth would be much higher in the Capital region (around Reykjavik) than in the rest of the country.

Population change from 2015 to 2019

Change in %

|	
< -2,5	-1,25 - 0	1.25 - 2.5	No Data
-2,5 - -1,25	0 - 1.25	> 2.5	

Source: Eurostat, 2020   Regional (NUTS 3) development of population between 2015 to 2019. The change is calculated as the population difference between 2019 and 2015 divided by the population of 2015

The European map shows quite a varied pattern in the field of population development during the period of 2015-2019. Positive population change can be seen in the core regions of the area, the Blue Banana which is an almost continuous urban area (megalopolis) spreading over Western and Central Europe. Towards the edges of the continent, there are countries/regions with negative development, e.g. parts of Portugal and Spain, Italy, and countries in Central and Eastern Europe. Several exceptions from this general pattern are found, such as in Norway, Ireland, Turkey, and Iceland where population development has been positive.
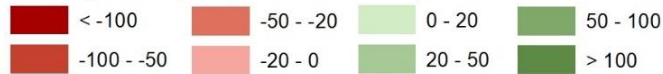
The Icelandic map shows two NUTS 3 regions: the Capital region in the south-west and the rest (Landsbyggðin) which is varied, containing towns and rural areas. Actually, this map hides several underlying regional differences. One is that the functional urban area of the Capital region has, in fact, become larger. Thus, parts of western and southern Iceland as well as the Reykjanes peninsula (extending to the south-west) follow the same positive development as the Capital region. In north-west and east of the country, population development has been less positive and even negative in some cases, especially in rural areas. Only around 6% of Icelanders live in rural areas. Tourism was booming in this period (2015-2019) which contributed to Iceland's economy and population.
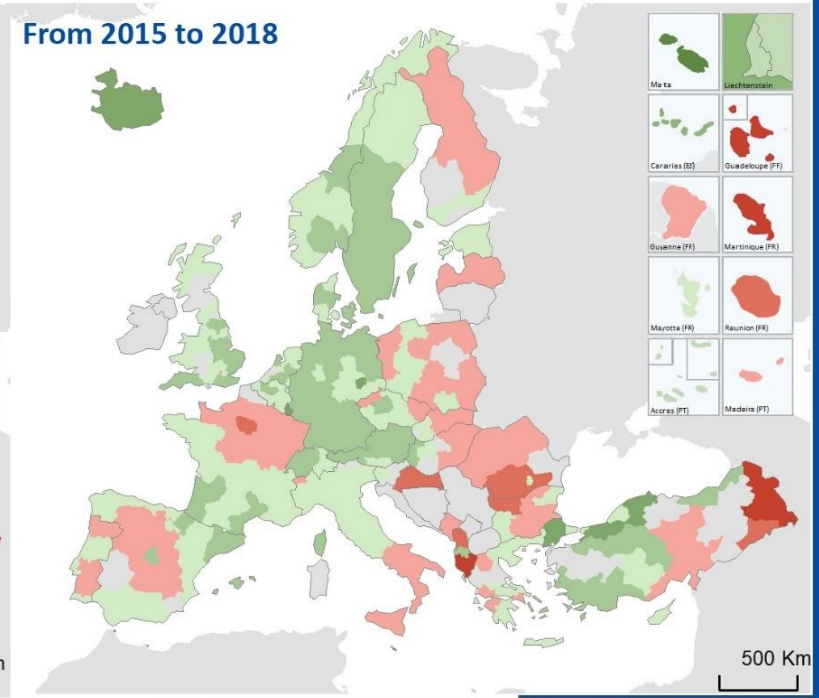
Net migration

From 2011 to 2014
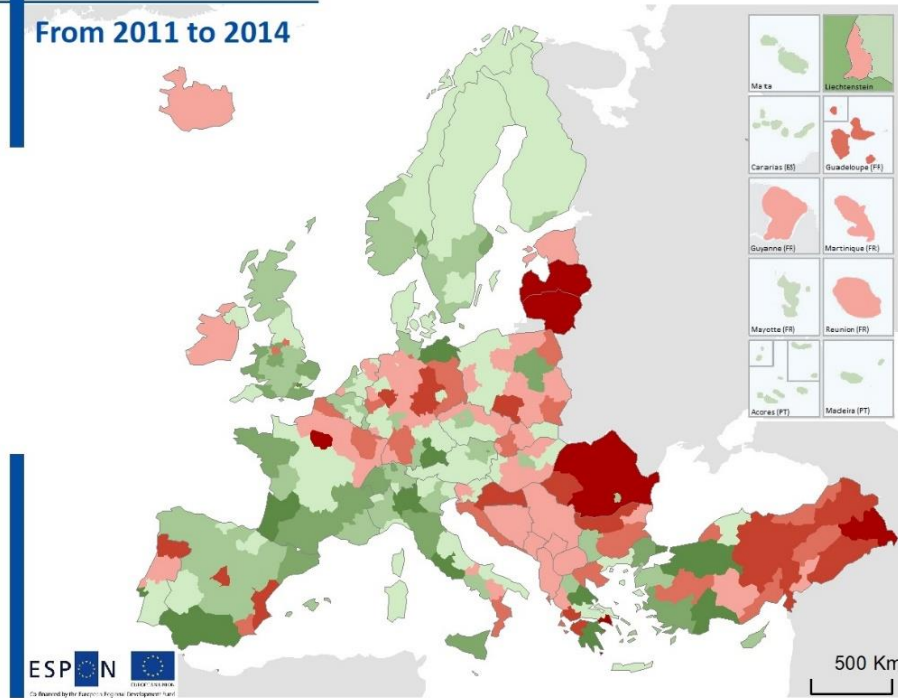
From 2015 to 2018

Net migration (in 1,000 inhabitants)

< -100	-50 - -20	0 - 20	50 - 100
-100 - -50	-20 - 0	20 - 50	> 100

Regional level: NUTS 2
Source: ESPON database for the 2011-2014 map
and Eurostat for the 2015-2018 map

The net migration plus adjustment is calculated as the difference between the total change and the natural change of the population.

The map above shows net migration patterns of regions in Europe at NUTS 2 level from 2011-2014 where there is a great variation. The northern and western parts of Europe are generally showing more positive developments in this regard than the south-eastern part. This thus reflects migration from the eastern part of Europe towards the western part; one of the reasons for this is the free flow of labour within the EU. Iceland is one of the exceptions in northern Europe, likely related to the fact that Iceland was particularly badly hit by the credit crisis that began in 2008. In the years to follow, there was high levels of emigration to other countries such as Norway and other Scandinavian countries.

During the period of 2015-2018 there are less pronounced regional differences. There is still outmigration from the eastern parts of Europe. Furthermore, there are regions with outmigration in France, Portugal, Spain, and Southern Italy. In Iceland, the situation has reversed from the period of 2011-2014. Tourism boomed in Iceland after 2011, which created many jobs, attracted people from other countries and afforded many Icelanders, who had left after the credit crisis, an opportunity to migrate back to Iceland.

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Total population aged 24-64 with a higher education degree (level 5-8) in 2016

Source: Eurostat, 2016
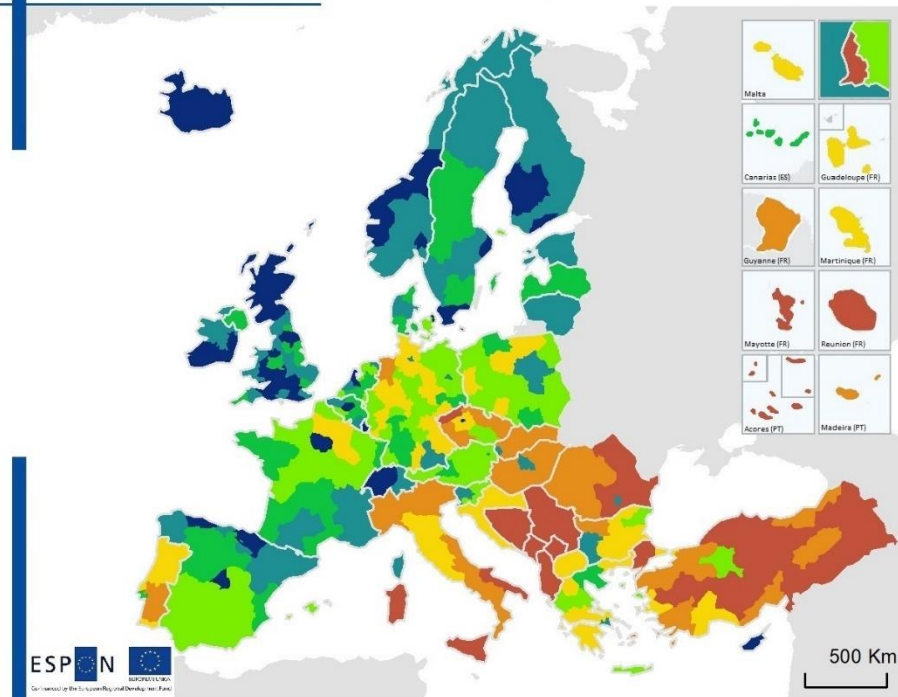
Rate of attainment (%)

