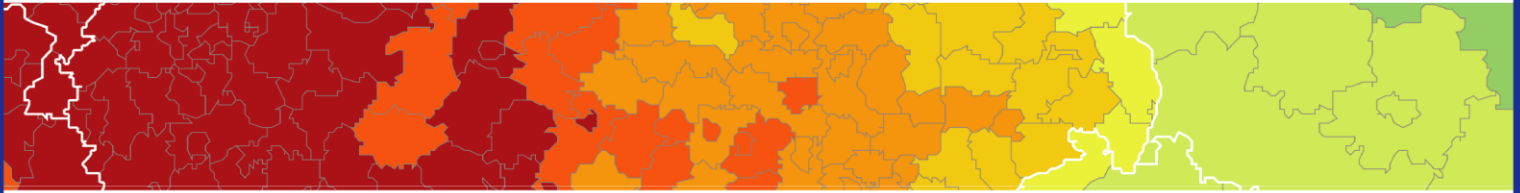


Inspire policy making by territorial evidence



BT2050

# Territorial Scenarios for the Baltic Sea Region

Targeted Research

**Main Report**

Version 29/11/2019

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## Abbreviations

AI	Artificial Intelligence
BSR	Baltic Sea Region
BSR-TeMo	Baltic Sea Region- Territorial Monitoring
CBC	Cross Border Cooperation
CBF	Connecting Baltic Facility
C-E	Circular Economy
CEF	Connecting Europe Facility
EC	European Commission
ESPON	European Territorial Observatory Network

FDI	Foreigner Direct Investment
GDP	Gross Domestic Product
GHG	Greenhouse Gas
HELCOM	Baltic Marine Environment Protection Commission
IoT	Internet of Things
MS	Member State
NUTS	Nomenclature of Territorial Units for Statistics
PM10	Particulate matter
R&D	Research and Development
SGI	Services of General Interest
SGEI	Services of General Economic Interest
SPA	Sparsely Populated Areas
SSGI	Social Services of General Interest
SDG	Sustainable Development Goal
TIA	Territorial Impact Assessment
VASAB	Visions and Strategies around the Baltic Sea Region
VASAB - LTP	Visions and Strategies around the Baltic Sea Region - Long Term Perspective

# Executive summary

The Baltic Sea Region covers a vast geographical area with the Baltic Sea as a focal point. Traditionally the sea has been connecting the region, being the main mean of transportation and trade. While the regions share history and have many similarities, there are also differences. Differences in population density show a clear north-south pattern with the sparsely populated north and the densely populated south. There is also still an east-west divide in terms of economic performance, although the divide has been closing. The BSR has developed from a divided region (e.g. Cold War, German divide) into a prosperous region with a dense network of cooperation arrangements. The thick governance structure suggests that the region is successful in bringing different sectors and actors together to address common challenges. The BSR has a strong position in research and development, industry and trade, entrepreneurship and well-developed welfare states. Within the European landscape, the BSR has paved the way for the implementation of the macro-regional approach marking a new beginning for the territorial cooperation policy of the European Union.

Yet the region faces many challenges arising from rapid population ageing and shrinking labour forces, 'brain drain', international immigration and increasing inequalities. These challenges can escalate in a fast-changing, interconnected and uncertain world. Scenarios offer an effective method to deal with uncertainties. The use of scenarios helps to explore possible developments and identify benefits and drawbacks of developments paths that are unforeseen today. This may empower actors who play a role in shaping the future of regions and, thus is an important step to successfully cope with the transition towards sustainable futures.

The ESPON project 'BT2050'- territorial scenarios for the Baltic Sea Region 2050' works in this direction. The project develops territorial scenarios for the BSR. As shown in Figure 1 this process is done in different phases, which have been informed by participatory processes (e.g. interviews with experts, workshops, focus group and consultation to target stakeholders).

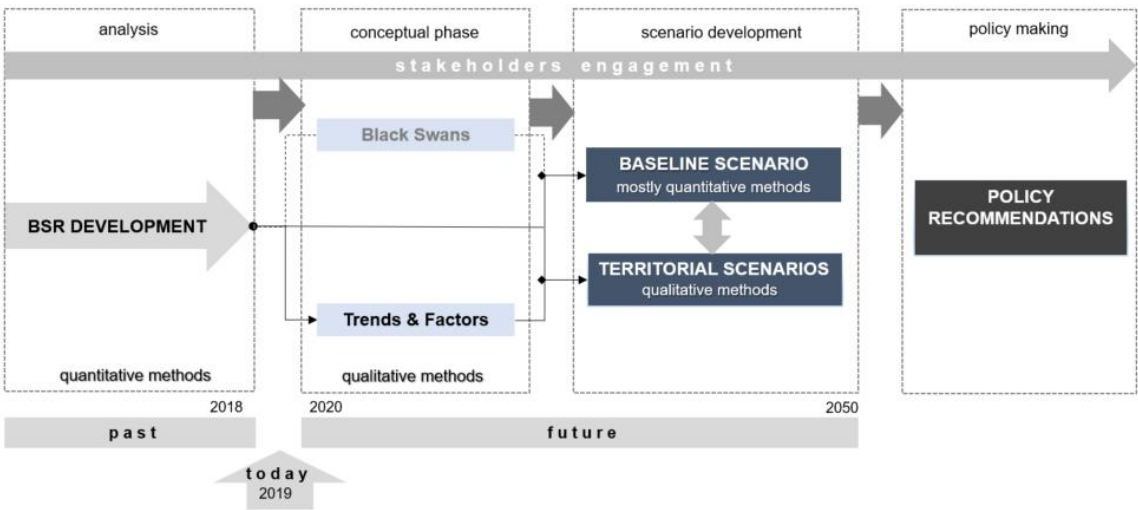


Figure 1: BT2050 research framework

The research process began with the analysis of the development of the region, which provided the current state of the region specifically in relation to how demographic, economic, environmental and governance aspects have shaped the territorial structure of the region. Some of the relevant findings of this analysis are the stable population development in the region, the polarisation of growth in urban areas at expenses of rural areas, the presence of stronger urban networks in the densely populated countries and the prevalence of the east-west disparities when it comes to GDP per capita.

The process of looking into the future resulted in the identification of the main trends and factors as well as unforeseen events (black swans) that can disturb the future development of the region. In this stage, literature review and interviews with experts were resourceful to identify some of these aspects – trends, factors and black swans - which were discussed and prioritized during a workshop with the participation of VASAB stakeholders.

After this, a Baseline Scenario for 2030 and 2050 and two territorial alternative scenarios for the future of the Baltic Sea Region were developed. The **Baseline Scenario** assumes the most likely development if all important factors, including all major exogenous trends and all policy practices used in the recent past, will continue to be in effect until the target years of 2030 and 2050. The demographic and GDP projections presented in the Baseline Scenario were based on quantitative methods by applying the socio-economic SASI Model. Nevertheless, workshops with stakeholders assisted in settling the assumptions that foreground the future development of the region.

The territorial implications of the Baseline Scenario yield two main messages. There will be a further pronounced unbalanced development between urban and rural regions in the BSR as a whole with urban areas being the economic powerhouses and attracting more population than other types of regions. Nevertheless, despite this unbalanced development, overall territorial cohesion - measured with GDP per capita - will happen across all regions regardless of the regional type.

The two alternative territorial scenarios for the BSR 2050 “**Well-being in a circular economy – a RE-mind for a good life**” and “**Growing into green-tech giants: The ecological footprint clear-up**” show two different pathways of how the future of the BSR could look like depending on different future developments. Both scenarios were developed based on the main trends and factors identified in a workshop with the project’s stakeholders, organised by the project team, as well as on a second interactive and co-creative workshop in the form of a role-play with the participation of VASAB stakeholders. The development of the scenarios’ narratives relied also on the review of relevant literature. The two scenarios are of very different nature and focus, with distinct characteristics and differentiated territorial implications. Despite their differences, environmental protection and good relation with the European Union are common assumptions between both developments.

‘**Well-being in a circular economy – a RE-mind for a good life**’ describes a future where the BSR has developed into a sharing and circular economy region, where citizens have consciously decided to change the existing linear economic model in favour of a better quality of life. In this scenario, a repairing and sharing culture, as well as the manufacturing potential of regions, play a key role. As people consume less and more responsibly, companies adjust their production model to a ‘slow production’, where they produce less though of higher quality to ensure that products last longer. This society driven

circular economy transition has supported re-industrialisation in the region, as more products are produced by local communities and in small-scale. Eco-vation, innovation in the area of green economy has been necessary in that scenario, while it is particularly manufacturing that largely shapes the employment. Due to the regionalisation of production, the sharing culture and the longer livelihood of products freight transport and logistics become secondary in this scenario and more expensive as its importance is reduced. Decentralised patterns are observed, where second and third-tier cities and towns become the main centres and regionalised centres gain importance. Furthermore, the importance and concentration in metropolitan and large urban areas are reduced, and they slowly but surely lose out as being the GDP growth poles, as GDP is no longer a key indicator for growth and good quality of life in this scenario. The big transport hubs and logistic centres lose their global profile, and transport and accessibility become more regionalised. Cooperation in this scenario is a prerequisite, particularly for improving the environmental situation in the Baltic Sea Region, a topic that cannot be addressed single-handedly and needs strong commitment.

