ESPON

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Inspire Policy Making with Territorial Evidence

Territorial fiche

# Territorial patterns and relations in the Danube basin

General context

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Sustainable energy

Tourism and culture

Environmental risks

Biodiversity, landscapes, and air & soil quality

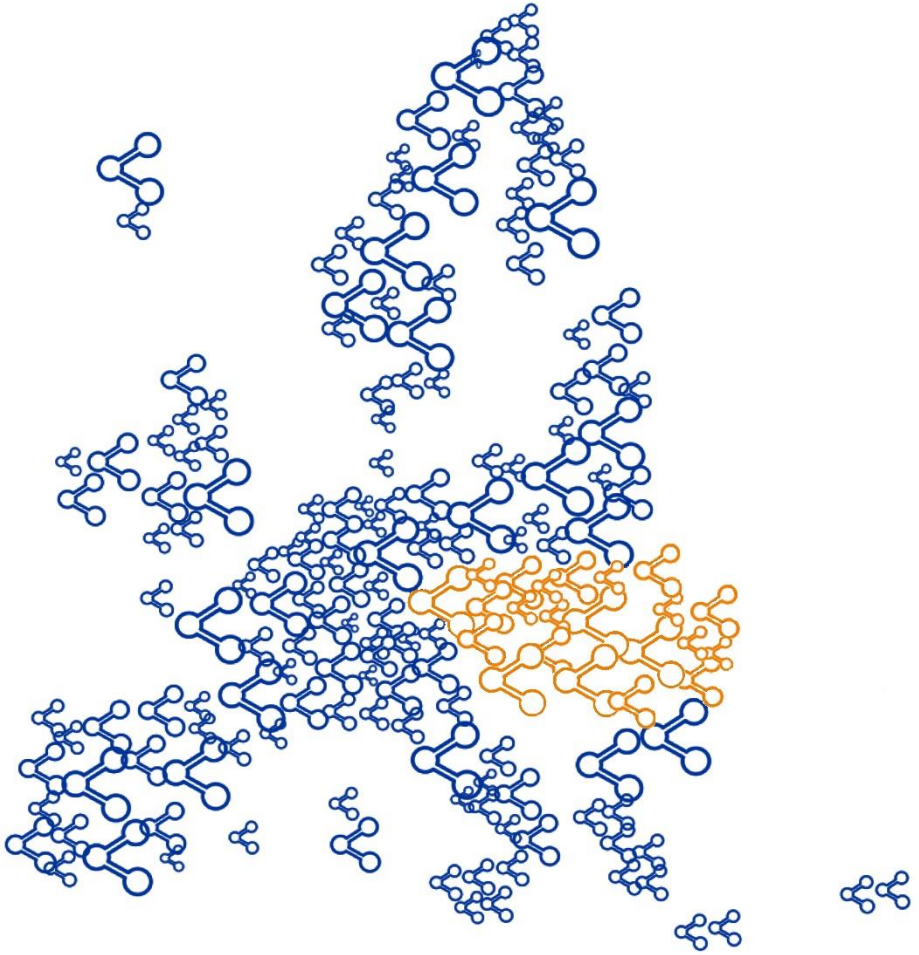
Knowledge society and ICT

Competitiveness

People and skills

Institutional capacity

Cooperation



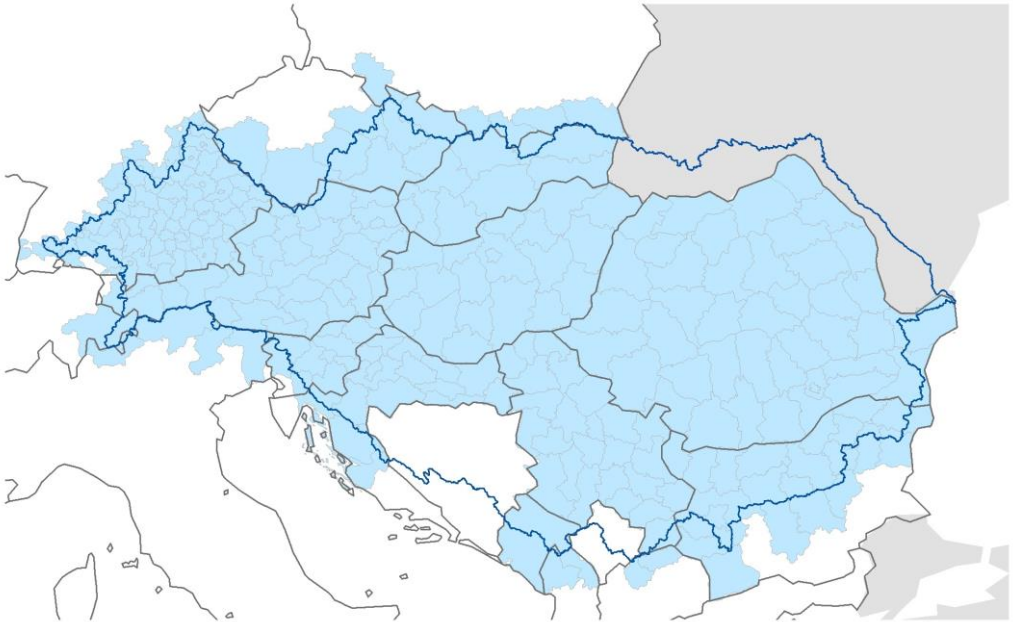
Interactive version: www.espon.eu/danube-basin

## 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 area, to raise interest for the scientific results at national and regional scale.

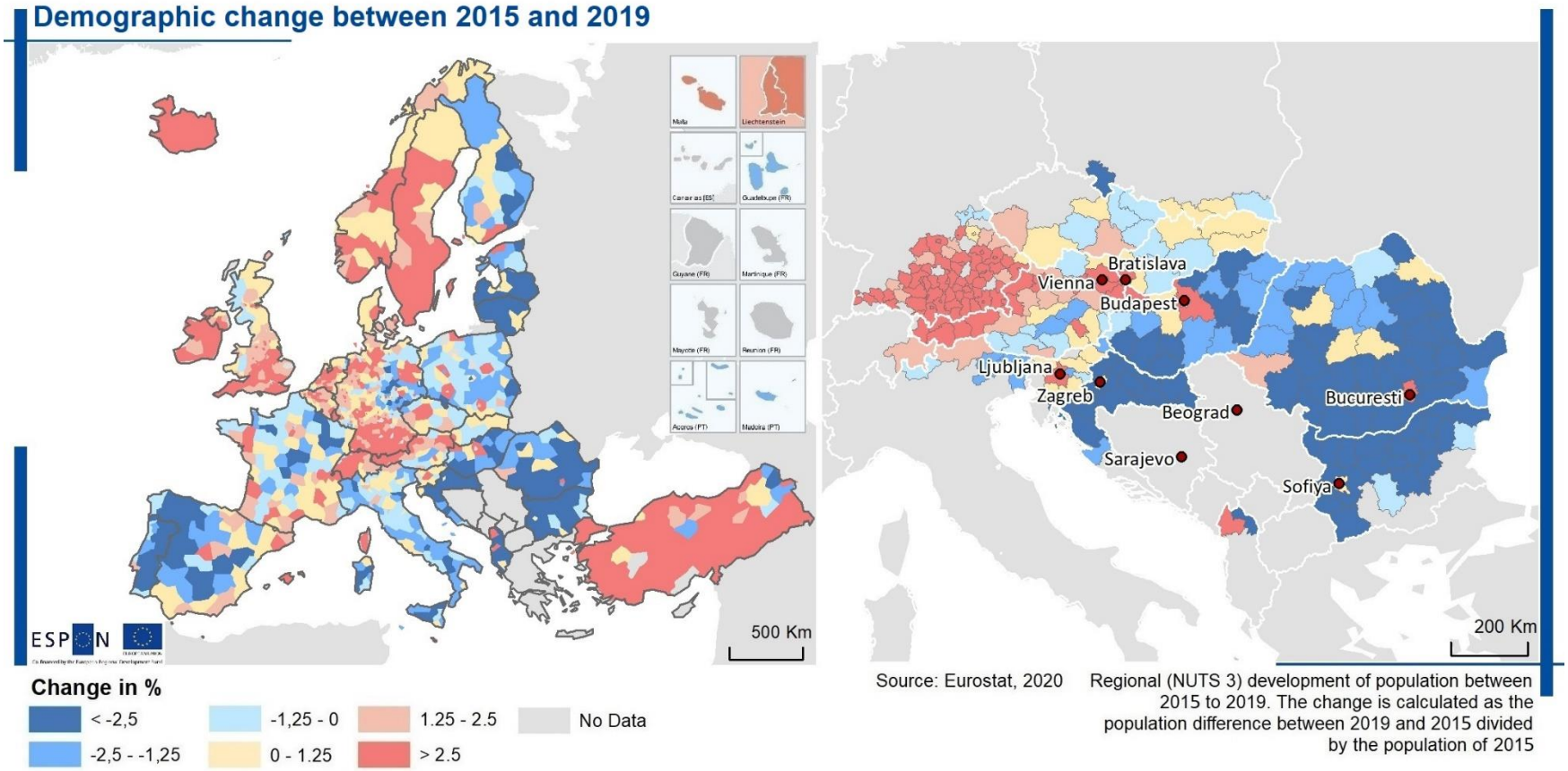
This territorial fiche focusing on the Danube basin features the spatial patterns of indicators selected by representatives of the Directorate for Policies and Strategies of Ministry of Public Works, Development and Administration of Romania. The Danube NUTS regions were selected using the topographic boundaries of the Danube catchment (see map below). However some of these regions are not part of the EU Strategy for the Danube Region, e.g. the Italian and Swiss NUTS-regions, and were thus not mentioned in the text.