< 15	20 - 25	30 - 35	> 40
15 - 20	25 - 30	35 - 40	
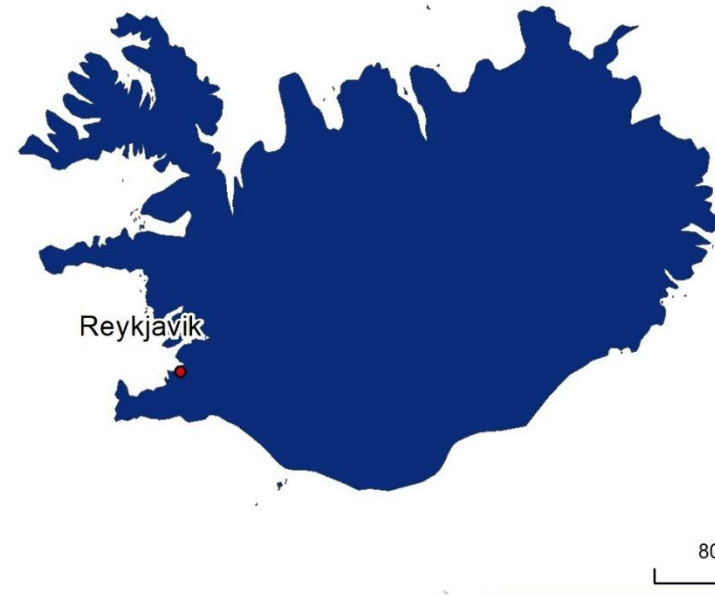
Regional (NUTS 2) share of population from 24 to 64 years old with an educational attainment of level 5 to 8 according to the ISCED (2011) classification.

Higher education levels among those aged 20-64 years are seen in the northern and towards the south-western parts of the ESPON area. Lower education levels are recorded in countries such as Italy, the Balkans, Romania, and Turkey. The map shows NUTS 2 level and thus finer geographical details are somewhat missing.

In Iceland, the rate of people aged between 24-64 years with an education level of 5-8 is more than 40%, which is the highest category in this analysis. Iceland shares this position with a few other regions in Europe, such as parts of the Scandinavian countries and the UK. Access to university education is good in Iceland. There are seven universities in the country and the five state universities do not charge tuition fees. Remote teaching has been offered for many years from some of the universities, which has enabled students to reach university from all around the country and allowed mature students to pursue university degrees while performing other work and family duties.

Projected population development 2014-2030

Relative development (%)

- 20 - 50
- 10 - 20
- 0 - 10
- -10 - 0
- -20 - -10
- -50 - -20

Reykjavik

500 Km

80 Km
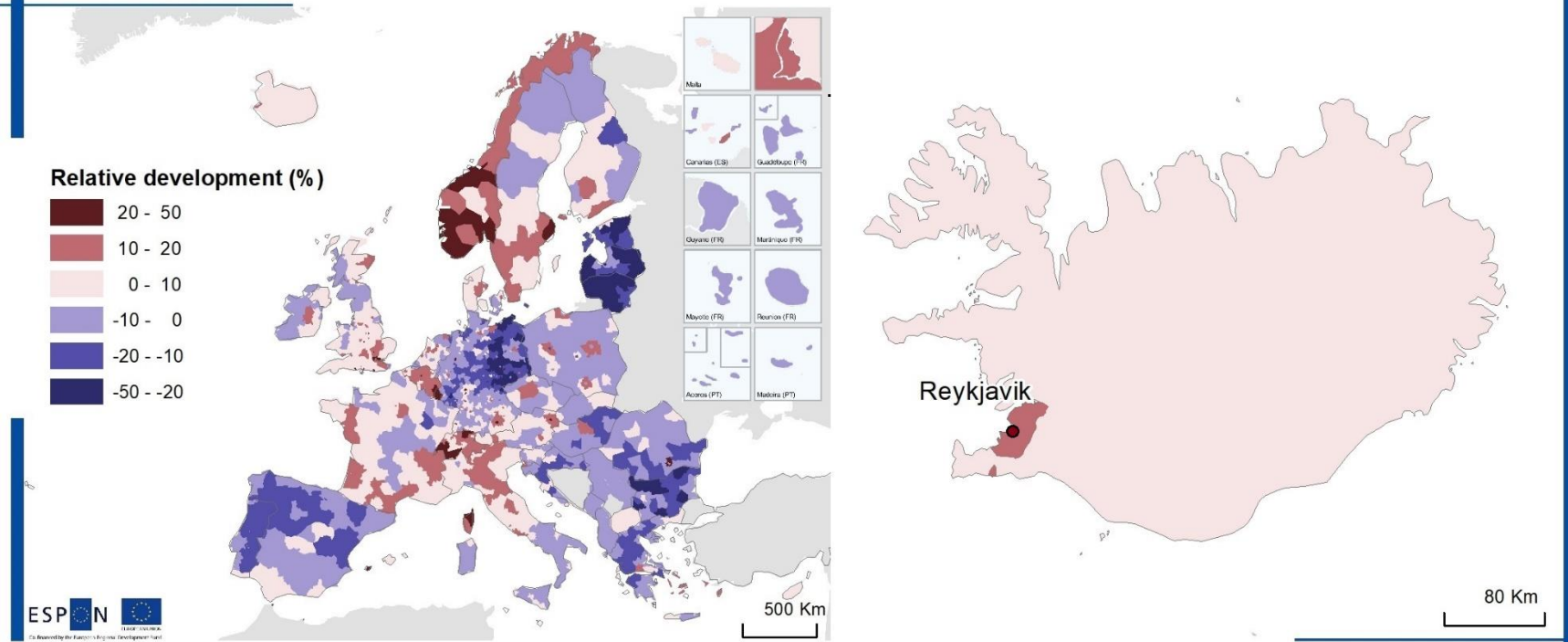
Regional level: NUTS 3
Source: Speakermann and Wegener Urban and Regional Research (S&W), Territorial Futures, 2017
Origin of data: Eurostat

This population projection for Europe shows much variation between countries and regions. The projection appears to predict continuing outmigration from the eastern part of Europe. In many regions, ageing will negatively affect future population development. Norway, parts of Sweden, and several regions in central and southern Europe will have relatively positive population development. Moderate population increase (0-10%) will be felt in many regions in central and western Europe as well as in Scandinavia and Iceland.

The population projection for the two NUTS 3 regions of Iceland shows an increase in the Capital region, which has been the major attraction for several decades. However, some local municipalities have experienced an increase of population but measurements of local developments have not been able to change this NUTS 3-development to any noticeable degree. As mentioned previously, the functional urban area of the Capital region (with Reykjavik and six neighbouring municipalities), has in fact become larger in recent years. Thus, parts of the southern and western areas of the country belonging to Landsbyggðin may expect to experience similar population development to the Capital region, while more remote regions will experience negative development.

Climate change and sustainable use of resources

Economic impact of Climate Change
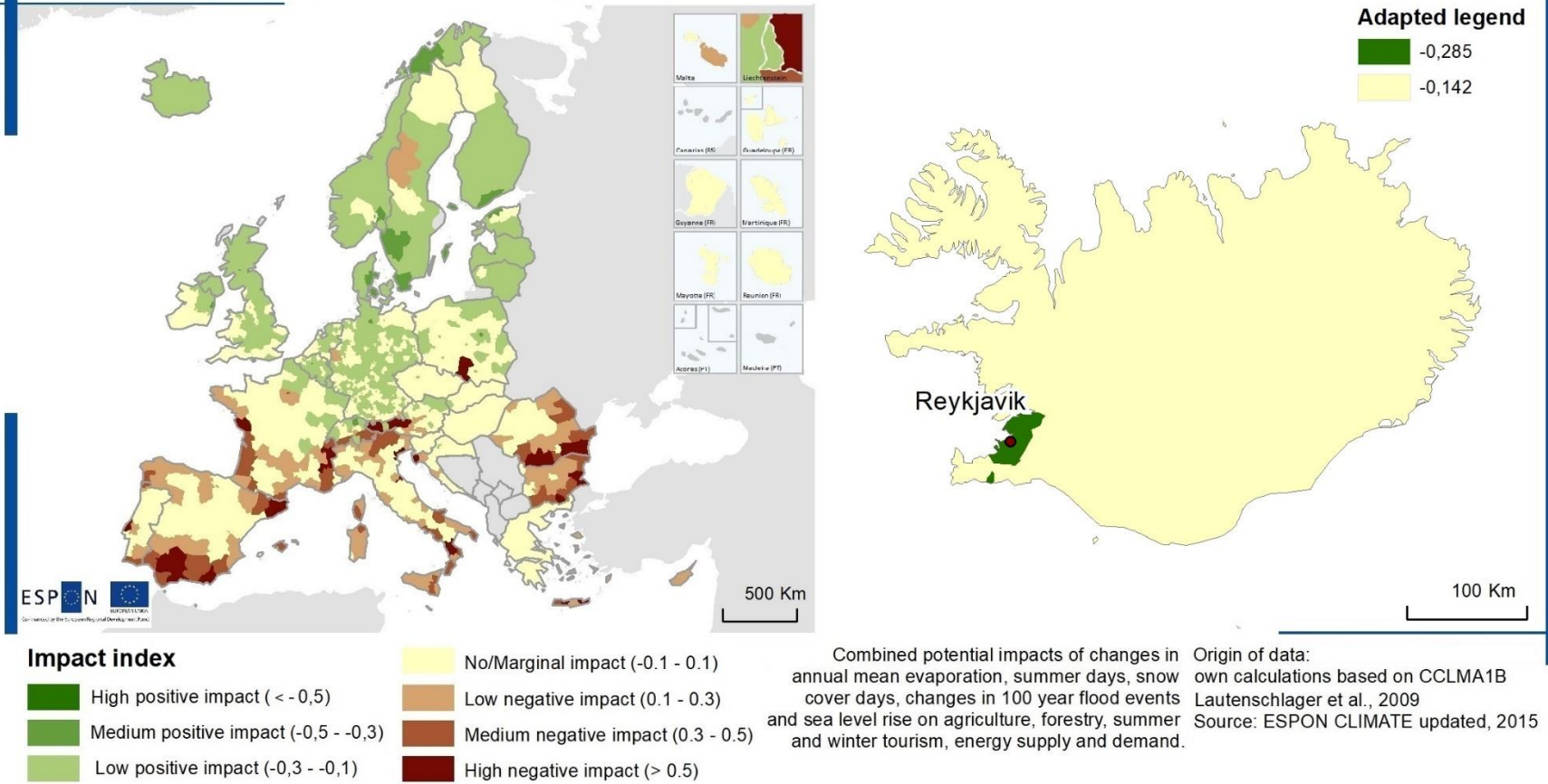
Social impact of Climate Change