**‘Growing into tech giants – the ecological footprint clear-up’** describes a future where the Baltic Sea Region is a giant in green technology. The achievements of the 4<sup>th</sup> industrial evolution are in the epicentre of everyday life, where a set of different technological advancements that influence manufacturing, services and everyday life of citizens through a fusion of technologies blurring the lines between physical, digital and biological systems (based on ESPON, 2019d) are visible in this scenario. Innovation also attracts capital and private investments in the region. This mix of innovation and green technology has transformed the Baltic Sea Region into a Baltic eco-silicon valley focusing on green innovation and has led to a reduction of the ecological footprint of the region. At the same time, high-end innovation and the race for more growth have allowed for a more tailor-made design of products, which together with the limited ecological footprint of production due to green technology, have led to an increased ‘guilt-free’ hyper consumerism. In this scenario, transport hubs are vital, and their importance is largely increased. This scenario depicts a polarised urban focused Baltic Sea Region. The green-tech four global giants are located in the cross-border urban global networks of Copenhagen and Malmo and Helsinki and Tallinn, while other urban centres follow. As the critical mass needed to run a knowledge-based economy is concentrated in larger urban centres, there is an increase of economic activity around the present metropolitan areas and growth centres which in most cases are the capital cities. Global transport hubs gain importance, as good connectivity is crucial. In this future, cooperation and competition interchange. Cooperation is of high importance on topics of interest and profit, while competition in the region is also high when interests are different or contradict.

The BT2050 scenarios – baseline and territorial – were then used as a vehicle for informing BSR spatial policy. As the main objective of the BT2050 project is to provide evidence to support the revision of the VASAB-Long Term Perspective, this document was of prime importance in the process of policy recommendation. The VASAB-Long Term Perspective is structured around three overarching goals: (i) Promoting urban networking and urban-rural cooperation; (ii) Improving internal and external accessibility and (iii) Enhancing maritime spatial planning and management. Seventeen policy actions specify how these goals may be achieved (VASAB, 2010b). In addition, nine thematic areas served as the conceptual basis for the actions laid down in the LTP document (VASAB, 2010a)



In the framework for policy recommendation, each thematic area is linked to the 17 policy actions and then discussed in relation to the BT2050 scenarios. From this analysis, several policies are identified and clustered into eight key integrated actions - sectoral policies with territorial relevance. A focus group and interviews with VASAB stakeholders were an essential step to validate the proposition of these key integrated actions which are:

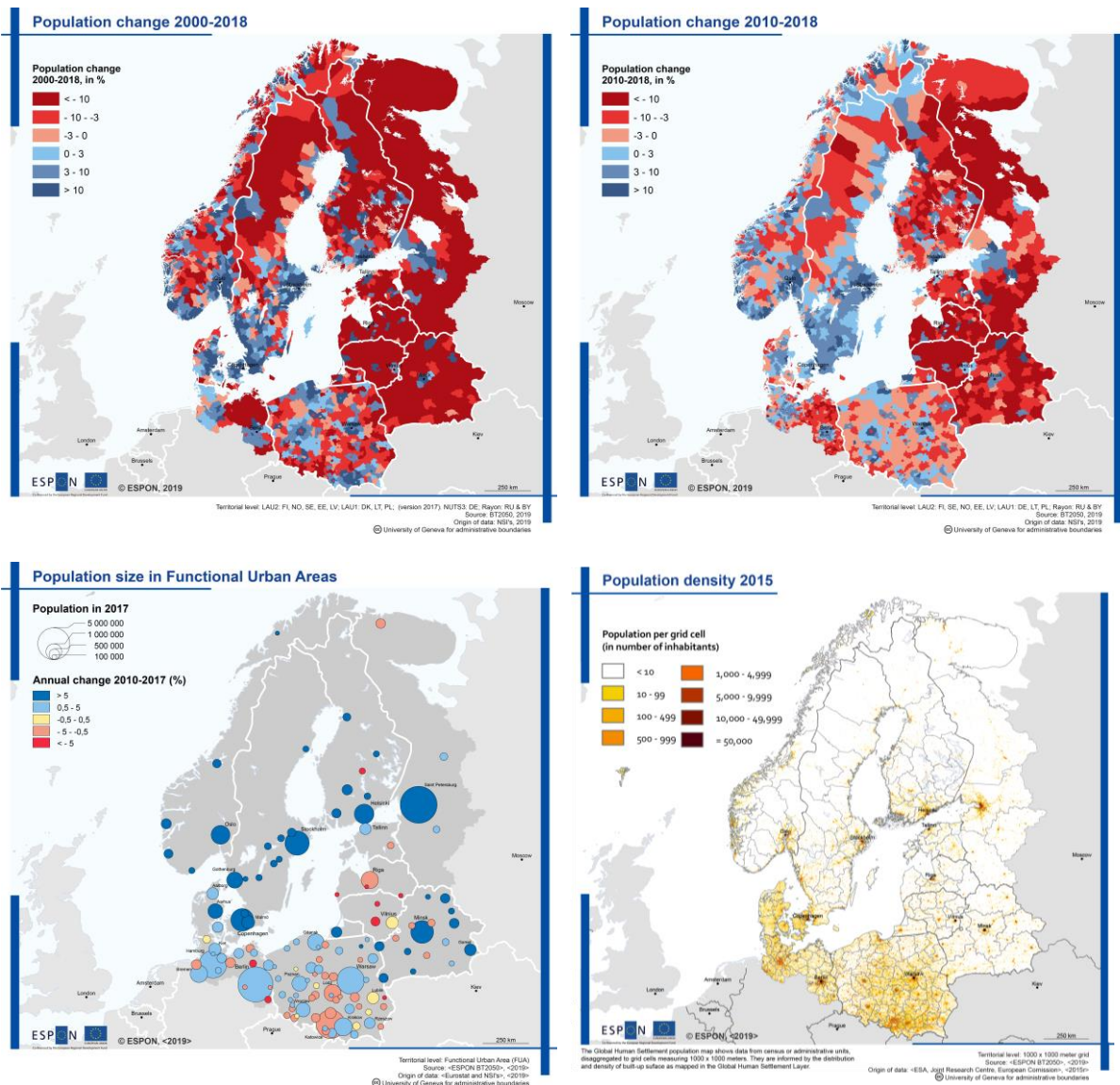
- **Strengthening the network of Baltic medium-size cities.** This action acknowledges the increasing importance that medium-sized cities may have with the implementation of circular economy. It provides advice on how to prepare these urban settlements for their new role.
- **Supporting cross border service networks based on new technologies.** This action highlights the importance of developing integrated cross-border systems, based on unified technological and social standards for the provision of services of general interest.
- **Connecting the Baltic infrastructure on the regional level.** Considering the possibility of a decentralised spatial development of the BSR, this action advises prioritizing investments on regional/local infrastructure networks rather than in European corridors. It encourages supporting the BSR secondary networks, after the finalisation of the main continental projects.
- **Supporting cross border metropolises.** Dealing with the possibility of further polarisation of population and growth in larger cities, this action calls for further development of competitive advantages of the Baltic metropolises while, at the same time, safeguarding the quality of life and social inclusion of their inhabitants.
- **Using the Baltic Sea assets wisely.** This action supports the sustainable use of maritime resources, through policies that enhance the sustainable fisheries, sustainable tourism, local cabotage, construction of local power systems.
- **Adapting to climate change, water and green cross-border clusters.** This action target mitigation and adaptation measures to climate change. It suggests the implementation of financial means (e.g. taxes) to incentivise activities that are climate-oriented and curb those that may harm the environment
- **Attracting migrants to the BSR.** This action aims to enhance demographically and spatially balanced population structure in the BSR through migration policies. It includes programs of return migration, implementation of immigration programs targeting particular groups, improvement of residential attractiveness in particular areas to prevent depopulation, incentivise telework in peripheral areas.
- **Improving BSR integration through data integration, monitoring, research and spatial planning.** This action endorses the need of monitor the socio-economic changes of the macro-region, including flows within and outside BSR; perform territorial impact assessment (TIA) for the strategic documents, concerning BSR (EUS BSR) and the importance of integrating the spatial development plans for the maritime areas

# 1 Territorial analysis of the Baltic Sea Region

The overview of the BSR is structured around four themes: 'demography & settlements'; 'economy & territory'; 'environment' and 'governance'. The analysis builds on the indicators from ESPON BSR-TeMo (ESPON, 2014a) the territorial monitoring system that was built to oversee the territorial development in the region and to relate to important policy fields (Rispling and Grunfelder, 2016).

## 1.1 Demography & settlements

The total population of the BSR is just over 105 million, which corresponds to 21% of EU:s population. Seen on the whole region the population has been remarkably stable and has had a modest population growth of a little bit more than 100 000 people (1.2%) between 1990 and 2018.



Map 1: Spatial pattern of population distribution

Some conclusions about the territorial development of the region can be drawn from the map compilation above:

- Although the BSR had a slight population increase between 2000 and 2018, most regions actually experienced a population decline as can be seen in the top maps. This is mainly the case for rural regions, continuing the long trend of **depopulation of the rural areas**. While the 135 biggest Functional Areas (with more than 55,000 inhabitants) had a 3.4% population growth between 2010 and 2017, the rest of the BSR had a population decline of 2% during the same period.
- The top right map shows the population change between 2010 and 2018. The depopulation of rural areas slowed down somewhat in the countries that received a lot of migrants in 2015-2016. Between 2015-2016 almost all parts of Germany and Sweden had a positive **net migration** rate. During the same period, Denmark and Norway had positive net migration in a majority of the municipalities. The other BSR countries experienced the opposite pattern with more municipalities having net out-migration. The exception is the bigger cities indicating that the migration flows from peripheral and rural areas toward the largest cities continues.
- A North-South divide is observed in the two bottom maps (Population size in FUA's and population density). As can be seen in the bottom right map the BSR is sparsely populated. The main urban areas are located in southern Poland and around Hamburg and Berlin in Germany. Denmark is also relatively densely populated. For the whole BSR, the population density is 43 inhabitants/km<sup>2</sup> which is significantly lower than the EU average of 115 inhabitants/km<sup>2</sup>. The population density varies significantly between the different BSR countries. Although certain parts of the German North East have a population density below 40 inhabitants/km<sup>2</sup>, Germany still accounts for the most densely populated BSR region with 172 inhabitants /km<sup>2</sup> and the lowest in Finland (17 inhabitants/km<sup>2</sup>).
- The bottom left map shows the 135 largest functional urban areas (FUAs) in the BSR. Of these 135 more than half (75) are located just in Poland and Germany. The FUA's make out 63% of the total population of the BSR, for Germany and Poland this share is only slightly higher with 66%. The main difference is the higher density of cities in the southern part of the BSR that also implies a more polycentric structure. For the vast majority of regions in the Nordic countries, the Baltic States, Russia and Belarus, no large city or only one such city is within reach. In contrast, residents in Southern Sweden and Finland, Denmark, Germany and Poland have a considerably higher number of large cities within commuting distance.
- The BSR doesn't have any megacities (> 10 million inhabitants). The biggest cities are Saint Petersburg and Berlin, both with more than five million inhabitants in the functional urban areas. Fourteen cities have more than one million inhabitants.
- The Nordic cities are in general located along the coast or along important transport corridors radiating out from the main metropolitan areas. The urban networks are stronger in the densely populated countries of Germany, Denmark and Poland. Poland is the country with most cities and strong urban connectivity. However, the population is growing faster in the Nordic and Belarussian FUAs than in the rest of the BSR.
- Large cities function as regional centres with their services reaching beyond the administrative borders to surrounding smaller municipalities and rural areas. The more large cities with good provision of services are reachable for the neighbouring settlements; the more functional the region is likely to be for its residents. The functionality is defined on the basis of flows between a core area and its surrounding territories. This functional approach captures more effectively the socio-economic characteristics of a region which cannot be fully understood using administrative boundaries as a reference (ESPON, 2018c, 2019d)<sup>1</sup>
- Urban-rural relations are stronger in countries with higher population density and a great number of cities or FUAs. A more polycentric spatial distribution of cities and FUAs in the territory is likely to increase the accessibility to services and goods to rural areas as well as strengthening the flows