# General context

Demographic changes

GDP per capita in 2030

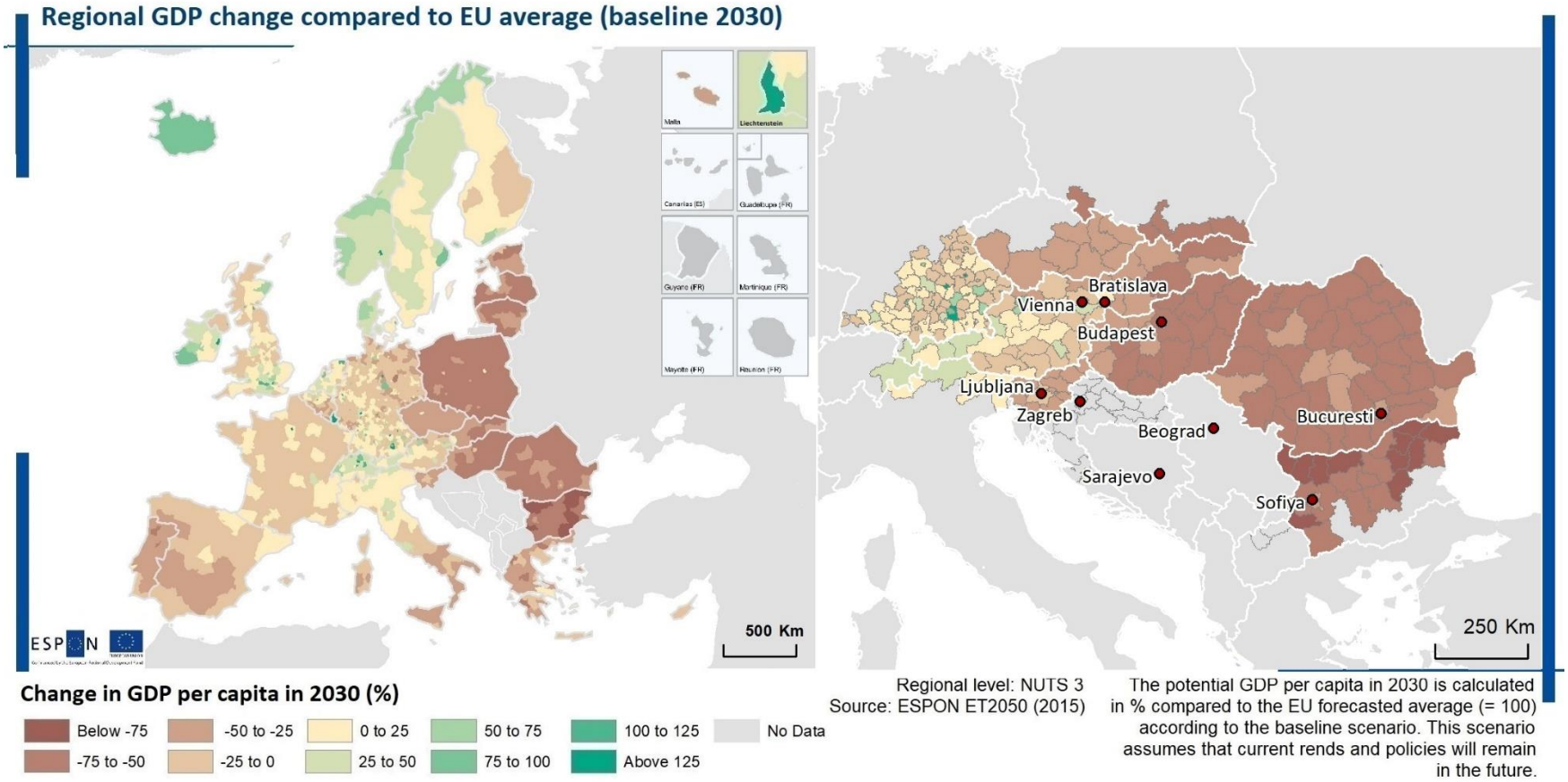



Source: Eurostat, 2020

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, as well as countries in Central and Eastern Europe. Several exceptions from this general pattern are found, e.g. in Norway, Ireland, Turkey, and Iceland where population development has been positive.

The Danube area shows all aspects of population development. Against the background of an overall East-West divide of growth and decline in the transnational context, some countries themselves have a coexistence of shrinkage and growth, such as Croatia, the Czech Republic, or Austria. The strongest population growth clearly concentrates in the capital cities. In the non-urban regions of the eastern part of the Danube area, shrinking is the common trend in population development. Thus, the respective regions in Croatia, Hungary, Romania, and Bulgaria are among those in Europe with the largest decline in population.



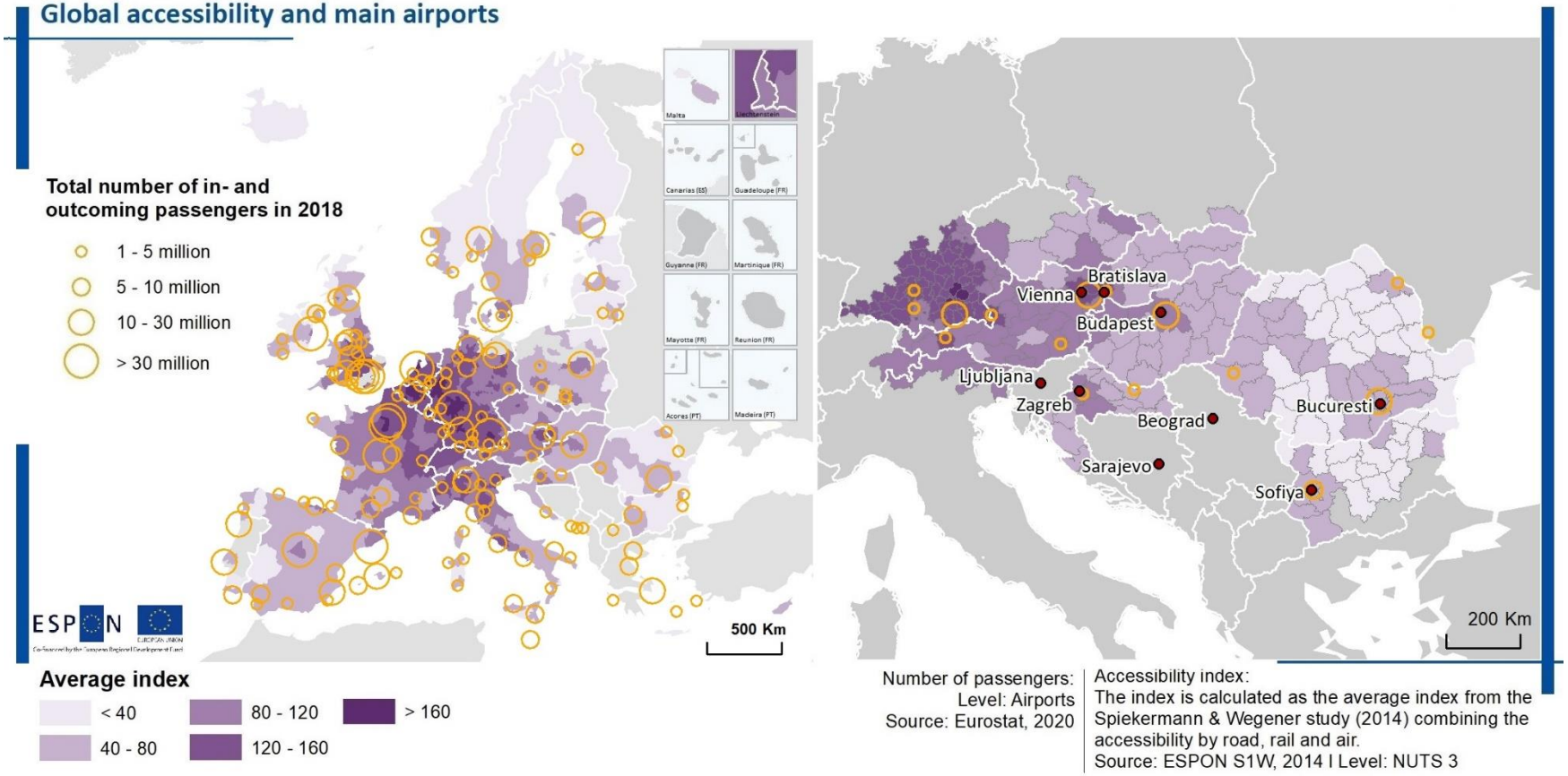

The ESPON ET 2050 project shows substantial regional differences in GDP outlook until 2030. According to the project results, imbalances are expected to continue. There is expected to be a considerable divide between north, south, and east in 2030. Furthermore, there are increased differences foreseen between regions within countries. The map shows only the change but not absolute level of GDP and thus 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 epidemic has hit countries differently.

According to this forecast, the regions of the Danube area will continue to lag behind the overall European trend of economic development, especially in the north-western and eastern parts of Bulgaria. The model predicts that urban areas in the Danube region will have a GDP change more similar to the overall EU trend. The GDP change of non-urban areas (intermediate and rural) is expected to be lower, which might further broaden the gap between urban and non-urban areas. Given that the regional change is clearly divided between eastern and western parts of the Danube Region, regional disparities will thus probably widen and the question of cohesion will be on the agenda in the long term.