Environmental impact of Climate Change

Adaptive capacity to Climate Change

Domestic material consumption

Islands are expected to be badly hit by the economic impacts of climate change. Even if models and data for Iceland were lacking in the respective ESPON project; Iceland was expected to gain some positive economic impacts. The country was also considered to have a relatively positive overall capacity to adapt to climate change. Material resource use in Iceland is high, similar to the Nordic countries. This is often both related to high importance placed on the primary sectors and low population density. Both of these factors are present in Iceland.
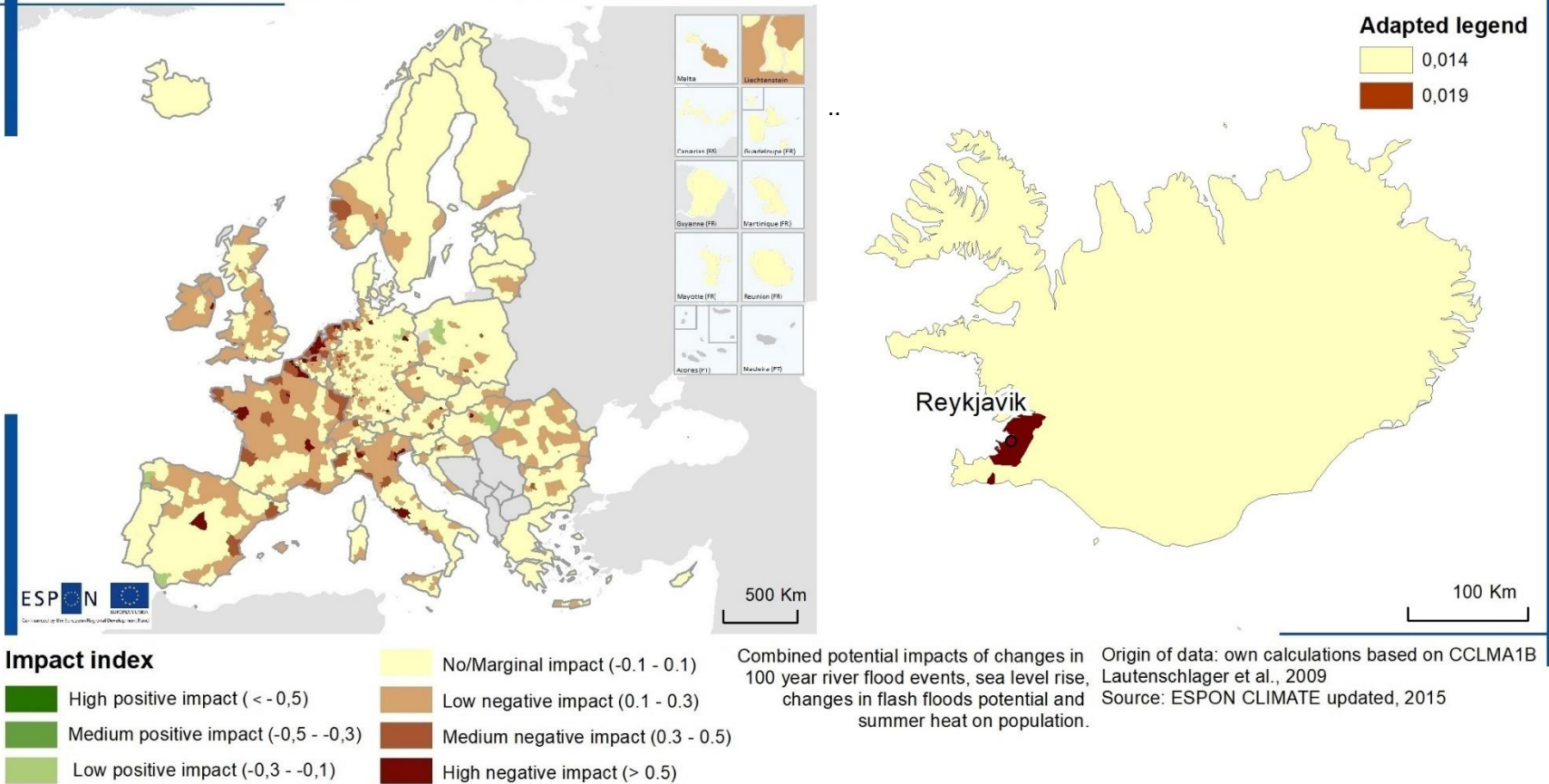
Potential economic impact of climate change from 2071 to 2100

Adapted legend
- -0,285
- -0,142

Impact index

- High positive impact (< - 0,5)
- Medium positive impact (-0,5 - -0,3)
- Low positive impact (-0,3 - -0,1)
- No/Marginal impact (-0.1 - 0.1)
- Low negative impact (0.1 - 0.3)
- Medium negative impact (0.3 - 0.5)
- High negative impact (> 0.5)

Combined potential impacts of changes in annual mean evaporation, summer days, snow cover days, changes in 100 year flood events and sea level rise on agriculture, forestry, summer and winter tourism, energy supply and demand.

Origin of data:
own calculations based on CCLMA1B
Lautenschlager et al., 2009
Source: ESPON CLIMATE updated, 2015

According to ESPON CLIMATE, economic impacts of climate change between 2071-2100 are expected to have a clear north-south gradient. Many large economies such as Germany, Poland, and Scandinavia may expect a positive economic impact. The main reason for the gradient is the economic dependency of large parts of Southern Europe on (summer) tourism and also on agriculture. Both are projected to be negatively affected due to the increase in temperature and decrease in precipitation while the environmental conditions for agriculture in north-eastern Europe may improve. Moreover, energy demands come into play through the increased need for cooling.