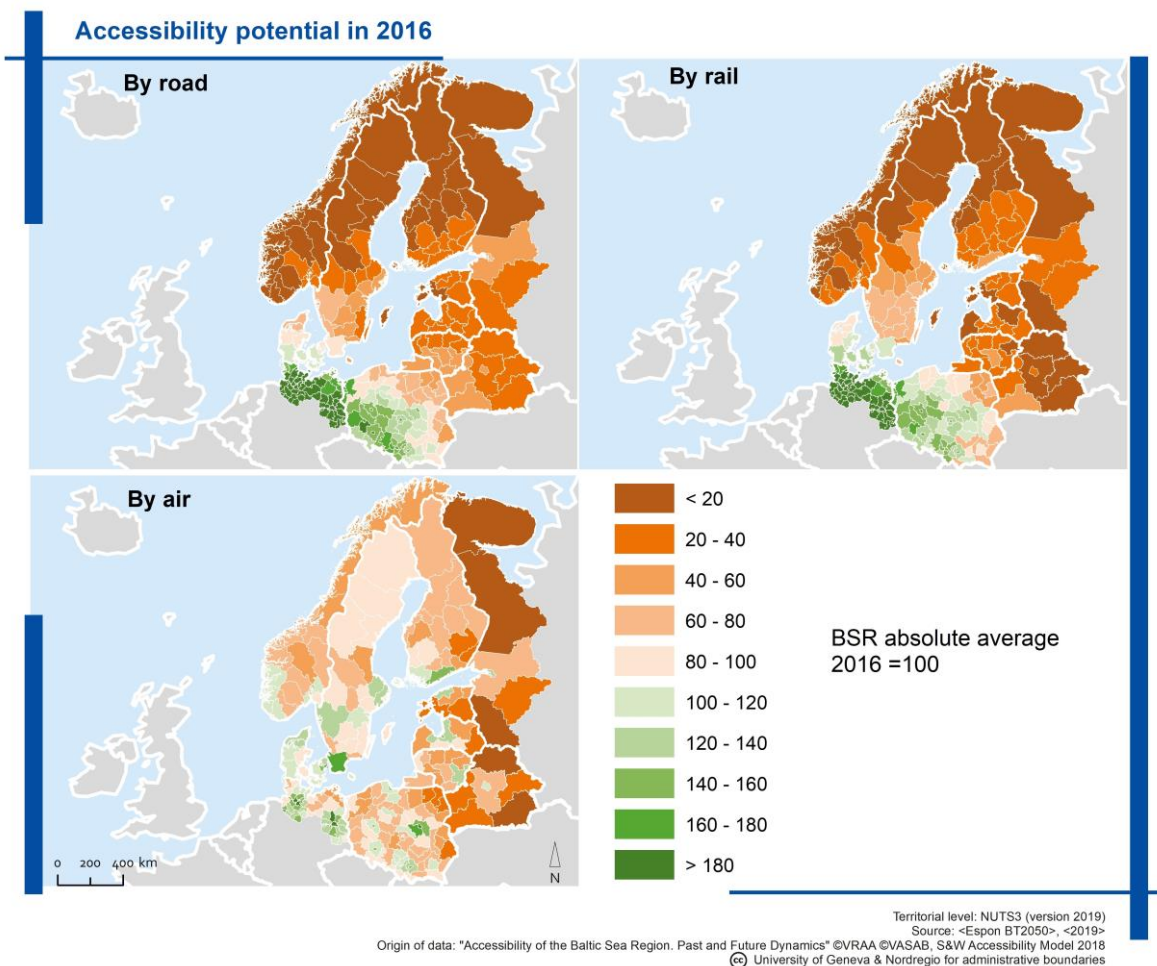
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<sup>1</sup> The workshop on Metropolitan and Cross-border functionality: definitions, examples and methodologies for post 2020 programming offers insightful resources on functionality (See the link: <https://www.espon.eu/functional-areas>)

of resources most commonly produced in rural areas (e.g. food) to supply urban environments. As shown in the bottom maps of the map compilation above, Poland and the Northern part of Germany belonging to the BSR are likely to offer better urban-rural linkages, as settlements and population distribution take place in different parts of the territory.

Naturally, regions with higher population density and a more polycentric urban system have better connectivity and accessibility. High accessibility means that there is potential for bigger flows and connections between cities as well as between rural and urban areas. It can also lead to wider labour markets which makes it easier for companies to find the right competencies and easier for residents to access services.

As can be seen in Map 2, the accessibility by road and rail is much higher in Germany, southern Denmark and western Poland than the rest of the BSR. Accessibility by air shows a different pattern where mainly the capital regions and agglomerations (e.g. Hamburg and Bremen in Germany, Wroclaw and Krakow in Poland, Gothenburg in Sweden) have high accessibility. Denmark has a more evenly distributed accessibility potential by air within the country. Sweden and Norway have better accessibility by rail than by road while the opposite pattern can be found in the eastern part of the BSR.



Map 2: Accessibility Potential, 2016

As the sea lies at the core of the BSR, maritime connectivity can be regarded as an indicator of integration of the region. The most frequent ferry routes are observed between ports in Denmark and Sweden, Sweden and Northern Germany, Sweden and Finland, Finland and Estonia. Ferry routes are

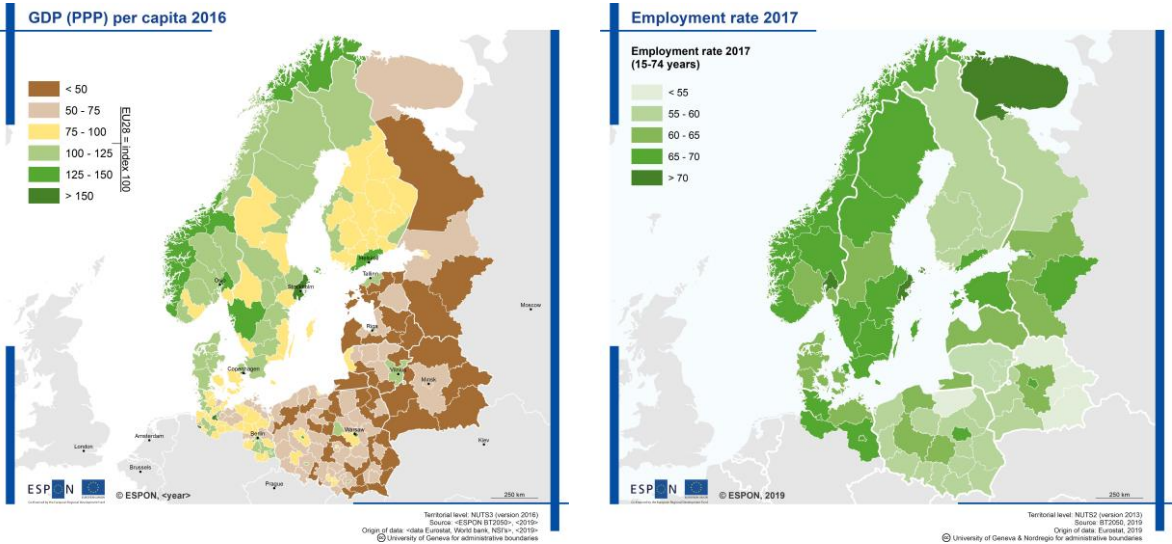
heavily loaded as well between Northern Germany and the Baltic States, Sweden and Poland, Norway and Sweden. Saint Petersburg serves as the main Russian port in connection with the other BSR countries. Text-box 1 highlights some synergies and conflicts that some of the observed trends related to ‘demography & settlement’ may have in relation to existing policies.