# Transport

## Global Accessibility

## Global accessibility and main airports




Number of passengers:
Level: Airports
Source: Eurostat, 2020

Accessibility index:
The index is calculated as the average index from the Spiekermann & Wegener study (2014) combining the accessibility by road, rail and air.
Source: ESPON S1W, 2014 I Level: NUTS 3

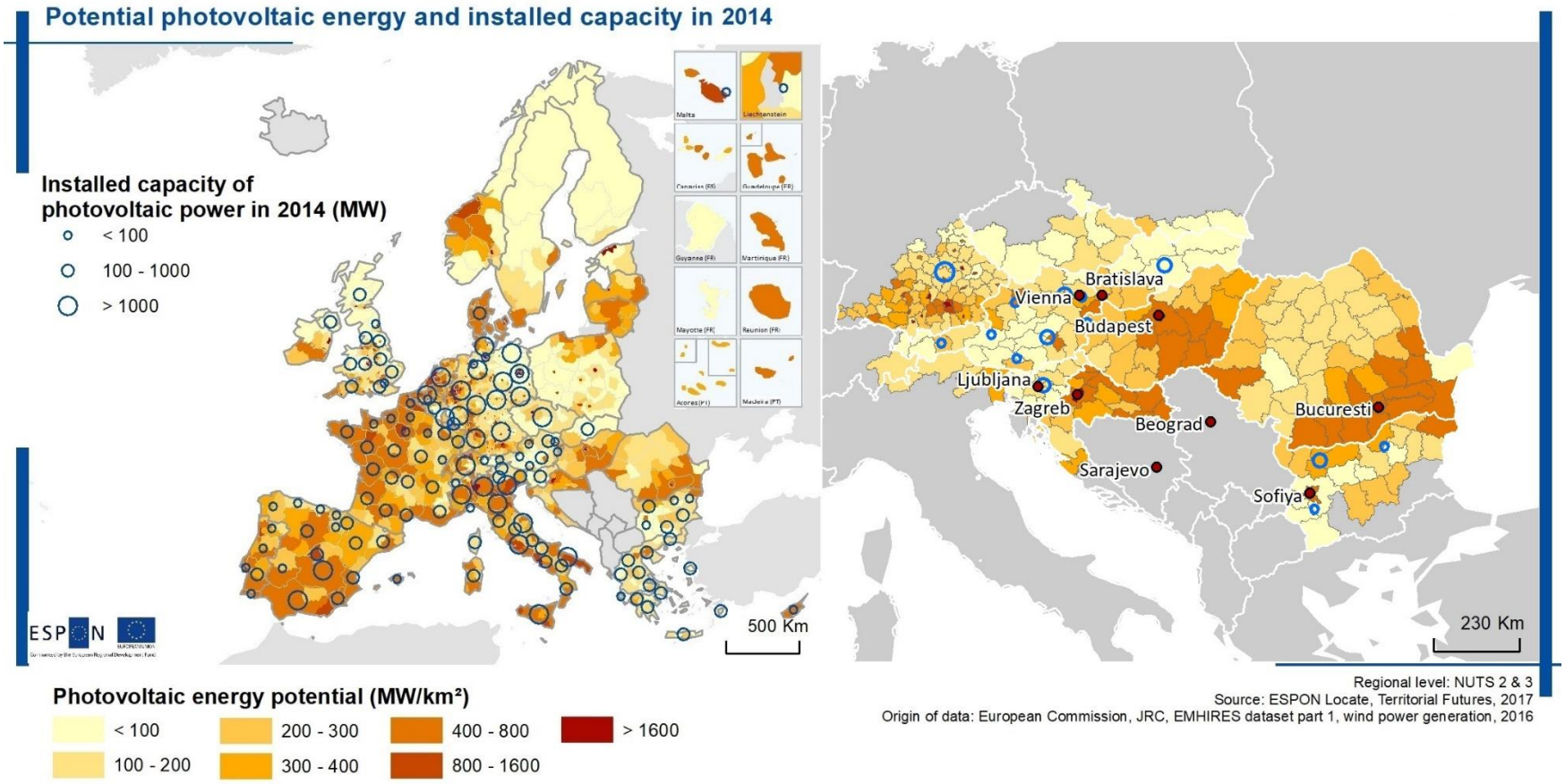
Air transport is important to global connectivity, both in continental Europe and in intercontinental travel. There has been a significant growth in air transport in the EU in the last few years. In 2018, intra-EU air transport had a share of 46% of the total air transport in the EU, extra-EU air transport was 37%, while the national share was 16%. London, Paris, Amsterdam, Frankfurt, and Madrid are the major global hubs in Europe. Lately, the largest increases in air travel have been in Lithuania, Latvia, Poland, and Slovakia. The global accessibility index combines density in population and of railway and road infrastructure. Hence, the highest global accessibility is found in central-western Europe where population and infrastructure density are the highest.

The differences in accessibility in the Danube area are influenced by population density combined with the difference in railway and road infrastructure between the urban and non-urban areas. Related to air traffic, the Eastern capitals like Budapest and Bucharest have a passenger volume comparable to Vienna. The role of secondary airports outside the capital regions is small, as they ensure limited inner-national air connections and the focus of international traffic is mainly restricted to the capital cities.

# Sustainable energy

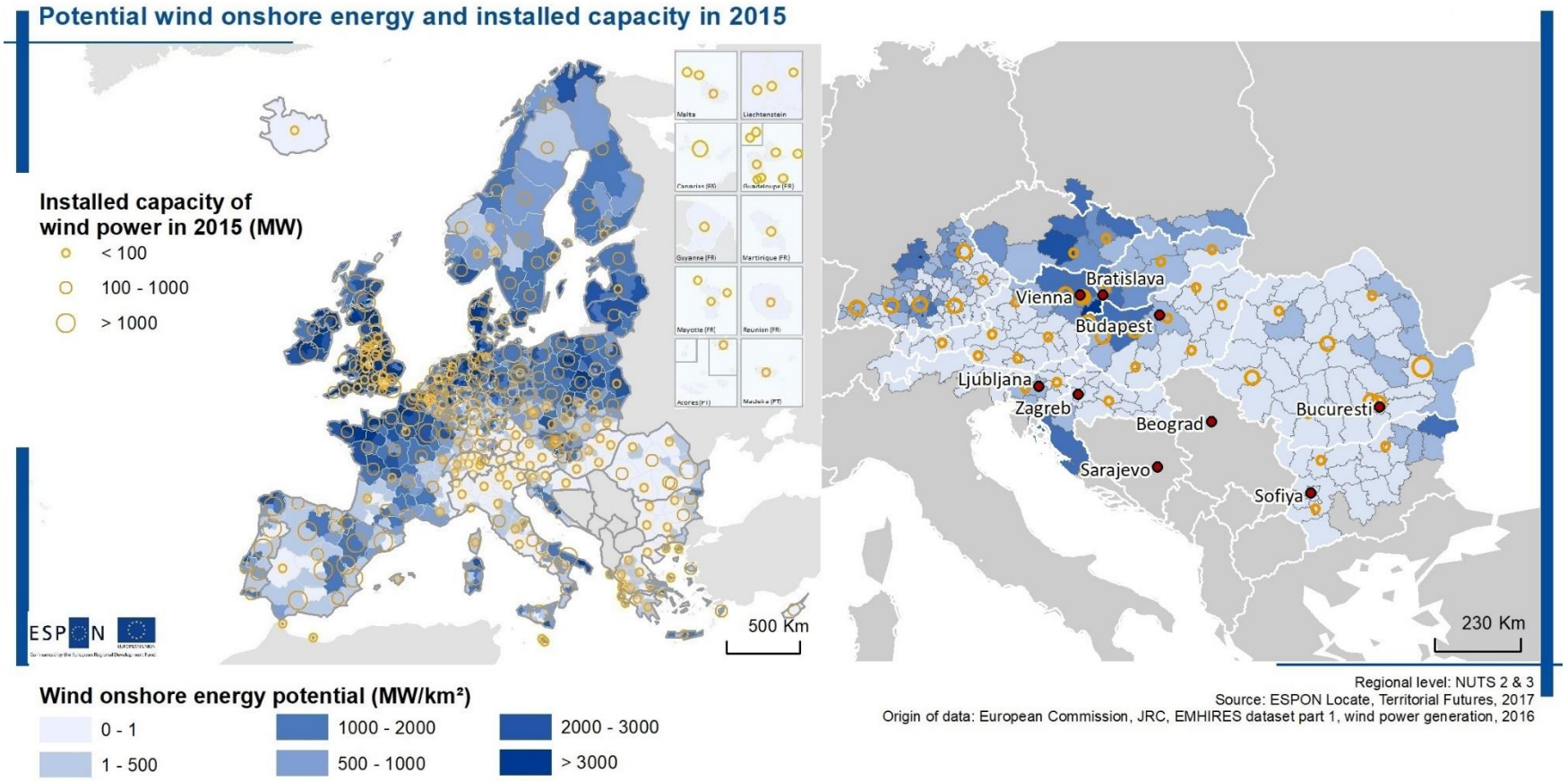
Solar energy

Wind energy




The ESPON LOCATE project studied the territorial dimension of transition to a low-carbon economy. It conducted the analysis at a NUTS 3 level. Solar energy potential is generally highest in south-western Europe. However, there are also regions outside that area with high potential. Areas with low solar energy harvest (less than 900 full load hours) were excluded from the potential. In the eastern part of Europe, installed photovoltaic power was generally much lower and it is apparent that in many areas with high potential there was little or no installed capacity.

The use of solar energy is not very common in the Danube area, in neither the western nor in the eastern part. Some areas have a rather high photovoltaic potential, such as the north of Croatia, east of Hungary, or south of Romania and could use efficiently this kind of energy. The installed capacity of photovoltaic power in the north of Bulgaria is low but has relatively high potential. The installation of photovoltaic power highly depends on national funding regulations, which might explain national differences as well as the localisation of installations in areas with lower potential.




This map also derives from ESPON LOCATE project and it shows onshore potential for wind energy and installed capacity in 2015. Regions around the North and Baltic Seas, Northern France, Germany, Netherlands, Denmark, the UK, Poland, the Baltic countries, and southern Scandinavia have high potential compared to other regions. However, installed capacity was not necessarily the highest in these regions in 2015. Overall, the installed capacities do not correspond with the wind energy potential in any case in a large number of European regions.