Data for Iceland was not available in the ESPON CLIMATE project and thus a model was used to calculate certain indicators for the country. According to the project, islands in general will be severely affected by the projected climatic changes. One of the models in the project did not allow projections for Iceland. The results of the calculation thus need to be observed with certain reservations. At the European scale, Iceland follows the north-south gradient expected by the project. The predicted economic impact was also calculated in function of the existing economic activities, which explains the higher positive impact for the urban area of Reykjavik.
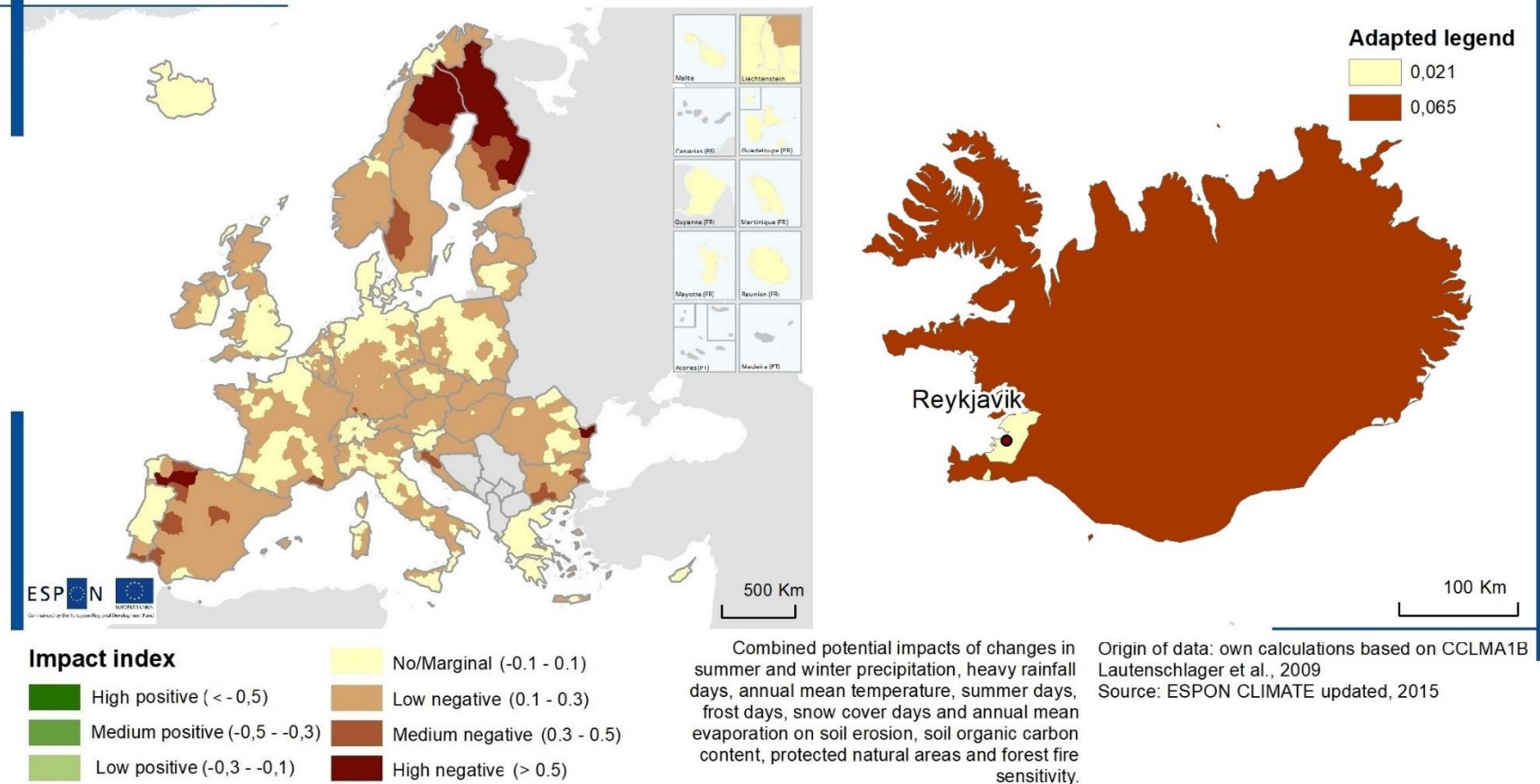
Potential social impact of climate change from 2071 to 2100

Adapted legend

	0,014
	0,019

Reykjavik

500 Km

100 Km

Impact index

High positive impact (< - 0,5)

Medium positive impact (-0,5 - -0,3)

Low positive impact (-0,3 - -0,1)

No/Marginal impact (-0.1 - 0.1)

Low negative impact (0.1 - 0.3)

Medium negative impact (0.3 - 0.5)

High negative impact (> 0.5)

Combined potential impacts of changes in 100 year river flood events, sea level rise, changes in flash floods potential and summer heat on population.

Origin of data: own calculations based on CCLMA1B Lautenschlager et al., 2009
Source: ESPON CLIMATE updated, 2015

According to ESPON CLIMATE, Europe's population is sensitive to extreme events which are driven by climate change, such as heat waves, sea level rise, storm surges, river flooding, and flash floods. Sensitivity to climate changes is different depending on the characteristics of social groups, such as age, population density, and size of urban areas (urban heat island effect). The project predicted a high negative impact on Southern Europe's densely populated areas. Negative impacts for north-west Europe and parts of Scandinavia would be caused by factors such as river flooding and sea level rise.

Data for Iceland was not available in the ESPON CLIMATE project and thus a model was used to calculate certain indicators for the country. According to the project, islands in general will be severely affected by the projected climatic changes. One of the models in the project did not allow projections for Iceland. The results of the calculation thus need to be observed with certain reservations. At the national level, a slightly higher negative social impact is expected in the urban area of Reykjavik because of the higher population density.

Potential environmental impact of climate change from 2071 to 2100

Adapted legend

	0,021
	0,065

Reykjavik

500 Km

100 Km

Combined potential impacts of changes in summer and winter precipitation, heavy rainfall days, annual mean temperature, summer days, frost days, snow cover days and annual mean evaporation on soil erosion, soil organic carbon content, protected natural areas and forest fire sensitivity.

Origin of data: own calculations based on CCLMA1B Lautenschlager et al., 2009
Source: ESPON CLIMATE updated, 2015

Impact index

- High positive (< -0,5)
- Medium positive (-0,5 - -0,3)
- Low positive (-0,3 - -0,1)
- No/Marginal (-0.1 - 0.1)
- Low negative (0.1 - 0.3)
- Medium negative (0.3 - 0.5)
- High negative (> 0.5)

This map from the ESPON CLIMATE project shows that climate change is expected to have the highest negative environmental impacts in the southern and northern parts of Europe. In the Mediterranean, drier and hotter climates increase the likelihood of forest fires. Soils in river deltas or along coasts also seem to be negatively affected by climate change. The severe impacts in northern Scandinavia are, in part, due to large protected areas where climate change is expected to negatively affect large ecosystems that are under protection.
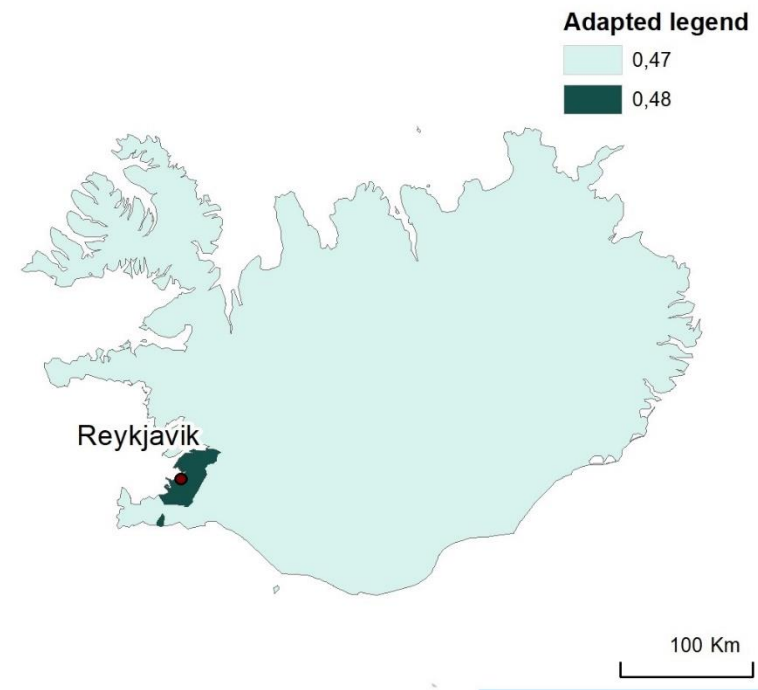
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Overall adaptive capacity to climate change

Adapted legend

- 0,47
- 0,48

Reykjavik

500 Km

100 Km
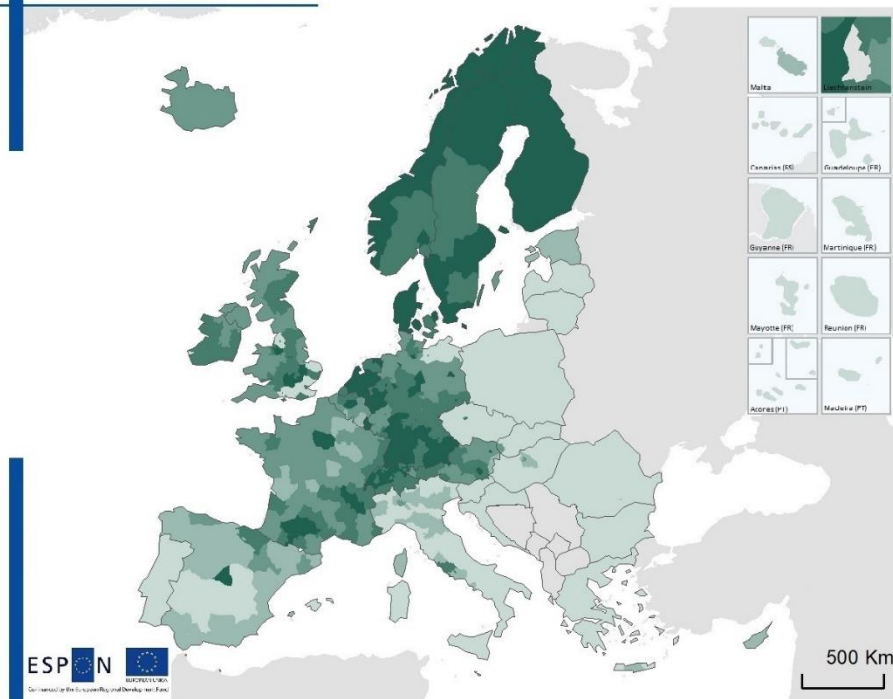
Ratio-scale variable between 0 and 1

- 0 - 0.3
- 0.3 - 0.4
- 0.4 - 0.5
- 0.5 - 0.6
- > 0.6
- No Data

Regional level: NUTS 3
Origin of data: EEA, 2012, 2013, 2014; E-PTR 2012; OSM2014; GISCO 2006;
Eurostat 2011, 2013, 2014; JRC 2006, 2012, 2013, 2014; USGS 2011, DIVA 2004,
ATSR2014; Statistics Iceland 2011; Bundesamt fur statistik 2011, 2014;
Amt fur Statistik Liechtenstein 2014; HESTA 2014.
Source: ESPON CLIMATE updated, 2017