*Text-box 1: BSR demography & settlements in relation to policies: synergies & conflicts*

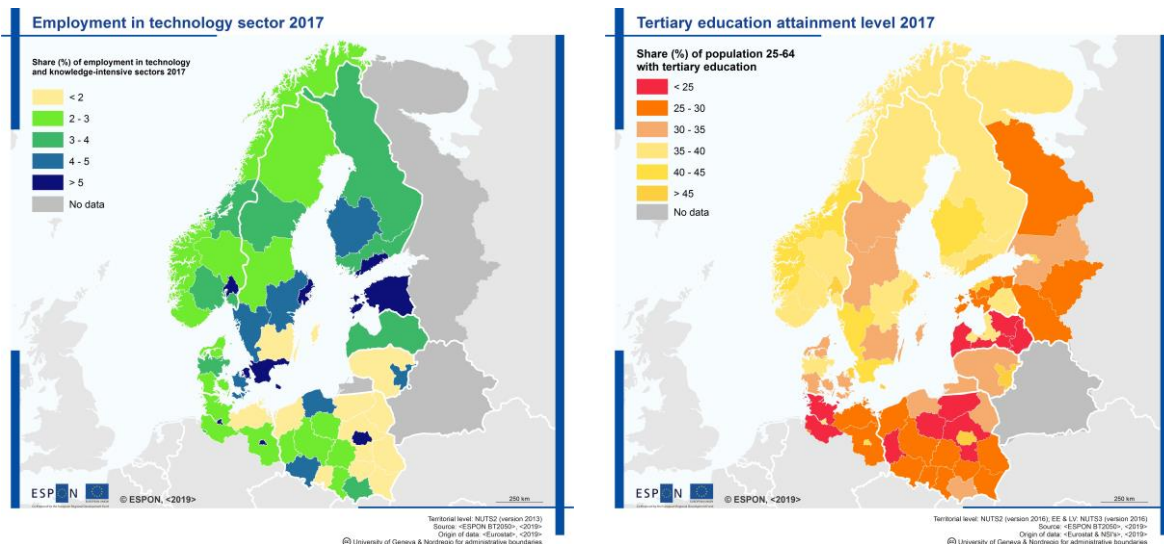
- If the current trend of polarization of growth in bigger urban centres continues the desired polycentric territorial pattern for the region (VASAB, 2016) will be even more difficult to achieve.
- The polarisation of growth in a few urban centres will probably weaken even more urban-rural relationships (VASAB, 2010b).
- With depopulation and ageing of the rural areas, there will need to be innovative ways of keeping services and skills, e.g. through the digitalisation of services and e-health
- The VASAB goal of improving internal and external accessibility in the region may be compromised if further investments would not be made in peripheral regions. When comes to railroads there are bottlenecks for cross-border traffic, such as different gauge sizes and technical systems that must be overcome.
- Significant investments would be needed to get faster train connections. On the other hand, high-speed trains between metropolises might decrease the role of small and medium-sized cities.
- Conflicts are likely to arise between the aim of improving connectivity in the region and the need to reduce CO<sup>2</sup> emissions

**1.2 Economy & territory**

When it comes to the economy, the total GDP of the BSR corresponds to almost a fifth of the GDP of the European Union. The BSR part of Germany is the biggest economy, with 21% of the regions GDP (measured in current market prices). The Nordic countries together stand for 51.8%, Poland for 18%, Russia and Belarus for 5.7% and the Baltic states for 3.6%, The average GDP per capita (measured in power purchase parities) in the BSR is lower than the EU average (86% of the EU average).







Map 3: Spatial pattern in economy

The Map compilation above allows drawing some conclusions:

- The east-west disparities prevail when it comes to GDP per capita. On a country level, Sweden, Denmark, Germany (BSR), Norway and Finland had GDP per capita above the EU average in 2016. Belarus had the lowest GDP per capita (46% of EU average) followed by Russia (BSR) (61), Latvia (65), Poland (69), Estonia and Lithuania (75).
- The GDP is significantly higher in bigger urban regions (especially in capital cities), and all countries except Belarus and Russia has at least one region with Gross Regional Product (GRP) per capita higher than the EU average. The differences between regions are highest in Poland and Germany.
- While there is some correlation between the employment rate and GRP per capita, there are also some regions that have quite low productivity (i.e. low economic output per person employed). Hamburg, Stockholm, Copenhagen, Berlin, Oslo and Helsinki are among the regions that have higher productivity (relation between GRP and employment) than the average while the productivity is lower in Russia and the Baltic states.
- In the BSR the number of people working in technology and knowledge-intensive branches have increased by almost 200 000 during the last ten years. This corresponds to a 14% increase in these sectors compared to a 4% increase in the total number of jobs. The growth in this sector has been particularly high in Estonia which, together with Finland, is now leading with a share of over 5.5%. The average of the whole BSR (3.6%) is otherwise lower than the EU average (4%). On a regional level, Helsinki has the highest share of employment in this sector, followed by Warsaw, Copenhagen region, Stockholm, Oslo and Berlin.
- Employment in the knowledge-intensive sector naturally correlates with investments in research and development (R&D). When it comes to total R&D, except for Berlin, all top ten NUTS2 regions were Nordic. For R&D in the business sector, it is the Nordic countries together with Bremen in Germany in the top.
- The bigger urban areas stand out with high shares of tertiary education. While the educational attainment in the Nordic countries is rather homogenous, there are significant differences between urban and rural regions in the rest of the BSR. Germany stands out with a low share of the population with tertiary education except in Berlin and Hamburg. The Baltic States have increased their share of the population with higher education in recent years, and Estonia and Lithuania have reached the levels of the Nordic countries. Regional disparities are observed in Russia (BSR), and Saint Petersburg has the highest share of tertiary education in par with the levels of the Nordic countries.

- Trade is a good indicator of the connectiveness of the BSR as it shows the flows of money and goods between countries. A high share of the total trade flows in the BSR goes to other BSR countries, and for eight of the countries, the biggest trade partner is another BSR country. This shows that geography matters when it comes to trade as well as that the BSR is a functional macro-region.

Text-box 2 highlights synergies and conflicts that some of the observed trends related to ‘economy & labour market’ may have in relation to existing policies.

*Text-box 2: BSR Economy & labour market features in relation to policies – synergies & conflicts*

- The BSR is still poorer than the EU average, but the **economic gap** between them is weakening, as the BSR is growing more than twice as fast than the EU average. Territories with geographic specificities (e.g. island, coastal and border regions) account for many of the regions lying below the BSR and EU GDP average.
- The Baltic states have a growing education level as well as a high share of employment in the technology sector which indicates that the east-west disparity is closing.
- The big urban-rural divide in regard to education attainment will have an implication on the job structure in rural areas, with a higher share of well-paid jobs in the bigger urban areas.
- The good performance of the region in technology and knowledge-intensive branches is a potential for exploiting digitalization as a means to enhance a more homogeneous territorial development – improve urban-rural divide and increase the attractiveness of the rural areas. This will contribute with some of the normative objectives of VASAB-LTP

### 1.3 Environment: ecosystem services and climate change

The status of the environment is important for the spatial development both because of its impact on health and wellbeing of the population as well as the long-term territorial assets of the region. The Baltic Sea is obviously important in the BSR, and one of the objects of the EUSBSR strategy is to “save the sea” and protecting the Baltic Sea marine environment is also one of the goals of VASAB.

While saving the sea is a goal in itself, the sea is also important for many human activities. Therefore an ecosystem services approach has been increasingly used. Ahtiainen and Öhman, (2014) identify four main types of ecosystem services: provisioning, cultural, supporting and regulatory. The *provisioning* ecosystem services include fishery, aquaculture, energy and waterways, the *cultural* include recreation and education, the *regulating*, e.g. embraces climate regulations and mitigation of eutrophication and the *supporting* ecosystem services include services “that are not directly used but underlie all other services” (ibid, p. 9). The ecosystems approach highlights the need for environmental protection for the upkeeping of the services that are connected with the sea.

One major issue for the ecosystem in the Baltic Sea is eutrophication. Cost-benefit analysis has shown that the benefit of reducing the eutrophication in the BSR could be as high as 1-1.5 billion dollars annually. (Ahtiainen and Öhman, 2014). In coastal areas, HELCOM utilises national indicators used in the Water Framework Directive (WFD) to arrive at an assessment of eutrophication status in eight countries<sup>2</sup>. Danish coastal WFD-classification differs from the open sea classification, and hence, the colours are not directly comparable. The Baltic Sea still suffers from eutrophication, with at least 97% of

<sup>2</sup> <http://stateofthebalticsea.helcom.fi/pressures-and-their-status/eutrophication/>

the region was assessed as eutrophied in 2011-2016. Increase in the supply of organic matter to the marine environment is leading to a series of ecosystem changes in the Baltic Sea. Nutrient inputs from land have decreased as a result of regionally reduced nutrient loading, but the integrated status assessment has not yet detected the effect of these measures.

Another environmental concern, mainly in urban areas, is air pollution. Particulate matter (PM10) levels are still high in many cities in Poland, especially because coal which is still used for heating. However, as fossil fuels are likely to be phased out, the trend is that the number of days that the PM10 concentrations exceed 50 µg/m3 is decreasing.

Currently, climate change mitigation measures focus on reducing greenhouse gases and shifting from fossil to renewable energy sources. Figure 2 shows the share of renewable sources divided by sectors. The total share of renewable sources goes from 71% in Norway to 11% in Poland, indicating that there are big differences within the BSR. Still, only Germany and Poland are below the EU average. Regarding electricity production, it should be noted that some countries have nuclear power that, while not being a renewable energy source, is not connected to carbon dioxide emissions.

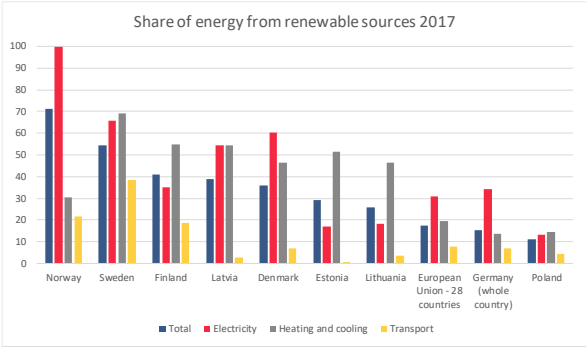


Figure 2: Share of energy from renewable sources  
Data source: Eurostat

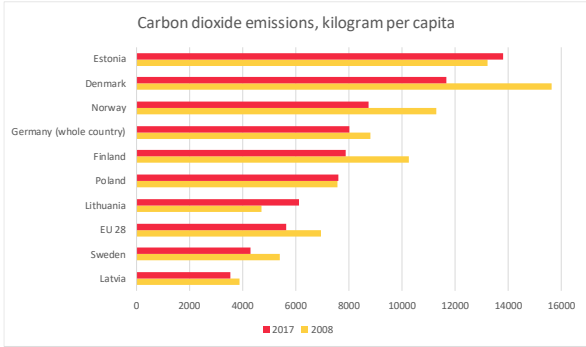


Figure 3: CO<sub>2</sub> emissions, kg. per capita.  
Data source: Eurostat

Figure 3 shows the per capita carbon dioxide emissions in 2008 and 2017. This figure shows a different picture than the last as Norway has higher CO2 emissions per capita than Poland. This can partly be explained by emissions from petroleum extraction in Norway. In 2017 Latvia had the lowest emissions, followed by Sweden while Denmark had the biggest decrease between 2008 and 2017.