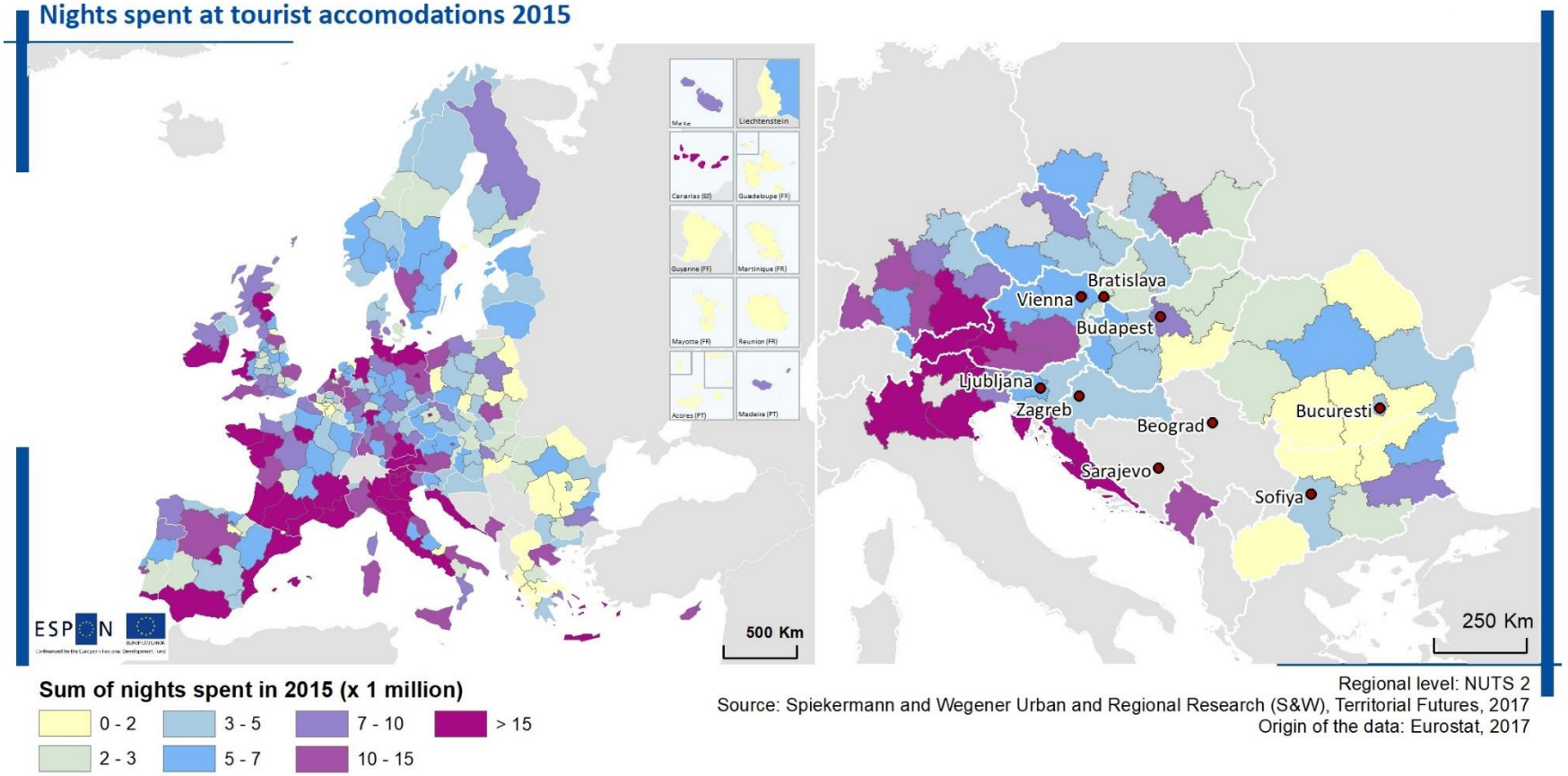
This is also the case in the Danube area in countries such as Romania, Bulgaria, and Hungary in which the plains are used for the production of wind energy. Constanta county in Romania is one of the regions with the largest wind farms in Europe, having more than 200 turbines. As in the case of solar energy potential, national renewable energy policies and regulation concerning the installation heavily influence the permits of the construction of wind farms and therefore the rate of wind energy production.