ESPON CLIMATE developed a vulnerability assessment method for climate change and applied it to NUTS 3 regions to create an evidence base for responses to climate change. The map shows an index for adaptive ability to climate change. The ability is calculated as a weighted combination of economic, infrastructural, technological, knowledge, awareness, and institutional ability. The Nordic countries appear to have the most adaptive ability.

Data for Iceland was not available in the ESPON CLIMATE project and thus a model was used to calculate certain indicators for the country. According to the project, islands in general will be severely affected by the projected climatic changes. One of the models in the project did not allow projections for Iceland. The results of the calculation thus need to be observed with certain reservations. At the Icelandic scale, the difference in adaptive capacity between the Höfuðborgarsvæði region (urban area) and the Landsbyggðin (rural area) is minimal.

Domestic Material Consumption (DMC) per capita in 2014

DMC in tons per capita
- No Data
- 0 - 15
- 15 - 17
- 17 - 20
- > 20

500 Km

Reykjavik

100 Km
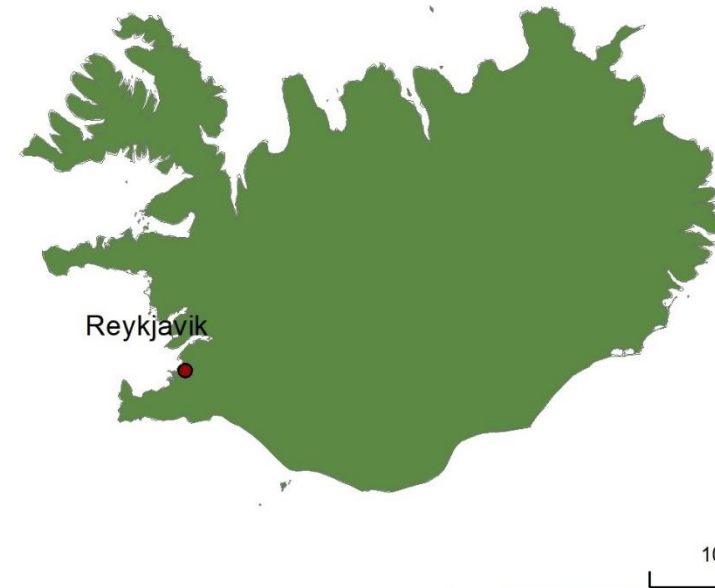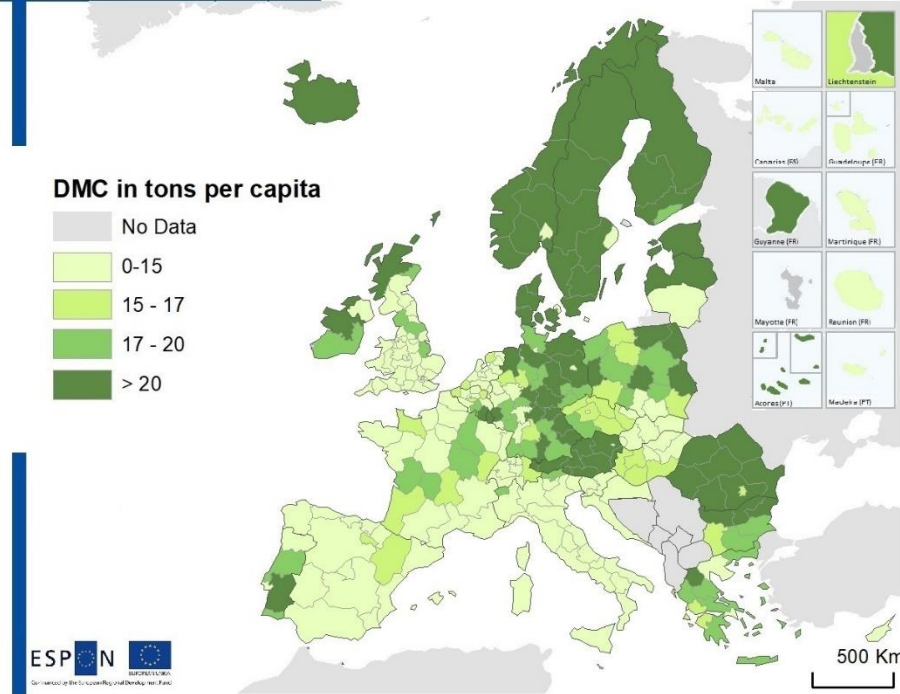
Regional level: NUTS 2
Source: ESPON Circter, 2018
Origin of data: ESPON Circter, 2018

The ESPON CIRCTER project focused on conditions to improve the circular economy that are needed to replace the linear economy in order to reduce the impact of anthropic activities on global ecosystems. A circular economy significantly reduces material throughputs and increases material efficiency over the long run. The map shows that the domestic material consumption per capita (DMC) is highest in the northern ESPON area and lower in countries and regions in central and south-western Europe. The indicator refers to the quantity consumed of materials originating within the boundaries of regions in question.

According to the CIRCTER project, material resource use is above average in the Nordic countries, including Iceland. This is often linked to the use of local natural resources, for example where there is strong forestry, mining sectors and agriculture, i.e. the primary sectors. This has also been linked to low population density since in less densely populated regions, the necessary materials for buildings or infrastructure are distributed among fewer people, so that material consumption per capita increases. Iceland has only 3.6 inhabitants per sq. km.
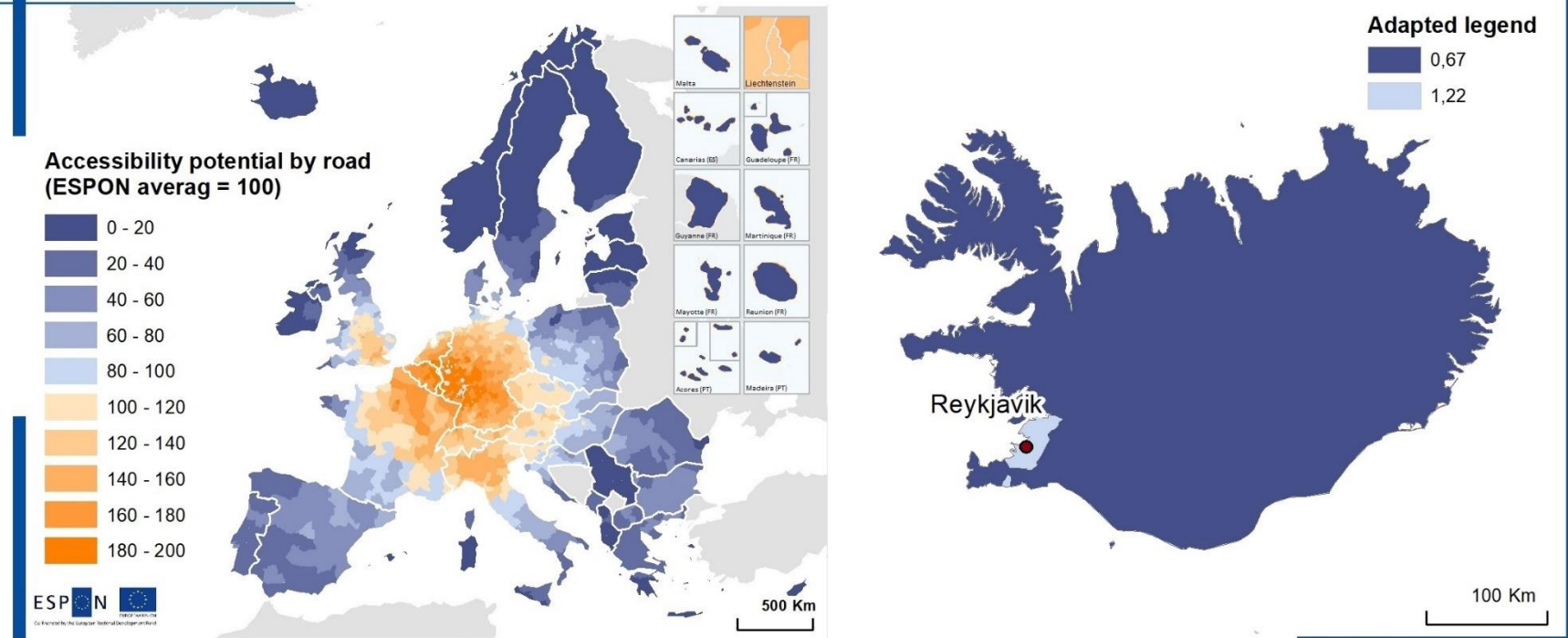
Accessibility

Accessibility potential by road
Accessibility to consumption services

Accessibility by road in Iceland is among the worst in Europe, reaching only one fifth of the European average. The situation is worse in other parts of Iceland (Landsbyggðin) than the Capital region. Accessibility to services such as banks and shops is, by default, better in more populous and densely populated areas. Thus, it is relatively low in Iceland, especially in the NUTS 3 region Landsbyggðin.