Regarding land use cover, the EU countries in the BSR have 25% agriculture, 48% forest and 2.2% residential buildings (Eurostat<sup>3</sup>). Forest coverage had increased in the BSR, with Finland presenting the highest share in the EU (73%). On the other hand, land for agriculture has decreased between 2009 and 2015. Text-box 3 highlights synergies and conflicts that some of the observed trends related to 'environment' may have in relation to existing policies.

<sup>3</sup> Land use overview by NUTS 2 regions [lan\_use\_oww]", [https://ec.europa.eu/eurostat/web/products-datasets/product?code=lan\\_use\\_oww](https://ec.europa.eu/eurostat/web/products-datasets/product?code=lan_use_oww). Retrieved on 2019-08-16



*Text-box 3: BSR environment in relation to policies: synergies & conflicts*

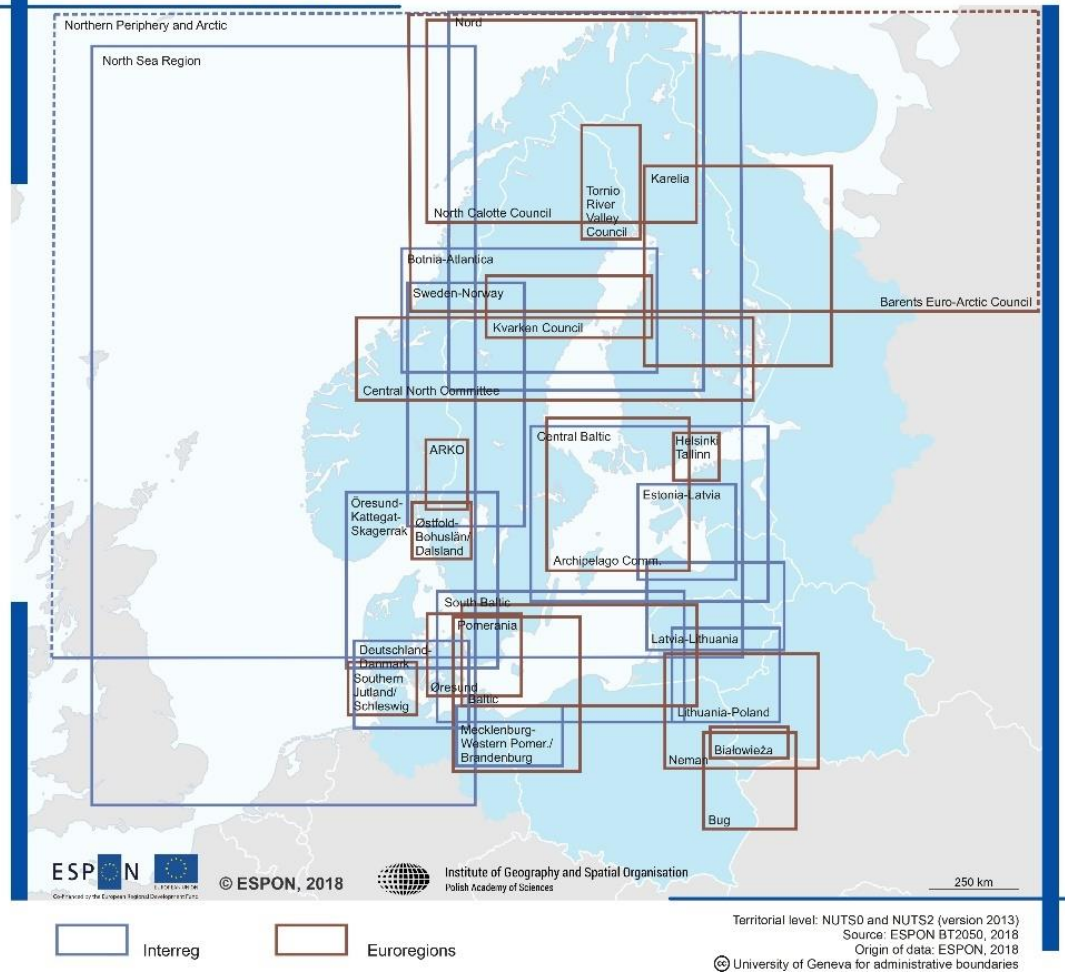
- Securing energy supply without affecting the environment is a challenge. A shift towards renewable energy sources will imply a bigger impact in the form of wind parks, plantations of bioenergy, etc.
- Maritime Spatial Planning needs to take into consideration different and sometimes conflicting interests, including environment protection, transport, blue economy and energy. An ecosystem services approach is needed in order to understand the symbiosis between nature preservation and economic output
- While keeping and increasing forests are crucial for mitigating climate change, loss of agricultural land might have an effect on food security.

## **1.4 Governance: institutions and stakeholders**

The BSR has a dense governance structure, characterised by various institutional arrangements. These arrangements cover differently the territory, accounting for part of the region, the entire region and even having influence beyond the borders of the region. This implies that transnational, multilateral, cross-border, local and regional cooperation are implemented throughout several organisations with different degrees of institutionalisation (e.g. formal and informal), different scope of agreements (i.e. goals pursued by promoters of the initiative) which are also financed by different sources (e.g. *Council of the Baltic Sea States, Swedish Institute, and Interreg Programmes*). Map 4 illustrates the geographic coverage of the Euroregions in the BSR as well as the 2014-2020 Interreg Programme areas.

At the country level, the distribution of competences between administration levels is important from the point of view of the implementation of activities in the BSR region, and it varies significantly between the BSR countries. This is a result not only from different traditions but also from the size of the country and from current demographic and economic processes (e.g. enlargement of administrative units in case of the declining population) (ESPON, 2018a; Pužulis and Kūle, 2016). Most BSR countries have strong competences in planning and territorial governance at the national level (except Germany and Sweden) and local level (except Belarus). Nevertheless, in relation to intermediate levels (e.g. regional, sub-regional / counties), the systems in the different countries are quite diversified. The regional level plays an important role in countries where competencies are not placed on the national level (e.g. Germany, Norway, Russia and Poland).

## The Baltic Sea Region



Map 4: Interreg and Euroregions CBC in the BSR

Two important changes in spatial planning and territorial governance can be observed in the BSR: the gradual increase of competences of local level and their territorial enlargement as a result of merging smaller administrative units (e.g. Denmark, Finland, Germany, Norway) and the limited role of the regional level (mainly in small countries such as the Baltic Countries and Denmark). Considering these arguments, Text-box 4 presents some aspects that need consideration for the implementation of macro-regional policies.

### Text-box 4: Macro-regional approach: synergies & conflicts

- It is necessary to check the consistency between macro-regional and national policies to address challenges and opportunities and, thus, strengthening the political commitment at the national level
- The strongest power of the local level may undermine the implementation of macro-regional policies since a great number of interests are at play. On the other hand, the involvement of local actors in the implementation of macro-regional policies may anchor and legitimize macro-regional policies; counteracting weak implementation chains between decision-makers and key implementers.

## 1.5 Looking into the future of the BSR

The process of looking into the future of the BSR comprised different phases: the identification and selection of main trends impacting the spatial development of the region; the identification of unforeseen

events that could disrupt the existing trends of BSR spatial development and spatial integration (black swans) and the scenario development which includes the design of the Baseline Scenario and two territorial scenarios. The following sections give an account of the different phases.

### 1.5.1 Main trends impacting the spatial development

Regardless the challenges of dealing with the future (e.g. uncertainties), the literature seems to agree that some mega-trends are likely to have an influence in the long-term future of the world (United Nations, 2018, Intergovernmental Panel on Climate Change, 2018, PwC, 2019). Some of the mega-trends are:

- **Urbanisation:** Today, 55% of the world's population lives in urban areas. By 2050 this share is expected to rise to 68% (United Nations, 2018). This mega-trend holds valid for the BSR since the 135 FUAs hosts 63 % of the total population in the BSR and showed a 3.4% population increase between 2010 and 2017.
- **Climate Change:** Human activity is estimated to have contributed to approximately 1.0°C of global warming above pre-industrial levels. If temperatures continue to increase at the current rate, global warming is likely to reach 1.5°C between 2030 and 2052. This will have profound consequences in ecosystems and will affect regions differently depending on geographic location, levels of development and vulnerability and implementation of adaptation and mitigation measures. (Intergovernmental Panel on Climate Change, 2018a). The risks associated to climate change are particularly crucial to the BSR as the sea can be severely affected by warming causing increase putrefaction and mass blooms of cyanobacteria, and poor oxygenation of the sea (Meier et al., 2017). This will impact tourism negatively and will compromise the fisheries economy. Raising the temperature, melting ice shields and the prospect of rising sea levels by two meters in a 30-year perspective (and its further increase) means that significant areas of the BSR will have to be protected from the sea (e.g. dykes and dams). Extreme changes in climate can even result in catastrophic floods and the disappearance of the Baltic coast (Räisänen, 2017)
- **Technological breakthroughs:** In a few years, technology has progressed in ways no one could have expected. It has been transforming the way that society works (e.g. social behaviours, business models, economy). Digital change is fast and ubiquitous, and the innovations of today will continue to have a major impact in the years ahead (pwc, 2019). As BSR hosts some of the pioneers in technological development the region is likely to face earlier than others the advantages as well as the drawbacks of technologies.
- **Shifting power from West to East:** the rising economic and geopolitical influence of South-East Asian countries represents a regime changer in global politics and economy. Not only China but also India is challenging the US as the largest economies, which are expected to gain the first and second place, respectively, by 2030 (McRae, 2018). Furthermore, a higher share of the population in productive age in these countries will boost the East economy (consumption markets) influencing the shift of power (Abbasi et al., 2017)

A review on the literature (Böhme et al., 2016; ESPAS, 2016; ESPON, 2017) helped to identify three processes that are relevant for the future development of the BSR: (1) Technology transforming economy and society (2) Demography and politics shaping society and (3) Environment shifting economy. These processes provided the frame to further identified trends as well as some factors that contribute to the magnitude of these trends. The relation between the mega-trends, processes, trends and factors is illustrated in Figure 4.