# Tourism and culture

Nights spent at tourism accommodations

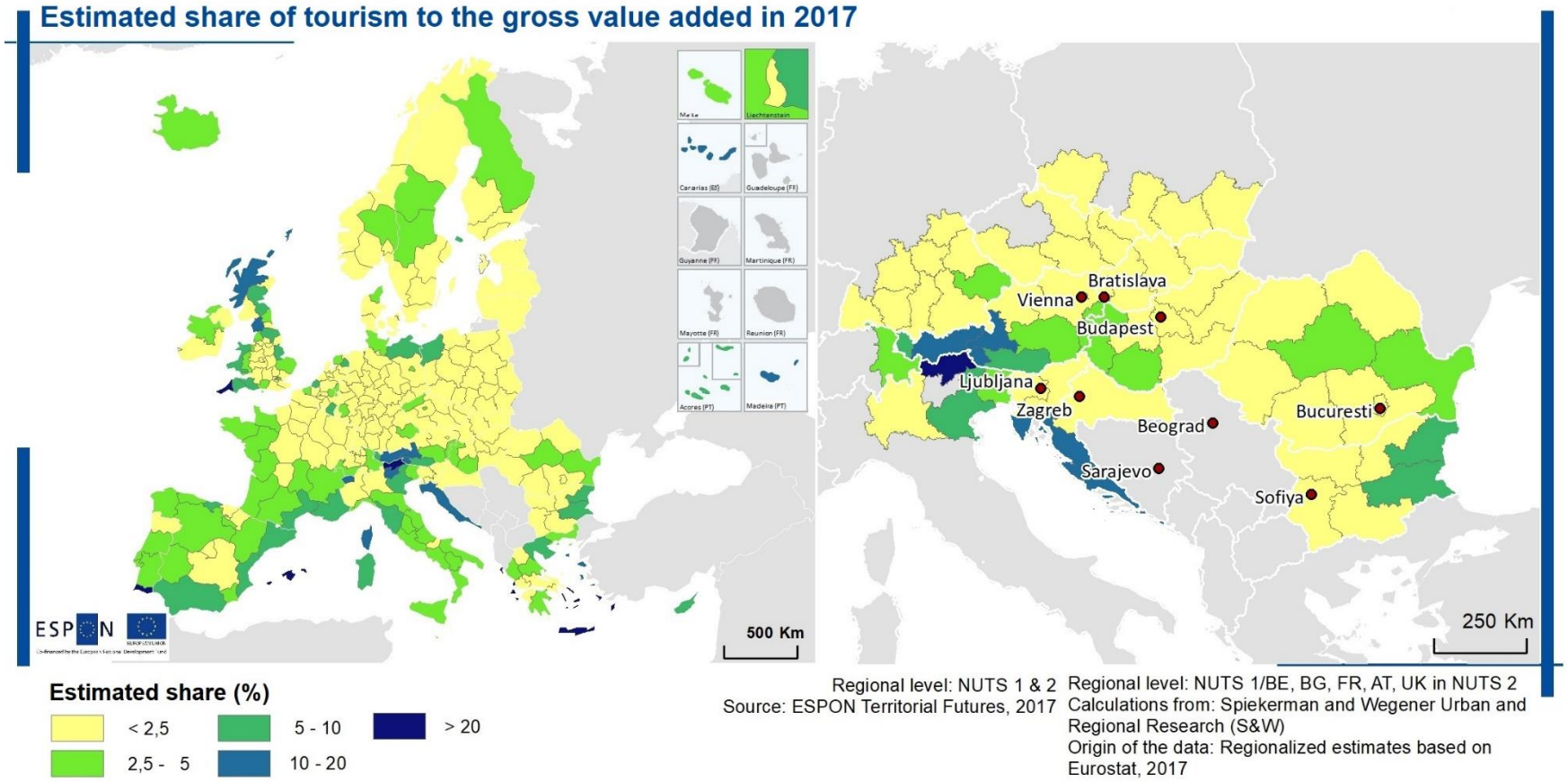
Estimated GVA share of tourism

Climate change cultural impact



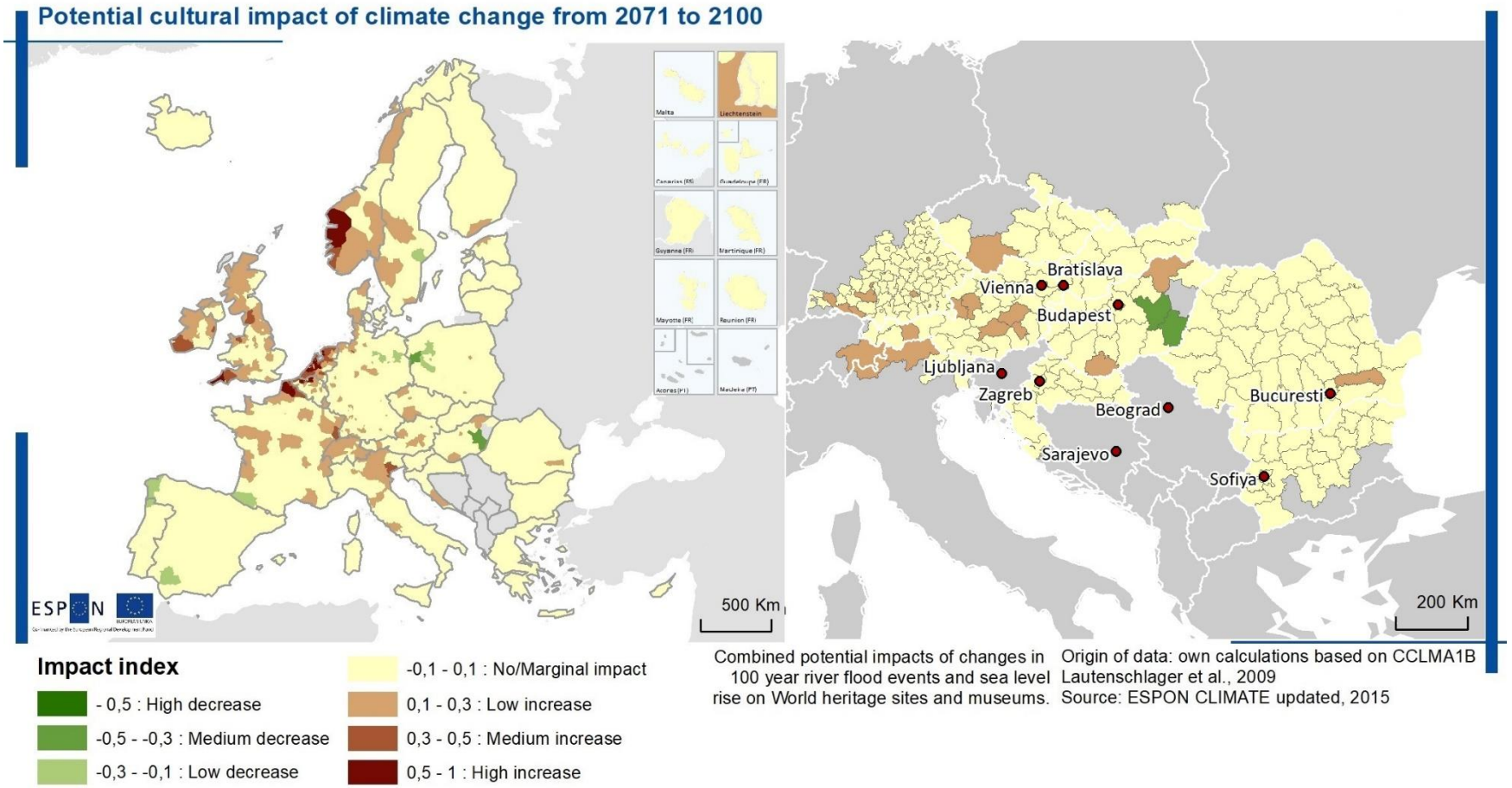

A common indicator of tourism development is the number of nights spent in tourist accommodations. Here, coastal regions tend to dominate in most parts of Europe, particularly in southern Europe. ESPON studies indicate that in order to lessen sensitivity to economic lock-in effects, homeowners can, for instance, try to temporarily let or rent their homes to tourists. However, this is difficult in peripheral regions, while coastal and urban regions have the best opportunities. In some urban areas, tourism seems to have met the carrying capacity, which currently spurs new quality-over-budget oriented trends in urban tourism.

The number of nights spent in a region indicates the intensity of that region's tourism and economic attractiveness, and also gives some hints concerning regions' amenities. In the Danube area, the highest level of touristic stays are located in the Alpine region and its foothills, the seashores of Croatia and the Black Sea, as well as the Tatra Mountains. Amongst these touristic regions, the least amount of nights were spent on the shores of the Black Sea regions where the tourism sector has more potential to grow. The Budapest region in Hungary is the most attractive for tourists looking for urban regions which are not directly landscape related.




The tourism sector is of notable importance for European economic development, especially in southern countries and some remote regions. In a few regions this plays an essential part of their socioeconomic profile. It should also be noted that tourism is a very location-sensitive activity, which means that some localities inside many regions all over Europe can be almost entirely dependent on tourism. This is often the case in peripheral places, which puts those places particularly at risk of various factors with potential negative influences on tourism, such as accessibility and transport costs.

Tourism is crucial for the regional economy in the mountain regions of Tyrol, Carinthia in Austria, Carniola in Slovenia, and the coastal regions of Croatia. In the other alpine regions, such as the south-west of Hungary (where Lake Balaton is located), the Carpathian Mountains, and the Coasts of Romania and Bulgaria, tourism still guarantees a significant part of regional income. In times of restricted possibilities for tourism and travel during COVID-19, these regions might belong to the most economically affected.




Combined potential impacts of changes in 100 year river flood events and sea level rise on World heritage sites and museums.

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

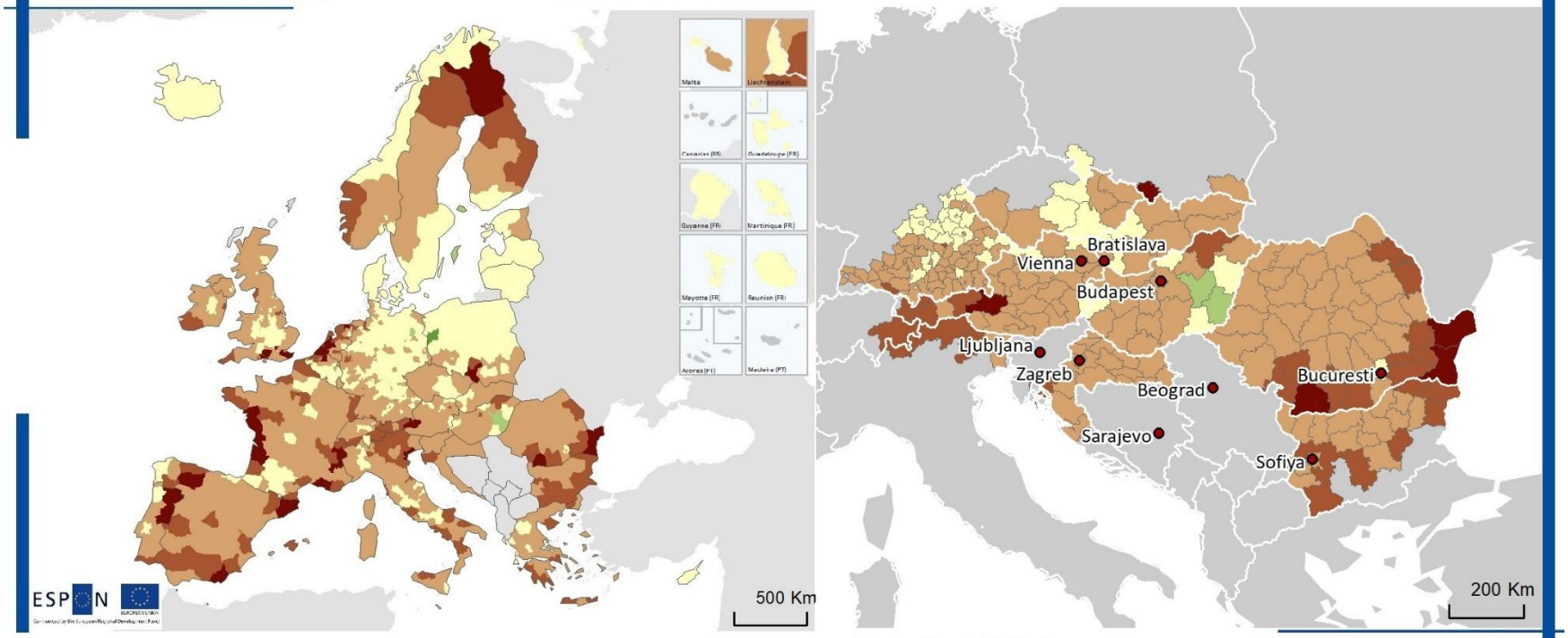
Material cultural assets may also be threatened by climate change. This encompasses assets such as museums and internationally recognised historic sites. The risk of extreme weather events, such as various forms of flooding, may particularly threaten cultural assets. This also helps to illustrate the distribution of areas in Europe with an expected increase in cultural impact of climate change. River deltas, valleys, and some coastal areas are particularly at risk. However, most of Europe will experience a minimal effect.

In the Danube area, the increase of risk related to the potential combined impact of climate change on cultural assets is evaluated as mainly marginal or not present. Cultural heritage seems to potentially be the most affected, mainly due to river flooding in mountainous areas. The Danube river basin is not seen as problematic from the point of view of cultural impact of climate change.