Accessibility potential by road in 2030

Adapted legend

- 0,67
- 1,22

Accessibility potential by road (ESPON averag = 100)

- 0 - 20
- 20 - 40
- 40 - 60
- 60 - 80
- 80 - 100
- 100 - 120
- 120 - 140
- 140 - 160
- 160 - 180
- 180 - 200

Malta | Liechtenstein
Canarias (ES) | Guadeloupe (FR)
Guyanne (FR) | Martinique (FR)
Mayotte (FR) | Reunion (FR)
Açores (PT) | Madeira (PT)

ESPON

500 Km

Reykjavik

100 Km

Regional level: NUTS 3 * For each NUTS-3 region the population in all destination regions is weighted by the travel time
Source: ESPON ACC SCEN, 2017 to go there. The weighted population is summed up to the indicator value for the accessibility potential of
Origin of the data: S&W Accessibility Model 2016; the origin region. All indicator values are expressed as index, i.e. related to the ESPON average.
RRG GIS Database, 2014. Calculations for the accessibility potential rely on an expected and realtistic timetable for the development
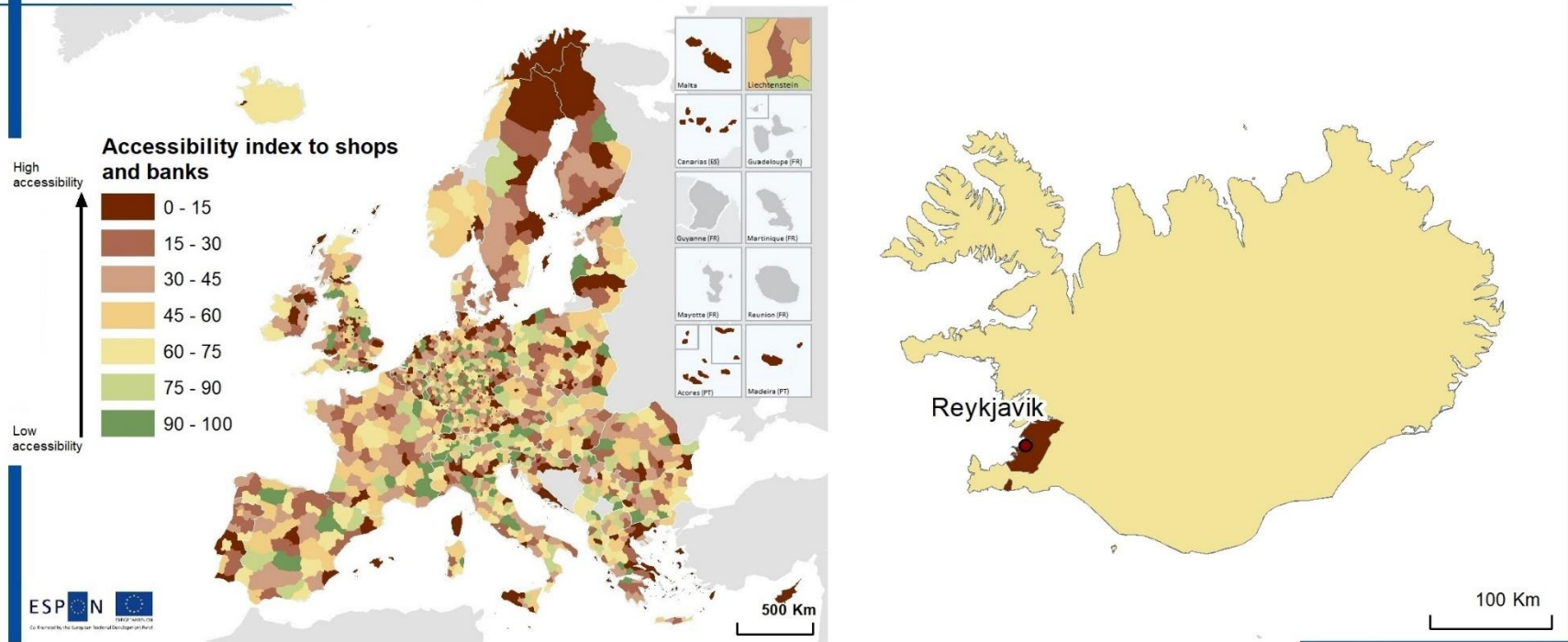of the TEN-T.

Accessibility by road is a key issue in regional development and interconnectedness of regions, especially concerning shorter and medium distances. Accessibility has much importance concerning issues such as commuting to work and accessibility of goods and services. The map above shows an example of calculated accessibility across the ESPON area and it is remarkably interesting how the accessibility decreases with distance from the economic and geographical centre of the continent towards the periphery.

Not surprisingly, a map of Iceland, as part of the periphery of the ESPON area, shows low accessibility. However, it is better in the Capital region than for the rest of the country (Landsbyggðin). Iceland is one of the countries with the lowest accessibility by road, where it is less than one fifth of the European average. Similar conditions can, however, be found in some other peripheral regions such as northern Norway, Sweden, and Finland, as well as several other remote regions and islands.

Composite accessibility to Consumption in 2016 (shops & banks)

Accessibility index to shops and banks

High accessibility

- 0 - 15
- 15 - 30
- 30 - 45
- 45 - 60
- 60 - 75
- 75 - 90
- 90 - 100

Low accessibility

Reykjavik

100 Km

500 Km

Regional level: NUTS 3
Source: ESPON Quality of Life, 2021
Map processed by AMRP, UGent

* Share of NUTS-3 region territories overlaid by shops Inner Peripheries at grid level (in %) & Share of NUTS-3 region territories overlaid by banks Inner Peripheries at grid level (in %). The calculations result in an index where low values indicate high accessibility and high values low accessibility

The project ESPON QoL examined quality of life measurement and policy-making in 10 case studies in different regions across Europe. Among those was north-east Iceland. The case studies showed a wide range of practices, with different definitions of quality of life, policy contexts, use of data, indicators, and citizen participation. It is interesting but not surprising that concepts relating to the representation of quality of life are tailored to the needs of each region. There is no unique approach, nor a single concept that can be applied in all territorial contexts. One of the indicators used in the project was accessibility to shops and banks, as shown in the map above. The picture is complex to say the least.

Quality of life indicators, such as accessibility to services and employment, are usually higher in central/urban areas than in peripheral/rural areas (e.g., accessibility to jobs, transport, shops etc.). Therefore, we see a distinct contrast between the Capital region and other regions of Iceland (Landsbyggðin) where most people live in small urban centres or rural areas.

Economy and entrepreneurship

Enterprise creation
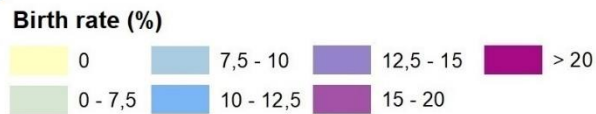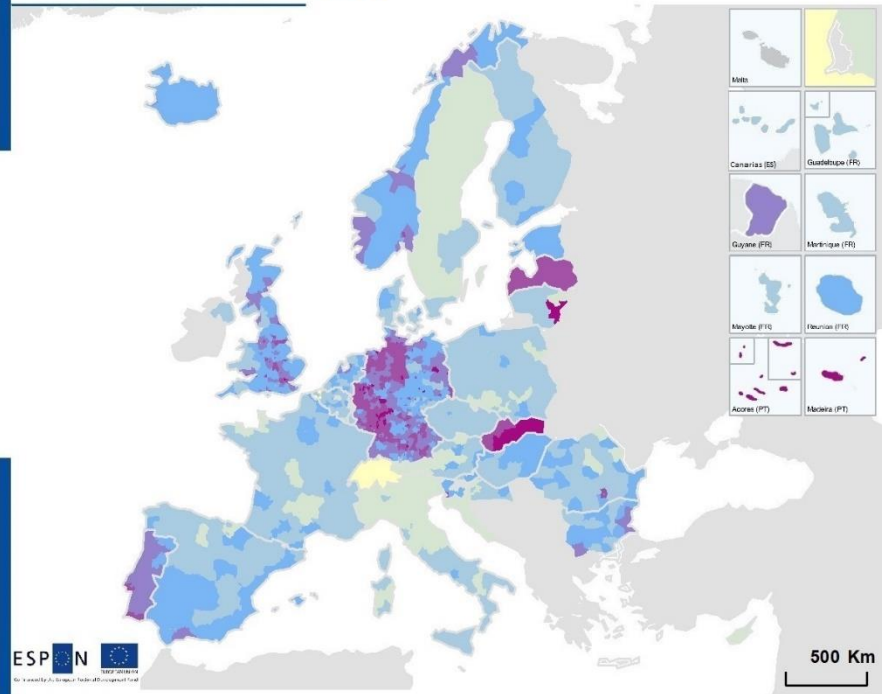
SMEs, knowledge and creative economy

SMEs and carbon-intensive economy

Projected GDP per capita

There is somewhat higher birth rate of new companies recorded in the Capital region compared to Landsbyggðin, which does not come as a surprise as the former NUTS 3 region has been the main centre of economic activity in Iceland for decades. The share of employment in the knowledge and creative economy is below average both in the Capital region and Landsbyggðin but employment does take place in larger firms in the Capital region.