A further step was the description of the possible impact that each factor could have in the future of the region. For further explanation, see section 1.2.1 in Volume 2 of the Scientific Annex.

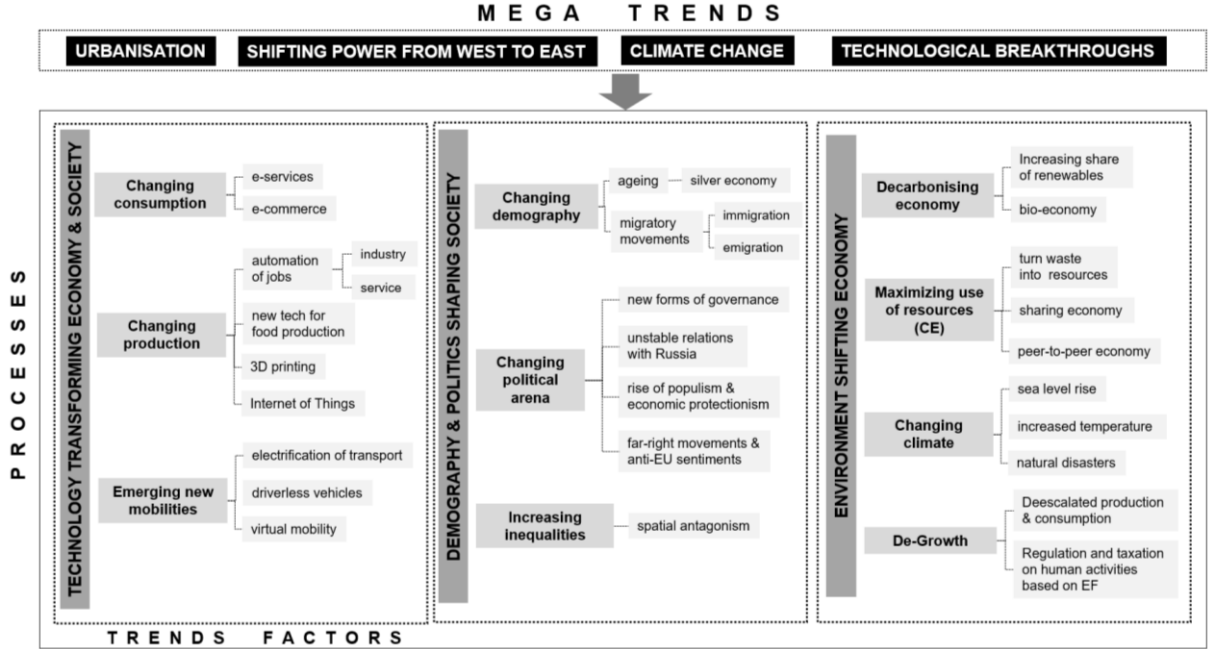


Figure 4: Mega-trends, processes, trends and factors

The selection of the main trends that are likely to shape the territorial scenarios was informed by participatory processes, specifically interviews and workshops (for further explanation see sections A2.1 and A2.2.1 in the scientific report). This outcome showed that economic developments in the BSR, especially as regards their link to technological advancements plays an important role in the future of the region. Economic development, however, challenges the environmental status of the region, being an equally important consideration for the region’s players. At the same time, Europe finds itself today at a crossing: on the one hand, European Union’s core values are contested, giving the floor to anti-EU and populist movements, while on the other hand, civil society movements become more prominent and widespread. Bringing all these views together, the scenario logic developed for the project combined these factors and build up a solid framework to base the four narratives for the BSR in 2050.

**1.5.2 Unforeseen events: black swans**

Black swan is ‘a metaphor describing an extremely low-probability /unforeseen, high impact event that takes everyone by surprise’ (Forward Thinking Platform, 2014). In this study, black swans were identified, with the aim of making the users of the scenarios aware that the world and the BSR must not necessarily develop as in the Baseline Scenario, which assumes that the world will develop without disruptive events. Several black swans, regarding economy, technology, security, military and political, biological and scientific, and environmental were identified in the context of the BSR. An extended list of black swans can be found on section B2.2. of the scientific report.

## 2 The BT2050 scenarios

### 2.1 The Baseline Scenario

The Baseline Scenario for the Baltic Sea Region is a scenario which assumes the most likely development, e.g. major exogenous trends and policy practices used in the recent past will continue to be in effect until the scenario's target years of 2030 and 2050. The Baseline Scenario serves as a reference or benchmark for the territorial scenarios.

The development of the BT2050 Baseline Scenario has been based on a combination of qualitative and quantitative approaches. Assumptions about relevant European and national policies and exogenous developments and main factors and their most probable future paths have been settled in dialogue with stakeholders. The SASI model is the backbone of this scenario and provides quantitative figures for the development of the BSR in relation to population and economy (GDP). Both parameters allow drawing reflections about the territorial cohesion of the region in the future.

#### 2.1.1 Baseline Scenario assumptions

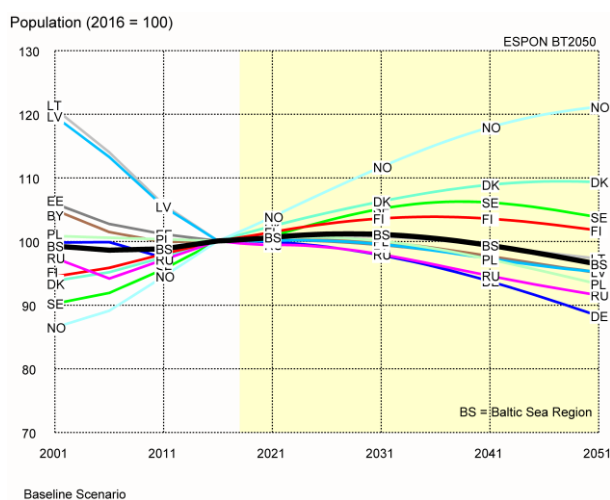
Main assumptions for the Baseline Scenario were developed for six themes as follows.

- **European political integration and disintegration:** the scenario assumes a positive perspective concerning further European political integration, which is pursued by main political actors as the only way to enhance Europe's role in the global arena. Nevertheless, the scenario considers different speeds of integration of individual EU member states for different thematic subjects. Distinct territorial settings, e.g. concerning the Eurozone or the Schengen Area continue to exist until the 2030s; but afterwards, the number of countries that join these alliances increases in the long run. Brexit happens in a modest form, with a newly agreed deal solving most of the disputes, and the UK leaving the EU eventually in the year 2021. The long process and uncertainties experienced with the Brexit inhibit other countries from leaving the EU. As no new EU members are expected in the EU, the number of EU MS remains stable. The relationship between the EU and Russia and Belarus becomes more cooperative.
- **European immigration and immigration policy:** the scenario presumes steady flows of migrants from different parts of the world to Europe with a net migration of more than 1 million persons per annum (Eurostat, 2019a; 2019b). EU outer borders are strictly controlled. Despite temporal restrictions, internal borders remain open in the long term. The scenario includes a pro-active immigration policy, which is related to different types of migrant (e.g. refugees and "economic migrants"). Whereas the next decade sees a continuation of current policies, the shrinking and ageing societies drive to a larger openness to immigration after 2030. There is a growing awareness for the need for joint European migration policy. However, MS have more autonomy than today to decide on migration policies. The Baseline Scenario includes an EU emphasis on actions in the migrants' origin countries to reduce the needs to migrate for political or economic reasons.
- **European economic growth path:** the scenario assumes a slow but stable growth. Following recent short and long term forecasts (e.g. EIU, 2015; EC, 2019), the real GDP growth of the EU is around 1.3 % yearly in the next decade and slightly less in the following decades. Given the global competition, the single market integration intensifies, and more Euro members are necessary to sustain even such modest growth. Growth does not occur in all economic sectors, but mostly in innovation, new technology-based sectors and circular economy activities. Thereby, growth does not occur in all regions to the same degree. Despite the innovation knowhow influencing the growth of the region positively, exports slow down during the next decade.
- **European transport policy (TEN-T):** the scenario assumes that by 2030 about 70 % of the TEN-T core network is developed; by 2050 the core network is fully developed, but only 70 % of the TEN-T comprehensive network meaning that some secondary links will be not developed. Multimodality and transport hubs play a significant role. In any case, the connectivity of the BSR improves by infrastructure investments such as the Rail Baltica as well as the overall EU internal and external connections. The growing Chinese economy and investments in transport infrastructure between Asia and Europe contribute to strengthening the links with the neighbouring eastern regions of the BSR.

- **European Structural and Investment Funds:** the scenario assumes that inequalities will continue in the future as well as the principle of the solidarity in regards to allocation of EU resources (e.g. funds for regions lagging behind and bonus for forerunners). The next decade experiences a slight decrease in the amount of funding. In the long term, regions in need will receive most of the funding, i.e. the long-term ESIF focuses more on promoting cohesion than growth. New forms of financial instruments, intending achieving more significant returns will emerge, with funds becoming more flexible reflecting changing economics. The EU funding schemes will prioritise investments for big projects.
- **Relevant national policies:** the scenario assumes a greater focus on national policies and priorities at the expense of cross-border and transnational activities. This is especially the case for larger states such as Germany and Poland, which are also influenced by other macro-regional strategies that cover parts of their territory.