# Environmental risks

## Aggregate impact of Climate Change

## Aggregate potential impact of climate change from 2071 to 2100




**Aggregate potential impact of climate change**

- 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)

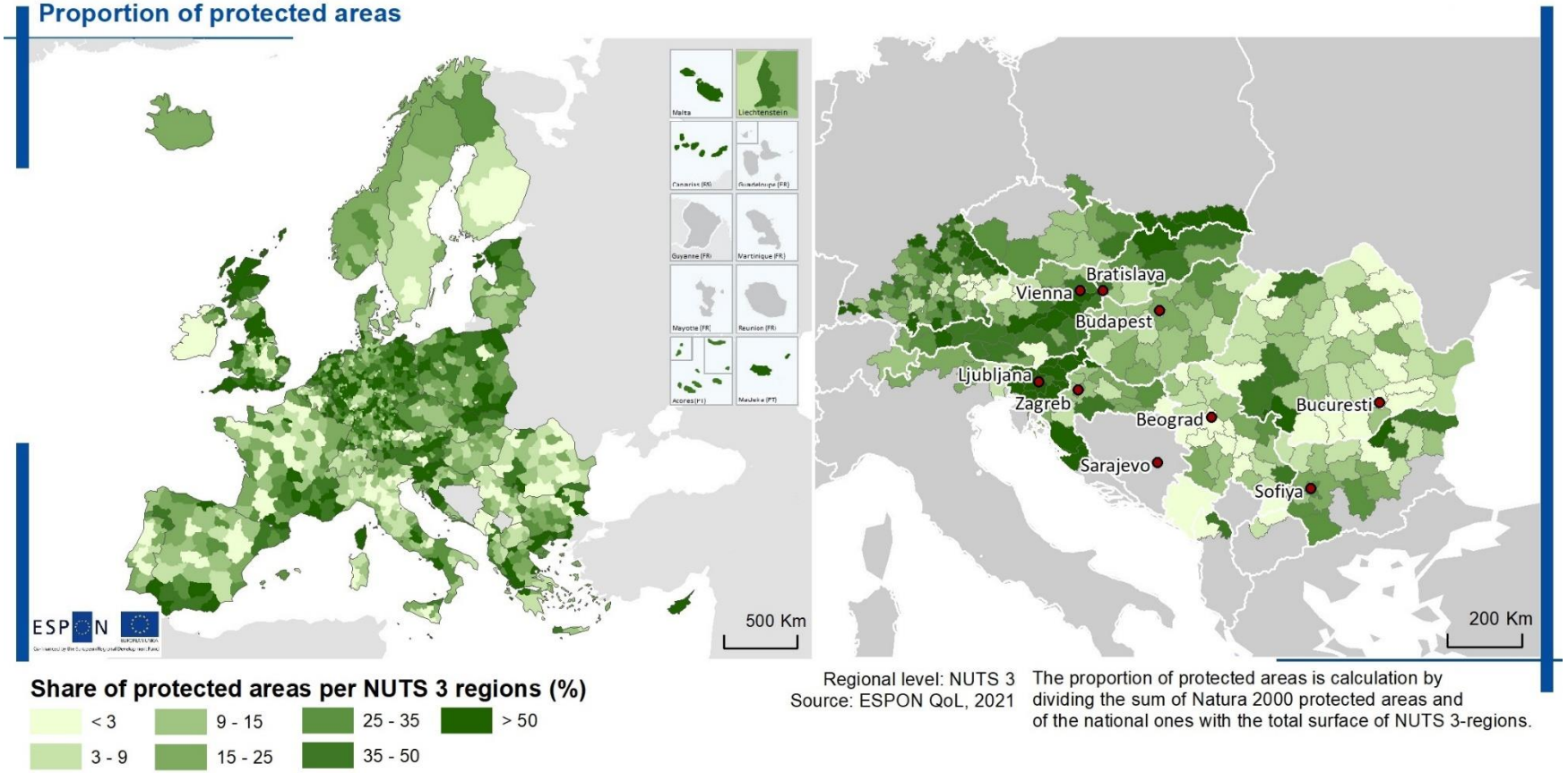
Regional level: NUTS 3
Origin of data: EEA, 2012, 2013, 2014; E-PTR 2012; OSM2014; GISCO 2006; Eurostat 2011, 2013, 2014; JRC 2006, 2012, 2013, 2014; USGS 2011, DIVA 2004, ATSR2014; Statistics Iceland 2011; Bundesamt fur statistik 2011, 2014; Amt fur Statistik Liechtenstein 2014; HESTA 2014.
Source: ESPON CLIMATE updated, 2015

Climate change is expected to impact most European regions by 2100. The computed potential impact is aggregated into the degree of exposure (the extent to which a region is facing natural hazards or climate change impacts), the sensitivity of the region (the economic, social and ecological damage potential, which is assessed, in this context, by using the regional GDP per capita), and their capacities to respond (the ability to react to and mitigate which, in this context, is addressed by taking into account national GDP per capita). The impact of climate change concentrates mainly along regions with natural borders (rivers, mountains, coastal regions).

The number of regions in the Danube area that will not or will just marginally be affected by climate change is quite small. In some countries like Austria and Bulgaria, the mountain regions are seen as potentially the most affected. In Romania, the flat area in the south and the Dobrogea counties near the coast appear to be the most potentially vulnerable.

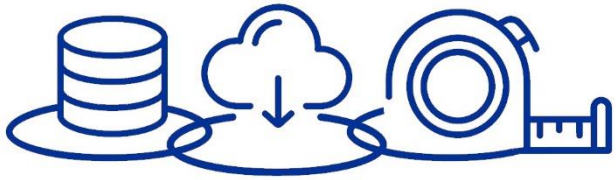
# Biodiversity, landscapes, and air & soil quality

## Share of protected areas



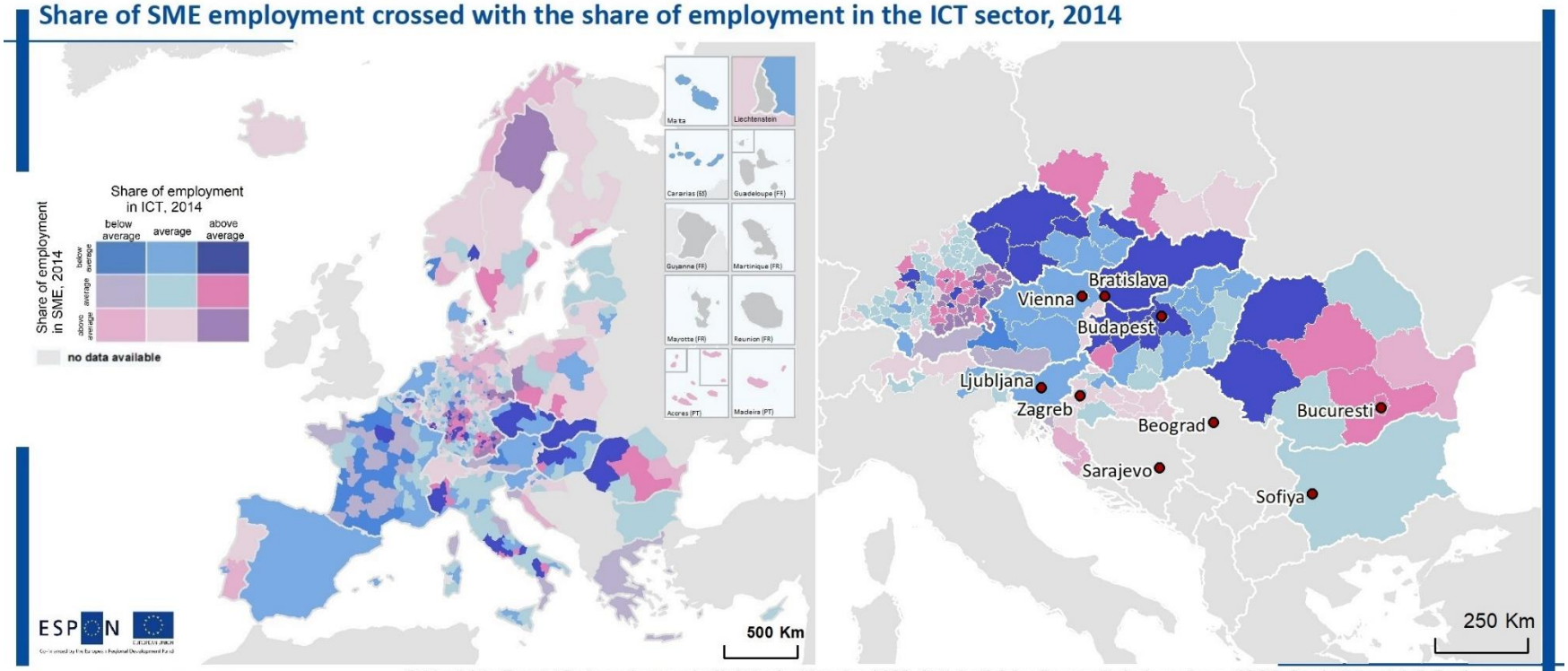

Europe's natural landscapes are unique and varied. They deserve protection as part of European identity and diversity. The European Union's nature conservation policy plays a crucial role in maintaining biodiversity. Its Natura 2000 network is the backbone of this policy and is the largest network of protected areas in the world. Natura 2000 defines the minimum standards for the protection of nature and species in the EU's 27 member states. Each member state show specific territorial patterns that are influenced by natural features such as mountains and hilly landscapes, rivers, and coastlines.

This is definitely also the case in the Danube region. There are some countries with more homogeneity, due to similar natural conditions, such as Germany, Austria, and Slovenia, compared to other countries with more regional diversity: Croatia, Romania, and Bulgaria. In general, the share of protected area is slightly lower in Eastern European countries; the shares are the lowest in Hungary and the Czech Republic. Protected mountain and forest regions like the Tatra, the Southern Carpathians or the Central Balkan Mountains are clearly shown on the map.