Iceland relies heavily on renewable energy, primarily hydropower and geothermal, therefore there is a lower share of persons employed in carbon-intensive industry than in the rest of Europe. Iceland is among the countries where GDP is expected to increase the most until 2030 and the outlook is somewhat more positive for the Capital region than for the rest of the country.

Enterprise birth rate in 2014

500 Km

Regional level: NUTS 2 & 3 (version 2013)
Origin of data: Eurostat, 2014

Birth rate (%)

0	7,5 - 10	12,5 - 15	> 20
0 - 7,5	10 - 12,5	15 - 20	

Reykjavik

100 Km

An enterprise birth is when an enterprise starts from scratch and actually starts activity; excluding mergers, break-ups, split-off or restructuring of a set of enterprises (Eurostat Regional Business Demography). The rate is calculation as the number of creation divided by the number of existing enterprises.
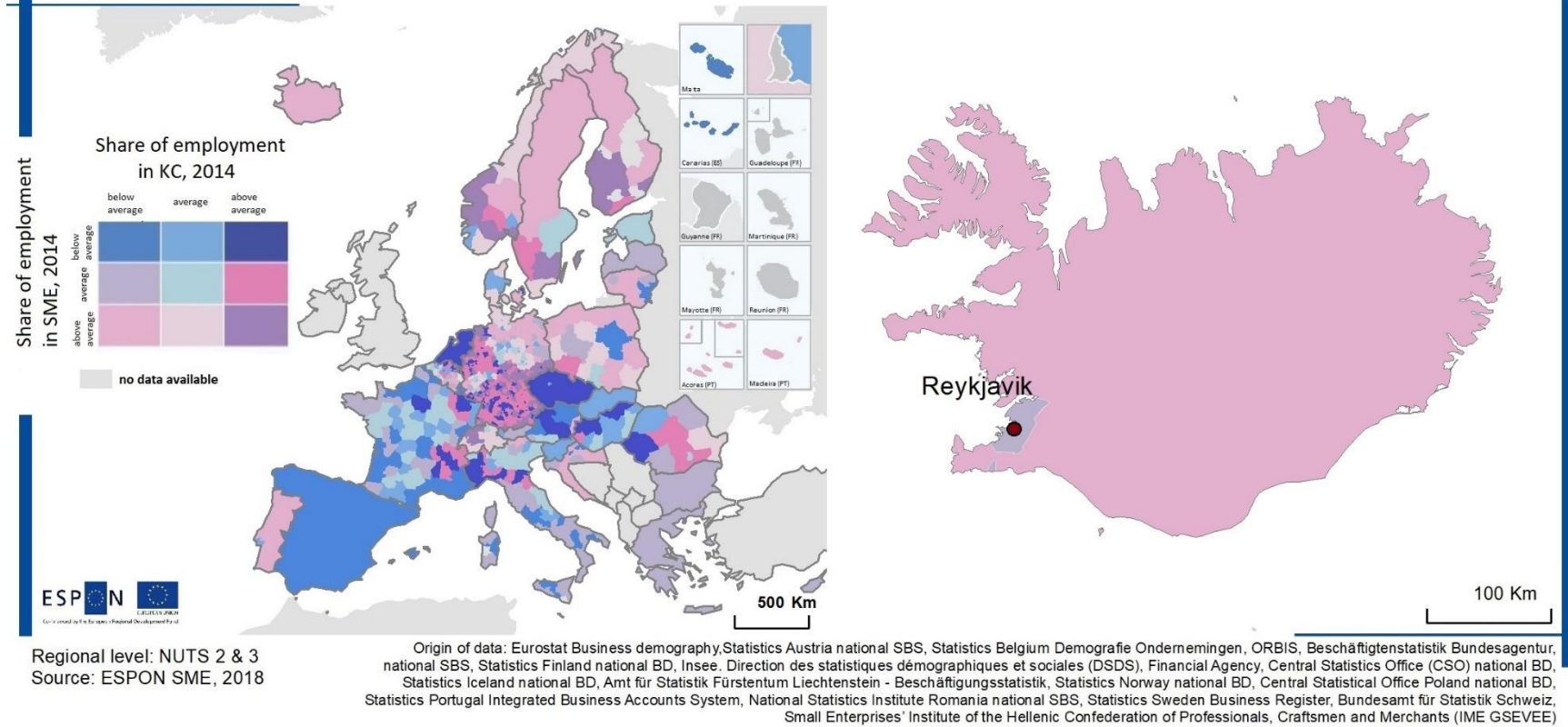
The highest enterprise birth rate can be seen in central Europe and the UK but there are also regions in different and more peripheral locations, such as in Norway and Portugal that also have a high rate. It is noteworthy how varied a picture the map shows with significant differences between countries and regions.

In Iceland in 2014, there was a somewhat higher rate of new start-ups in the Capital region than in Landsbyggðin which does not come as a surprise as the Capital region is the main growth region in the country.

Share of SME employment crossed with the share of employment in the knowledge and creative economy, 2014

Regional level: NUTS 2 & 3
Source: ESPON SME, 2018

Origin of data: Eurostat Business demography,Statistics Austria national SBS, Statistics Belgium Demografie Ondernemingen, ORBIS, Beschäftigtenstatistik Bundesagentur, national SBS, Statistics Finland national BD, Insee. Direction des statistiques démographiques et sociales (DSDS), Financial Agency, Central Statistics Office (CSO) national BD, Statistics Iceland national BD, Amt für Statistik Fürstentum Liechtenstein - Beschäftigtenstatistik, Statistics Norway national BD, Central Statistical Office Poland national BD, Statistics Portugal Integrated Business Accounts System, National Statistics Institute Romania national SBS, Statistics Sweden Business Register, Bundesamt für Statistik Schweiz, Small Enterprises' Institute of the Hellenic Confederation of Professionals, Craftsmen and Merchants (IME GSEVEE)
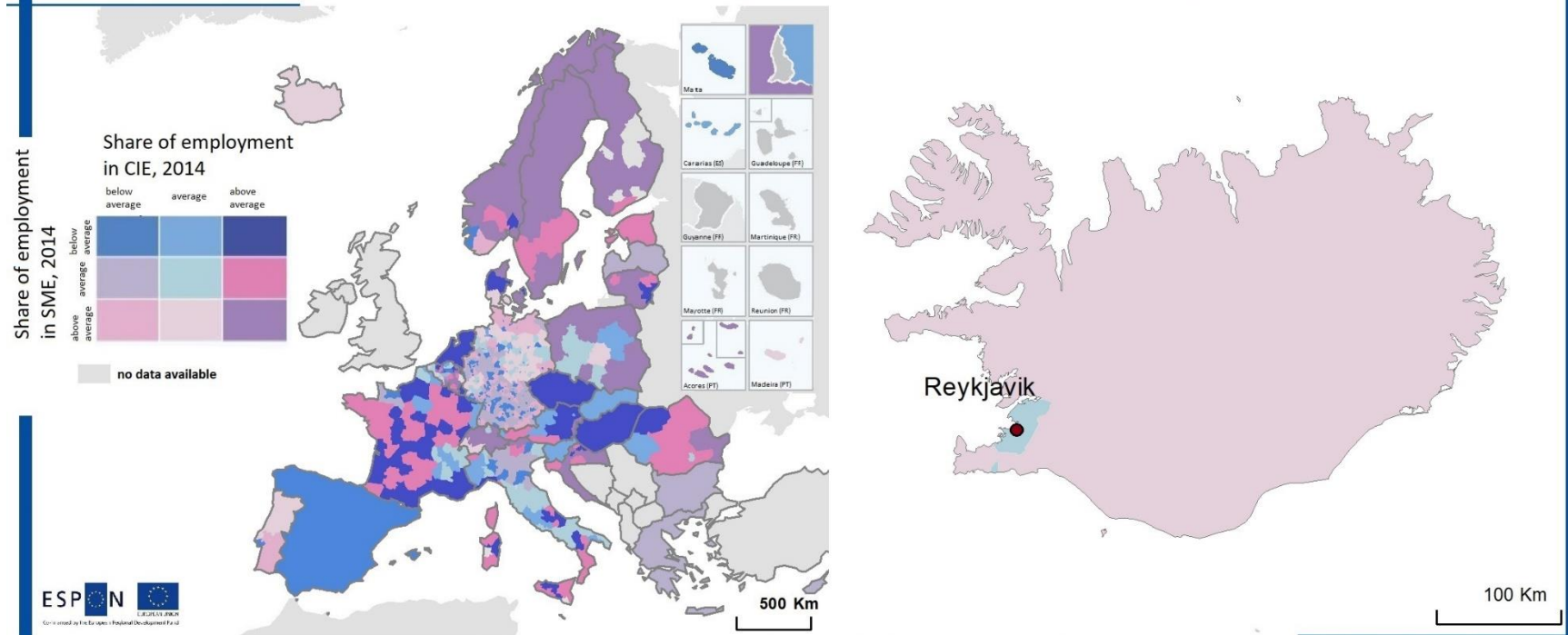
The map above shows a relatively high share of employment in the knowledge and creative economy in the southern regions of Scandinavia. A medium to high share can also be seen in the central part of Europe. However, employment in this economy seems to be more common in central Europe as the employment is in larger companies. It appears that in more peripheral parts of Europe the share of employment in the knowledge and creative economy is lower than it is in the core regions. Employment seems to take place in smaller companies as the distance from the economic core of the continent increases.