## 2.1.2 Overall future development of the BSR

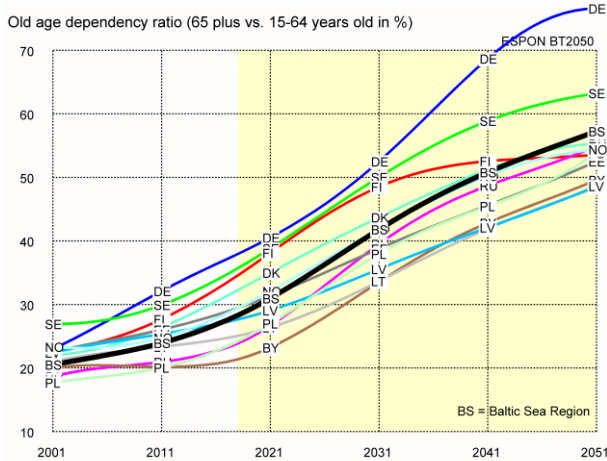
As shown in Figure 5, the population development of the BSR is quite stable in the future. This stability is mainly a consequence of positive net migration, that endures until the coming decade. Nevertheless, the population shrinks slightly in the decade towards 2050. This development is unevenly distributed within the BSR. The Nordic countries continue their past development, increasing the number of inhabitants. This growth is due to the great number of migrants, who are attracted by the Nordic booming economies. In particular, Norway continually grows and, to a lesser extent, Sweden, Denmark and Finland. Except for Norway, the population of the other Nordic Countries shrinks slightly towards 2050. Most other countries, including Belarus and the Russian regions of the BSR, lose population especially towards the end of the period. After the sharp losses of the last two decades, the three Baltic States are able to almost consolidate their population figures at their current level for a long time.



Baseline Scenario  
 Figure 5: Population development in the BSR 2001-2051  
 Source: S&W, SASI Model, 2019

Ageing is the main structural change in the population development of the BSR. In the three coming decades, the BSR experiences fewer people in working age and a growing number of retirees. For the BSR as a whole up to 2050, the share of the younger population is less affected but the proportion of people aged 30-60 years decreases from 43% to 34%. This is a common trend in all BSR countries, but most severe in Sweden and Germany. The share of people aged 60+ rises from currently 25% to almost 40% in 2050. Again, Sweden and Germany are leading this demographic transformation with above BSR average population shares in this age group. As a consequence, the region experiences a dramatic

shift in the old-age dependency rate from around 30% nowadays, to 55% in 2050 (Figure 6 ). Despite happening in all BSR countries, this demographic transition is more severe in Sweden and Germany and less in the Baltic States and Belarus. Other countries have age dependency rates below the BSR average.



Baseline Scenario  
 Figure 6: Old-age dependency ratio in the BSR 2001-2051  
 Source: S&W, SASI Model, 2019

In economic terms, the BSR is following the EU trend, i.e. the macro-region experiences a stable growth during the next three decades (Figure 7, left)<sup>4</sup>. However, expressed in terms of GDP per capita, the currently GDP above-average countries such as the Nordic Countries and Germany also experience steady economic growth. Other countries, in particular, Belarus and the Russian part of the BSR catch up to a certain degree. This development means that the overall economic ranking between BSR countries does not change.

As Figure 7 (right) suggests, the trend of decreasing economic disparities in the BSR is particularly noticeable when standardising the GDP per capita for the BSR countries and the macro-region as a percentage of the EU28 average. It becomes clear that the BSR as a whole is catching up to the European Union as a whole. This process began in the past and steadily continues to the year 2050 when the BSR on average will reach about 90 % of the EU average economic performance. The difference between the individual countries of the BSR also narrows down, moving closely to the average of the macro-region. This means that the growth of the high-performing national economies of the BSR is lower than the average. This trend is observed through the decrease of the above-average index values between 10 and 30% for the Nordic Countries and Germany. The decline of the economic disparities is a result of the economic performance of Poland, the Baltic States and particularly Belarus and the Russian regions of the BSR which grow above-average.

<sup>4</sup> It is to be noted that the GDP values are expressed in Euro of 2010, i.e., they are adjusted for inflation. It is also to be noted that the GDP figures not transferred to Purchasing Power Standards (PPS), but are expressed in Euro. This means that the differences in GDP levels between countries are higher than for indicators given in PPS.



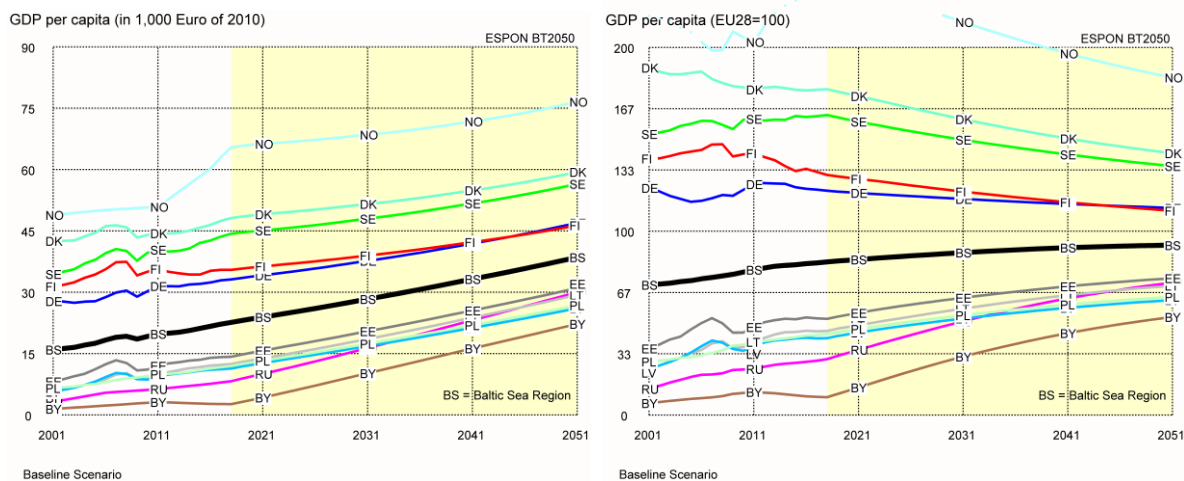


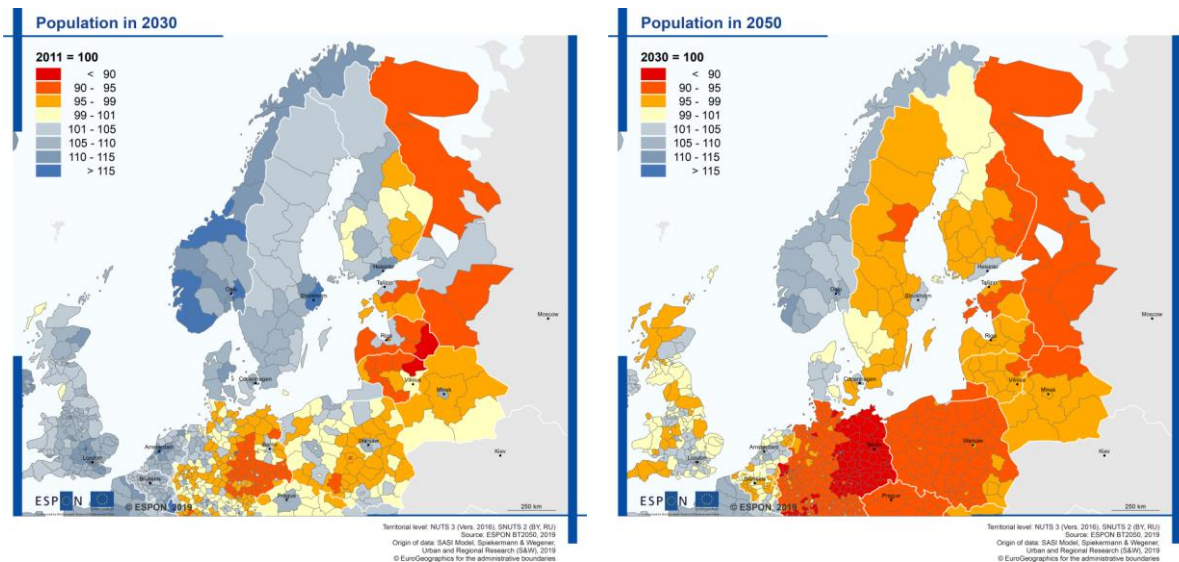
Figure 7: GDP per capita in the BSR 2001-2051 in 1,000 Euro of 2010 (left), standardised to EU average (right)  
Source: S&W, SASI Model, 2019

### 2.1.3 The BSR in 2030 and 2050

In 2030, the territorial structure of the BSR does not differ very much from today. Between 2011 and 2030 the total population remains almost constant, but the distribution of population becomes more polarised. In particular, the capital cities grow substantially, regardless of the overall population development of the individual country (Map 5, left). In 2030 the number of people living in cities increases significantly, at the expense of rural areas that face depopulation of more than 30%. This pattern is particularly seen in the Baltic States, Belarus and in the Russian regions that belong to the BSR but it is somehow less pronounced in Poland. Also, the negative population trend in rural areas is substantial in German BSR regions that have much fewer inhabitants than before. In those countries, the main urban agglomerations continuously increase in population while the other parts of the territory face depopulation. Regions of the Nordic Countries grow during the next twenty years with some exceptions in eastern Finland. Again, the capital city regions gain more inhabitants than other regions in these countries.

As shown in Map 5 (right), most parts of the BSR shrink between 2030 and 2050. Exceptions to this trend are Norway, some Danish regions and the capital regions of Copenhagen, Stockholm and Helsinki. Few regions in Finland, Sweden and Denmark maintain a stable population during these two decades.