# Knowledge society and ICT

Share of SME employment crossed with the share of employment in the ICT sector




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)

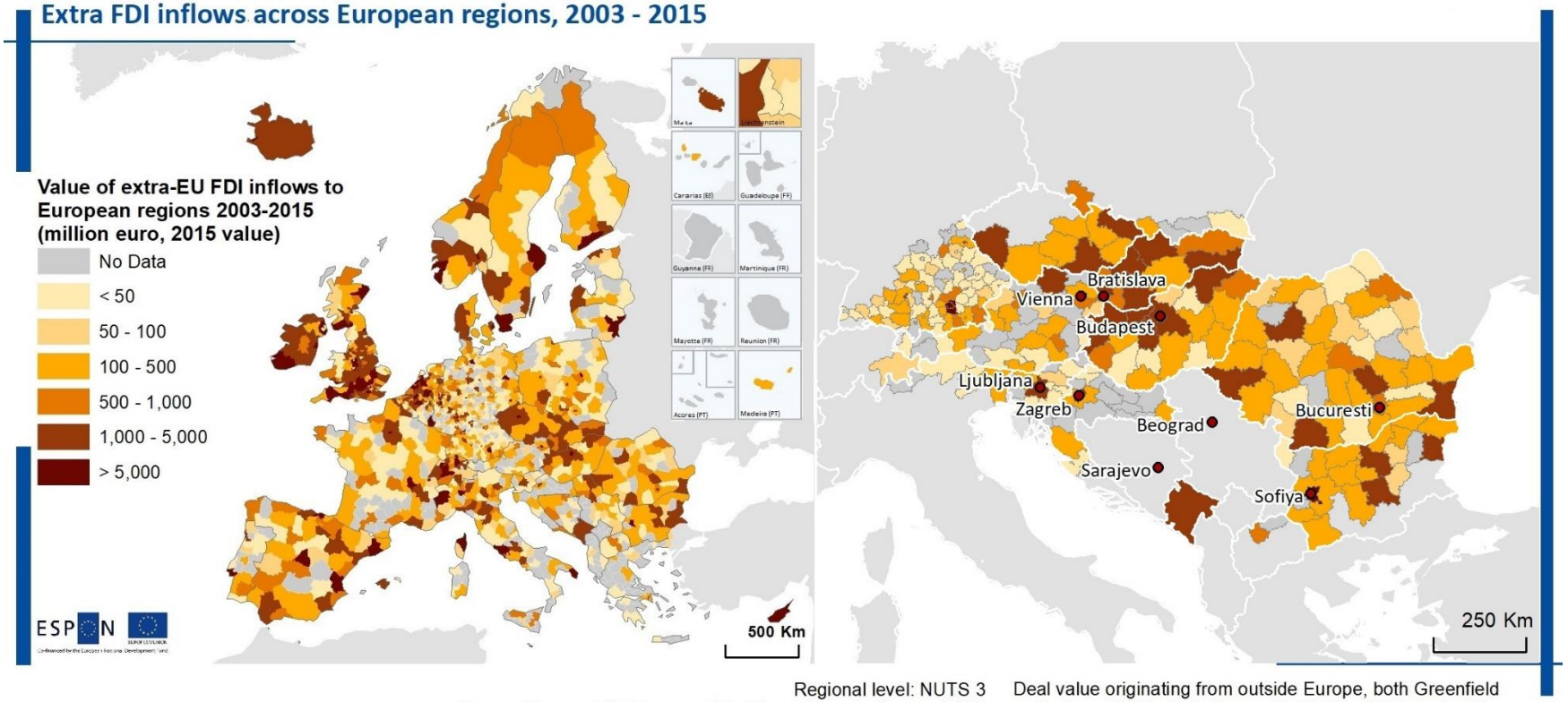
Information and communications technology (ICT) comprises all components and infrastructure that enable modern computing and digital technology. This sector is especially important in urban and metropolitan regions, as they are more specialised in knowledge-intensive businesses. The share of employment in ICT is high in the northern region of Sweden (Norrbotten) and Gothenburg, the metropolitan regions of Helsinki, Paris, Rome, Munich, Frankfurt, and their neighbouring university regions, the Italian region of Piedmont, as well as in the central regions of the Czech Republic, the south-west of Poland, and a substantial part of Romania.

Employment in ICT plays an important role in the regions of the Danube area. In 2014, an above-average share can be noticed especially in the Bohemian regions of the Czech Republic, the whole of Slovakia, the western parts of Hungary, and western and central regions of Romania. ICT employment has a relatively minor role in the west and south of Austria. Small and medium sized enterprises (SMEs) do not generally play an important role in employment, except for the Zala region in Hungary, central Romania, and the Bucharest region where SMEs have a more important role. Only some German regions show above-average ICT employment and also above-average employment in SMEs.

# Competitiveness

## Extra FDI inflows across European regions

## Extra FDI inflows across European regions, 2003 - 2015




Regional level: NUTS 3
Source: The world in Europe, global flows towards Europe, 2017
Origin of the data: Copenhagen Economics based on BvD's Zephyr and the Financial Times databases, 2016

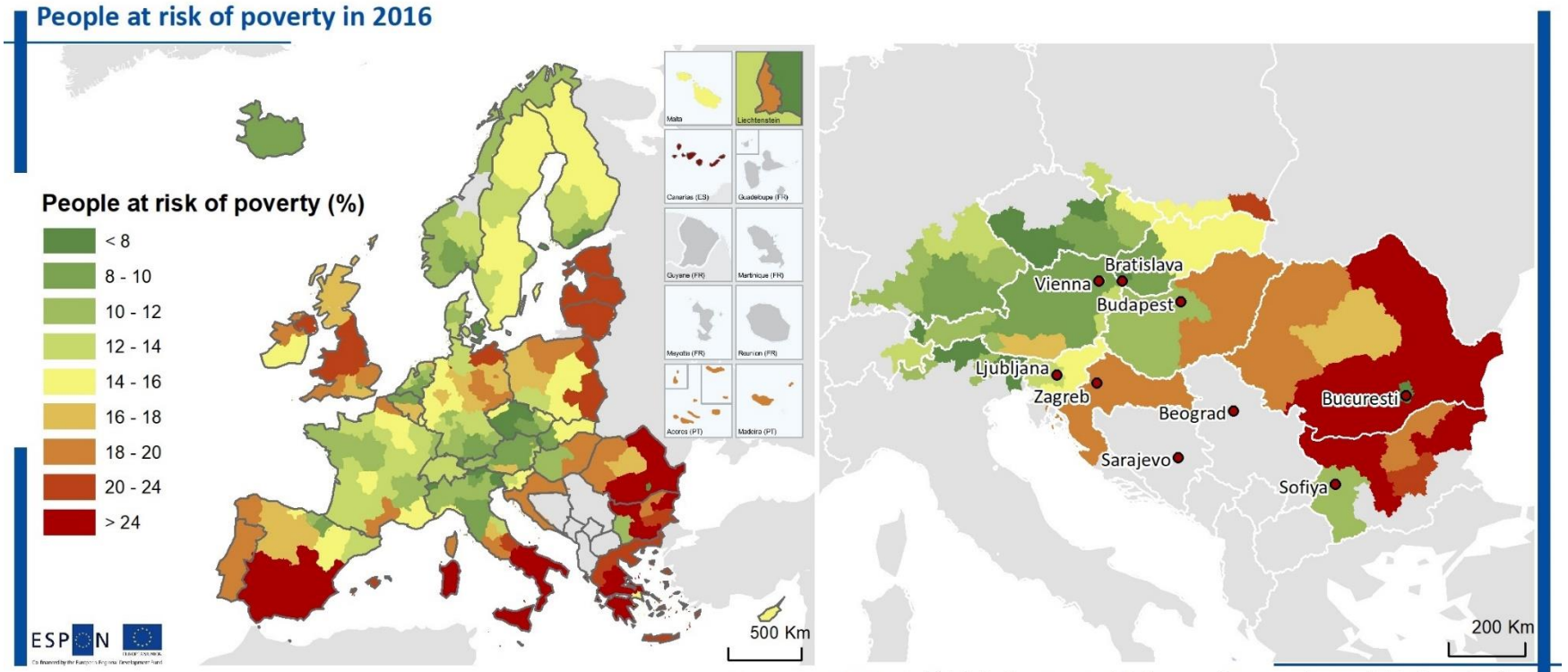
Deal value originating from outside Europe, both Greenfield projects and M&A deals (around half of the M&A deals did not have a reported deal value – the total deal value is reported for the GF and M&A projects that had a reported deal value).

Foreign direct investment (FDI) is considered as a key factor in economic growth. This map shows the extra-EU inflows of Greenfield FDIs (when foreign companies set up new production facilities, infrastructure, or buildings) investments from 2003-2015. This type of FDI stimulates economic activity during the construction phase and expands the capital stock in the region. In general, capital metropolitan regions are more likely to be attractive for FDI, but Greenfield investments tend to also take place in rural or peripheral areas in the case of available resources. FDI originating outside Europe brings new capital to Europe, stimulates employment, and boosts productivity in local firms.

Extra-EU FDI inflows into the Danube space concentrate in the Czech Republic, Slovakia, Hungary, Romania, and Bulgaria. Highest FDI inflows are not necessarily concentrated in the capital regions, but also in regions with a more industrial-oriented employment structure like central Slovakia or western Romania. Otherwise, the Munich area, Oberösterreich (Upper Austria), and Steiermark (Styria) in Austria show some significant inflow. The Danube regions definitely have a relatively high inflow of FDI, even in comparison to some Western countries and regions, and seem to be the focus of many investors.

# People and skills

## People at risk of poverty




Regional level: NUTS 2
Origin of data: ESPON database, 2020
Source: ESPON Quality of Life, 2021

This indicator corresponds to the sum of persons who are: at risk of poverty after social transfers, severely materially deprived or living in households with very low work intensity. Persons are counted only once even if they are affected by more than one of these phenomena.