In Iceland, the share of employment in the knowledge and creative economy is below average both in the Capital region and Landsbyggðin. The main difference is that a larger share of the employment takes place in large companies in the Capital region. That is a similar picture to mainland Europe where employment in larger companies is more common in the core of economic activity.

Share of SME employment crossed with the share of employment in carbon-intense economy, 2014

Regional level: NUTS 2 & 3
Source: ESPON SME, 2018

Origin of data: Eurostat Business demography,Statistics Austria national SBS, Statistics Belgium Demografie Ondernemingen, ORBIS, Beschäftigtenstatistik Bundesagentur, national SBS, Statistics Finland national BD, Insee. Direction des statistiques démographiques et sociales (DSDS), Financial Agency, Central Statistics Office (CSO) national BD, Statistics Iceland national BD, Amt für Statistik Fürstentum Liechtenstein - Beschäftigungsstatistik, Statistics Norway national BD, Central Statistical Office Poland national BD, Statistics Portugal Integrated Business Accounts System, National Statistics Institute Romania national SBS, Statistics Sweden Business Register, Bundesamt für Statistik Schweiz, Small Enterprises' Institute of the Hellenic Confederation of Professionals, Craftsmen and Merchants (IME GSEVEE)
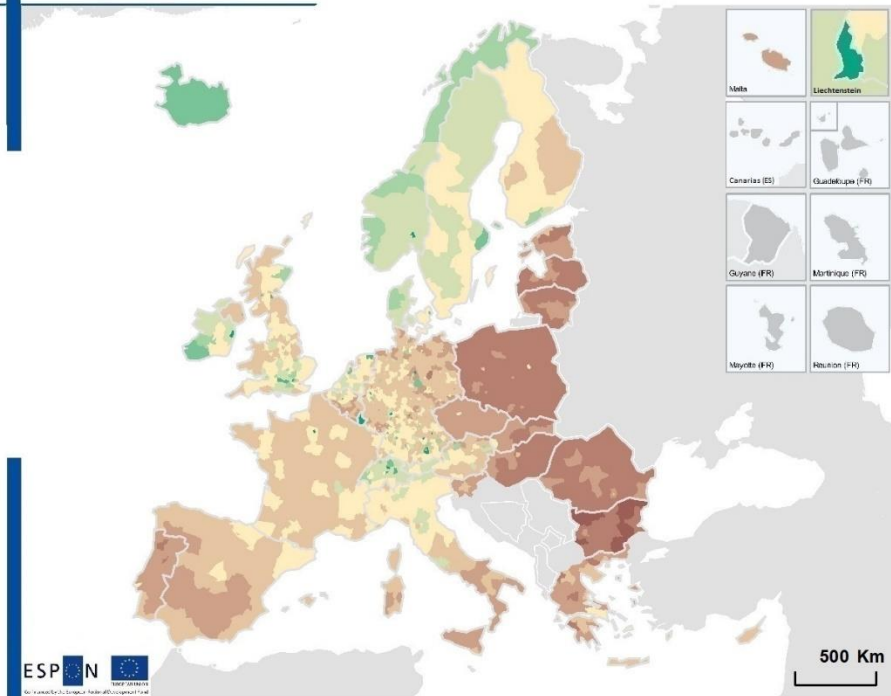
The share of employment in small and medium sized enterprises (SMEs) and in the carbon-intensive economy is high in Scandinavia, Lithuania, large parts of Poland, Switzerland, and Croatia. Below average shares in SMEs but a high share in the carbon-intensive economy are present in parts of France, the Czech Republic, Austria, Slovenia, Denmark, and southern Italy. Both factors are low in Germany and several metropolitan areas. The carbon-intensive industry is important for employment in Norway, Sweden, the Baltic Countries, Poland, the Czech Republic, Austria, Croatia, Romania, and France.
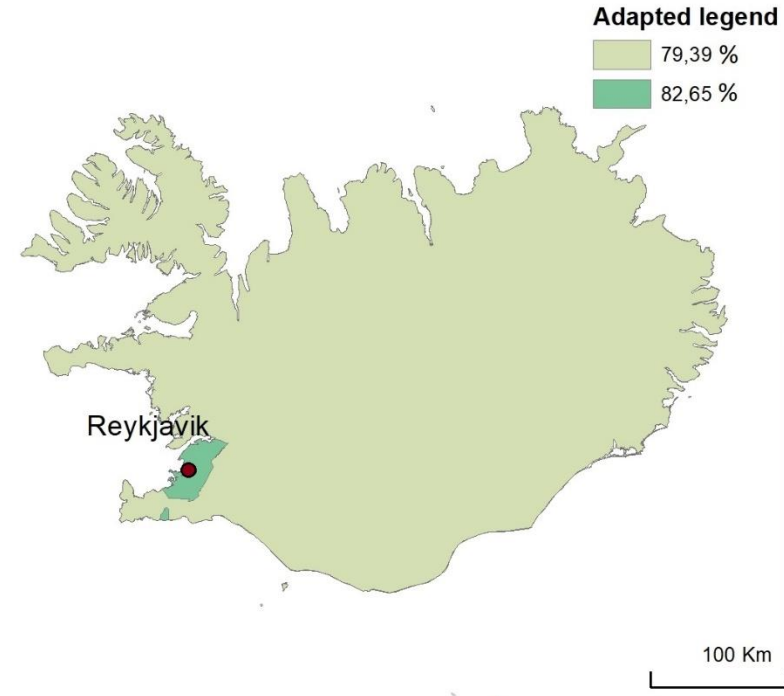
Iceland has a low share of the employment in the carbon-intensive industry and has an average share of SMEs. Iceland relies much on renewable energy, primarily hydropower and geothermal. However much of this energy is used for energy-intensive industries such as aluminium and alloy production. Much of this production takes place in large factories in and around the Capital region. That may be among the reasons why the share of employment in carbon-intensive industries is higher and employment in SMEs lower in that region.

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Regional GDP change compared to EU average (baseline 2030)

Adapted legend
- 79,39 %
- 82,65 %

Reykjavik

Change in GDP per capita in 2030 (%)

Below -75	-50 to -25	0 to 25	50 to 75	100 to 125	No Data
-75 to -50	-25 to 0	25 to 50	75 to 100	Above 125	

Regional level: NUTS 3
Source: ESPON ET2050 (2015)

The potential GDP per capita in 2030 is calculated in % compared to the EU forecasted average (= 100) according to the baseline scenario. This scenario assumes that current rends and policies will remain in the future.

The ESPON ET 2050 project shows substantial regional differences in the outlook for GDP until 2030. According to the project, imbalances between regions are expected to continue. There is expected to be a considerable divide between north, south, and east in 2030. Furthermore, there are increased differences foreseen between regions within countries. The map only shows the change but not the absolute level of GDP and thus the present levels of differences may increase even more. It is not unlikely that large events such as COVID-19 may change this projection as the pandemic has hit countries differently.

Iceland is among the countries where GDP is expected to increase the most until 2030. There is a slight difference between the outlook for the Capital region, where it is a bit more positive, than for Landsbyggðin. Again, we must keep in mind that the functional urban area in south-west Iceland is larger than the NUTS 3 Capital region. This may hide more regional differences than the map shows.

www.espon.eu/iceland