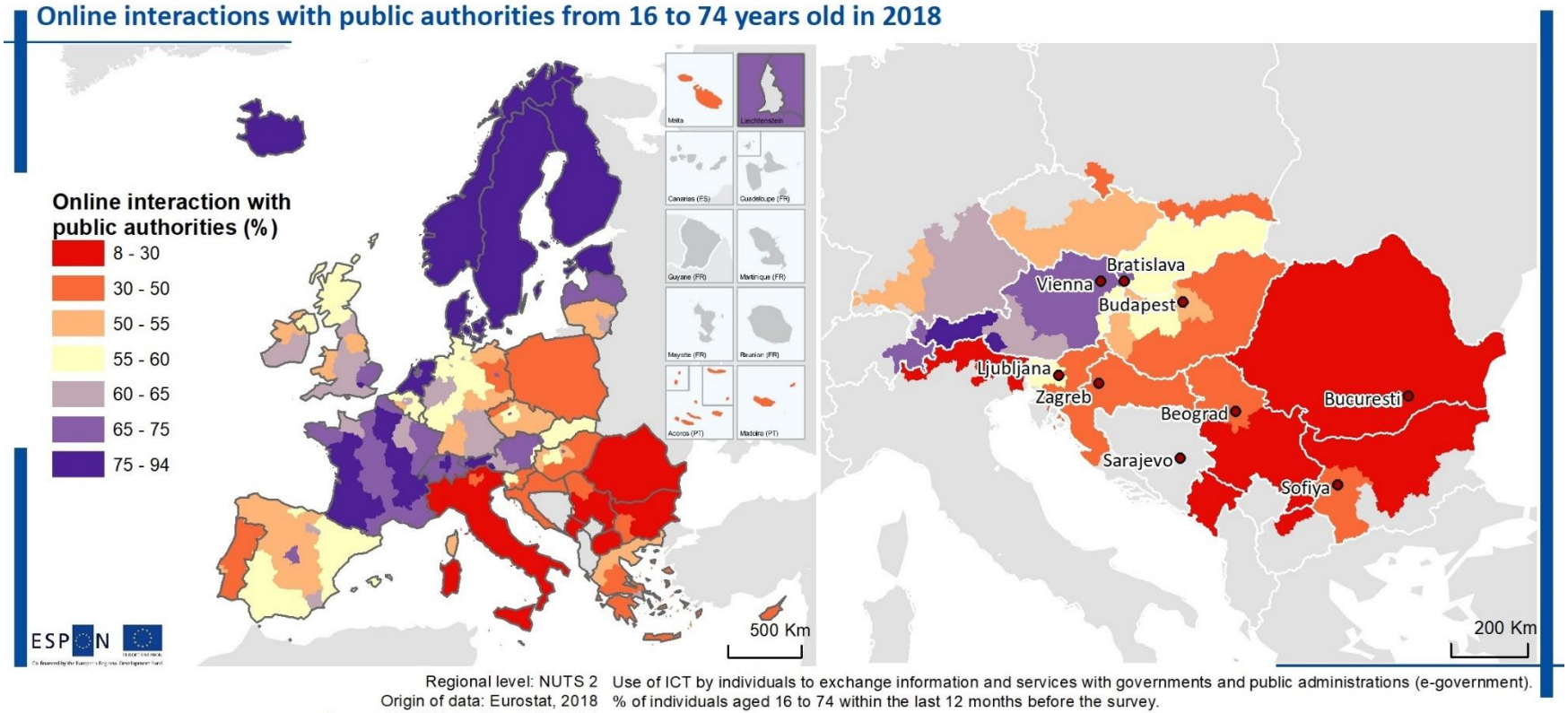
Social inclusion, especially through the reduction of poverty, is one of the main factors necessary for a just Europe. The indicator used to measure the risk of poverty takes into consideration dependencies on social assistance, severe material deprivation, and unsuitable working conditions. The people affected by poverty face financial restrictions on basic living conditions like housing and life maintenance, and face severe restrictions in societal participation. The degree of poverty risk influences the regional social balance as well as regional vulnerability, currently visible to some respect following the impact of COVID-19. The map shows that regions with high shares of people at risk of poverty exist in almost all countries besides northern Europe.

In a rough sketch, the Danube area appears to be divided into two parts by East and West when considering poverty risk. Whereas Germany (at least in the part included in the Danube area), the Czech Republic, and Austria appear homogenous with low risk rates and Croatia is also homogeneous but with a higher rate, the other countries show up with distinct regional differences. The highest rates are found in the regions in the eastern and southern parts of Romania and in the northern and central parts of Bulgaria, where more than one person out of four is at risk of poverty.

# Institutional capacity

## Online interactions

## Online interactions with public authorities from 16 to 74 years old in 2018




Regional level: NUTS 2
Origin of data: Eurostat, 2018
Source: ESPON Quality of Life, 2021

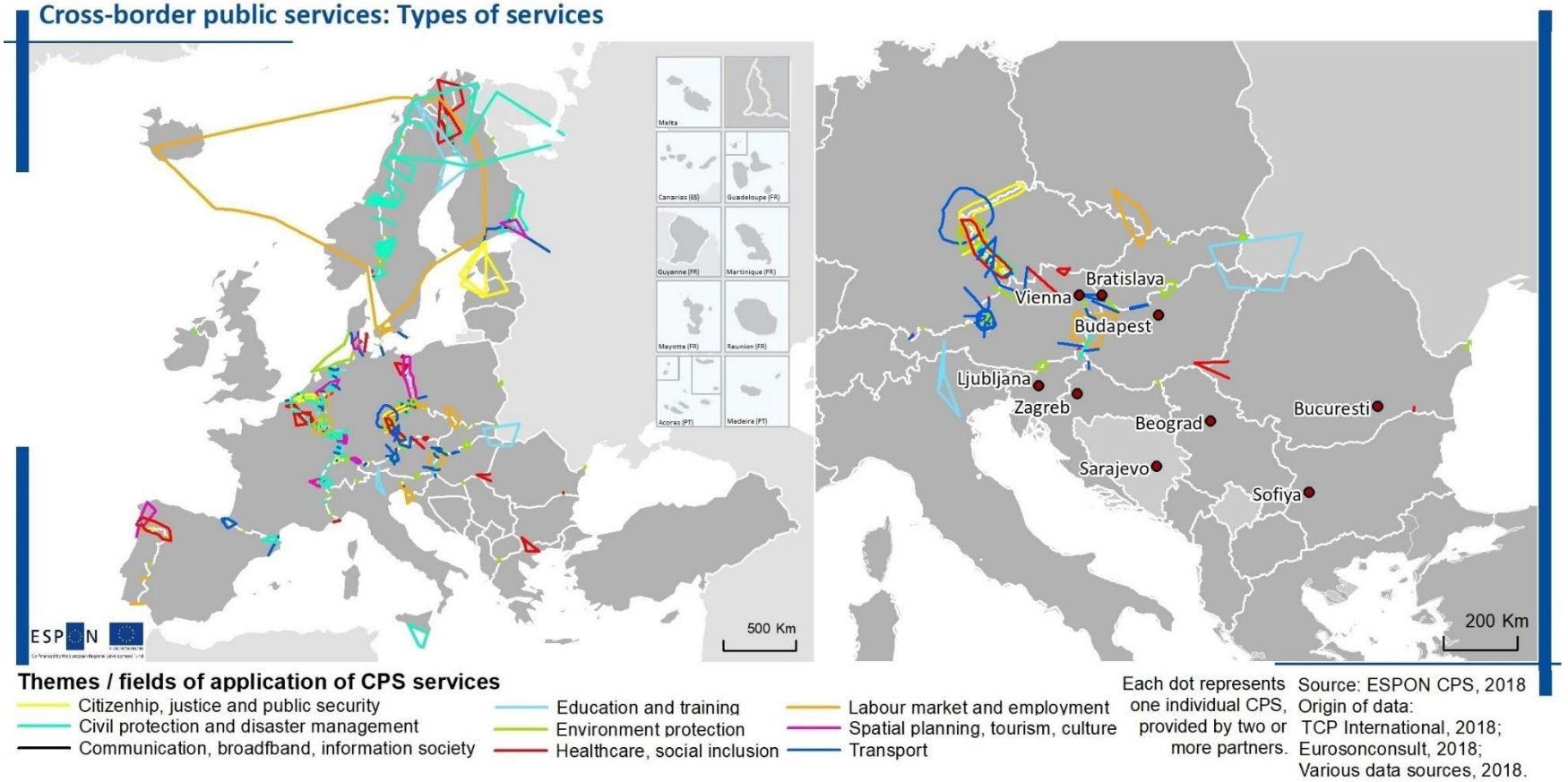
Use of ICT by individuals to exchange information and services with governments and public administrations (e-government).
% of individuals aged 16 to 74 within the last 12 months before the survey.

The ongoing progress in the availability of adequate access to the internet goes in line with an increasing use of the internet on a daily basis. Almost three quarters of the EU population use the internet for social media, purchase of goods and services, internet banking, and interaction with public services. Almost half of the population uses the internet to contact public services. There are distinct national specificities; northern and western countries and regions generally record higher levels of use than southern and eastern countries. Regarding the interaction with public authorities, individual accessibility and skills are important, but so is the degree of digitalisation of public authorities, which might explain the limited use of the internet for this purpose in some countries.

The digitalisation of public authorities in the Danube area seems be the most advanced in Austria, where at least 60% of the population has interacted online with public authorities. In Hungary, the use of internet for that purpose is higher in the western part compared to the eastern part. The regions of central Serbia, Bulgaria, and Romania show the lowest rate of online exchange in both the Danube area and in the overall European context. In these areas only the capital regions have, if any, slightly higher values.

# Cooperation

## Cross border public services




Cross-border public services (CPS) address joint problems or development potentials of border regions that are located on different sides of one or more nation state borders. The highest share of CPS is found along the borders between the Benelux countries, France, Germany, and Nordic countries. The map also shows a high density of CPS along the German-Swiss, French-Swiss, and Danish-German border(s). This is largely determined by a long-standing tradition of general decentralised cross-border cooperation. Due to topography, areas of low cross-border interaction are rather concentrated e.g. between France and Spain or Switzerland and Italy.

In the Danube space there is a long tradition of cooperation in the Austrian-German border region. There is also strong cooperation, developed quickly and intensely, in the Czech-German area. Potentially resulting out of history, Austrian-Hungarian cross-border public service activities are very intense in a broad range of thematic fields. Otherwise, CPS are rather rare and selective in the Danube region between Austrian-Slovenian, Hungarian-Croatian, and Croatian-Serbian borders and between Romania and Hungary, Bulgaria and Moldova. In the case of the Romanian-Bulgarian border, as there are only a few bridges built, the Danube river, rather than economic circumstances, is a separating factor.

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