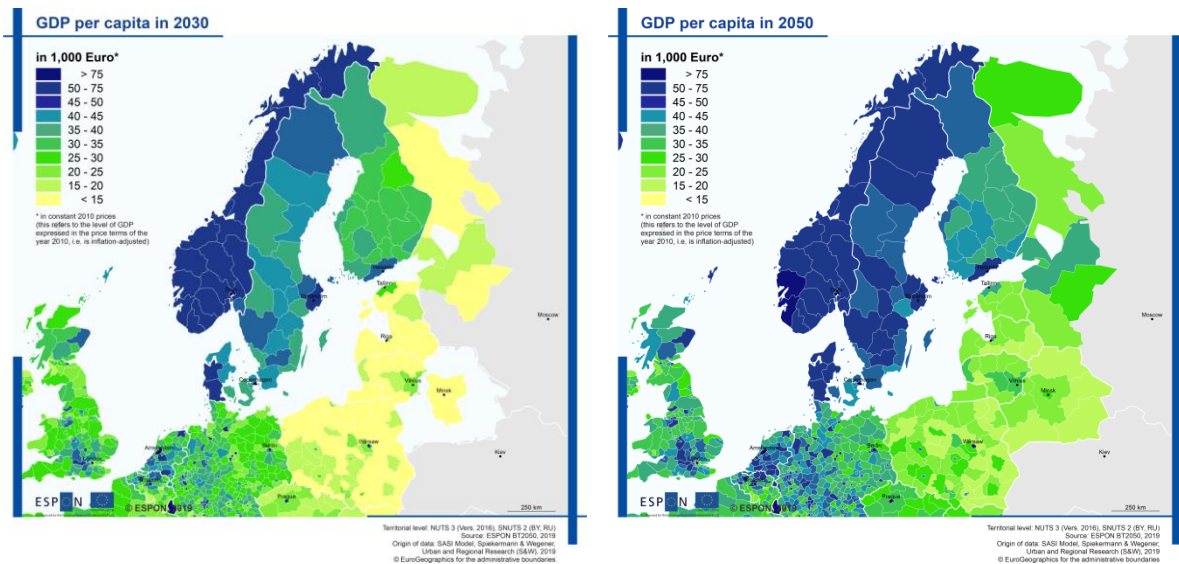


Map 5: Population development in the BSR, in 2030 (left) and in 2050 (right)  
 Source: S&W, SASI Model, 2019

This demographic transition mirrors differently in the BSR territory. By 2030, many Swedish and German regions already face issues related to the ageing population. Nevertheless, this phenomenon is just emerging in Poland, the Baltic States, Belarus and the Russian regions of the BSR. But by 2050, the high proportion of the older population (60+ y.o.) reaches levels never seen before in the BSR. In Swedish and German regions, older people account for almost 50% of the total population. In other regions in the BSR, at least one-third of the total population belongs to this age group.

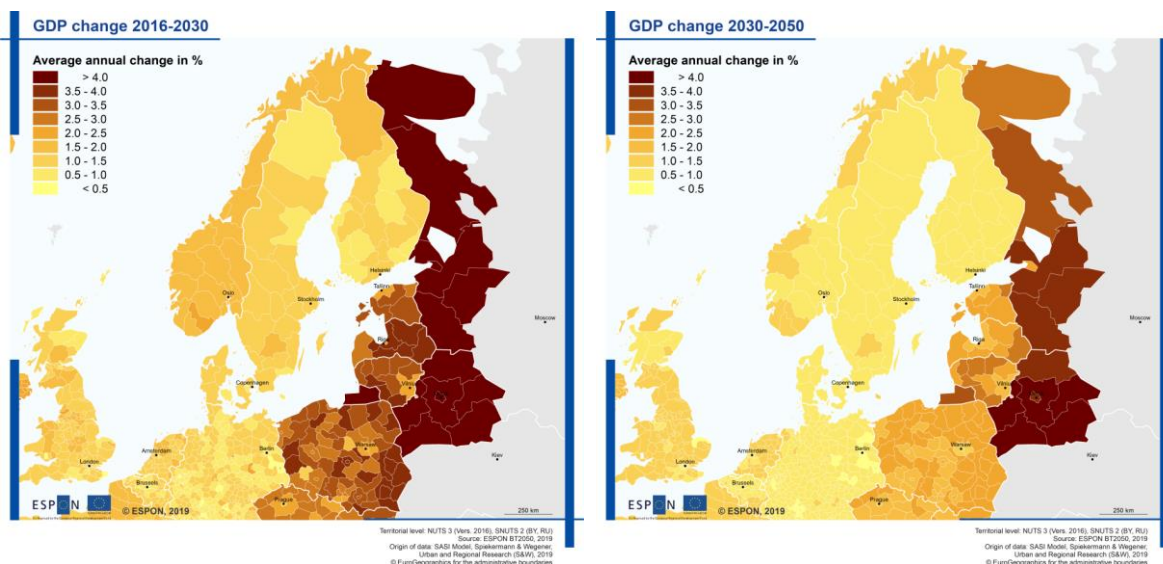
In terms of economic performance, by 2030, the overall territorial structure remains somewhat similar as it is today (Map 6, left). The capitals and other regions of the Nordic Countries and a few German urban regions (e.g. Hamburg) have a great economic performance and have much higher GDP per capita than other areas of the macro-region. Rural regions in the German parts of the BSR are following. Poland, the Baltic States, Belarus and the Russian regions of the BSR still have the lowest GDP per capita. However, also in these countries, the capital regions and other agglomerations are much better off than the rural regions.

By 2050, the east-west economic divide, that reflects the spatial distribution of thriving economies in the west and the declining economies in the east of the macro-region, still persists (Map 6, right). The capital regions of Poland, the Baltic States, Belarus and the wider Saint Petersburg region are a few exceptions. These regions have gained substantial economic power with increases in their GDP per capita comparable to many regions in western Europe and much higher than in other regions in these countries. Therefore, spatial disparities grow in these parts of the BSR as a result of the diverse development of urban and rural regions.



Map 6: GDP per capita in the BSR, in 2030 (left) and in 2050 (right)  
Source: S&W, SASI Model, 2019

However, changes in economic performance since 2016 yield a somewhat different view. Average growth rates during the 15-year period towards 2030 are highest in Belarus and in the Russian regions of the BSR which have values above four per cent annually (Map 7, left). Regions in Latvia are following close with growth rates of between three and four per cent. Estonia and Lithuania and most regions in Poland are closely behind with between two and three, and sometimes up to four per cent per annum. GDP growth is undoubtedly lower in regions with the best level of overall economic performance in 2016. This development refers to German, Danish, Norwegian, Swedish and Finish regions that in the period 2016-2030 mostly have annual growth rates between one and two per cent.



Map 7: GDP average annual change, 2016-2030 (left), 2030-2050 (right)  
Source: S&W, SASI Model, 2019

The territorial pattern of higher and lower growth rates continues in the two decades up to 2050 (Map 7 right). Growth rates are somewhat lower than before, but the highest growth happens in Belarus and Russian regions with between three and more than four per cent per annum. The Baltic States and many

Polish regions, follow this trend with annual growth rates between two and three per cent. The growth rates of the regions in Germany and the Nordic countries are mostly between one and two per cent. For the whole BSR, this development is a sign of economic convergence as lagging regions grow much stronger than the better-off regions.

**2.1.4 Baseline Scenario - territorial implications**

Some results of the Baseline Scenarios are analysed using Eurostat's urban-rural typology that distinguishes the EU territory into three types: urban, intermediate and rural. This analysis gives further insights into what might happen in the BSR during the next decades, from a territorial perspective.

The population of the macro-region will reduce slightly more than three per cent during the next three decades (Figure 8). The constant inflow of migrants to Europe and the BSR will prevent a stronger decline. Whereas all urban regions of the BSR together will lose only two per cent of the current population, all rural areas together will diminish by almost five per cent. Nevertheless, the Nordic Countries will experience an increase in the numbers of inhabitants. This growth is primarily based on a massive population increase in urban areas due to their outstanding economic performance. In Finland and Sweden, the population in rural regions will slightly decrease. All other countries face a reduction in population, being the German regions of the BSR the most affected. In most countries that lose population, the rural areas shrink much more than urban areas. By 2050, the BSR is much more urban-oriented than today. In the Nordic Countries, this is the result of much stronger growth there, in the other countries a result of much less shrinking than in the other regional types.

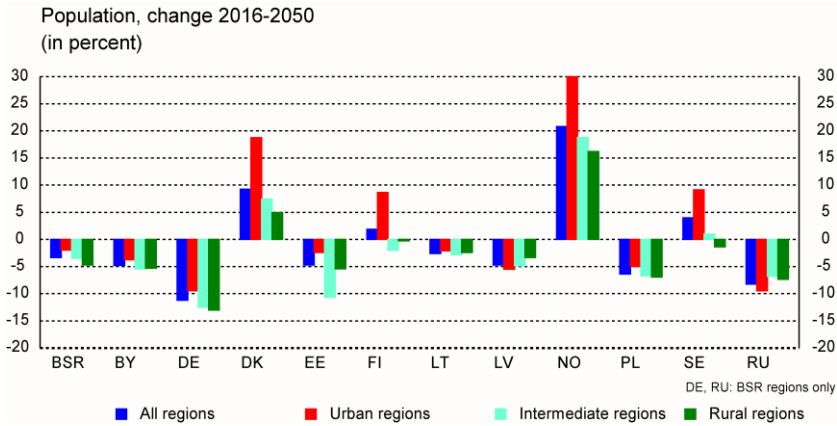


Figure 8: Population change by country and territorial typology in the BSR 2016-2051  
 Source: S&W, SASI Model, 2019

There will be a continuous economic imbalance not only between the countries of the BSR but also between urban and rural areas in the BSR (Figure 9). This is true not only for the entire region but also for every single country, with the exception of Belarus and the Russian regions of the BSR. Urban areas have much higher GDP per capita than intermediate and rural areas. The urban areas of the Nordic Countries have the highest economic performance by 2051 as measured in terms of GDP per capita,

which is also one of the reasons for the positive population development in that part of the BSR.

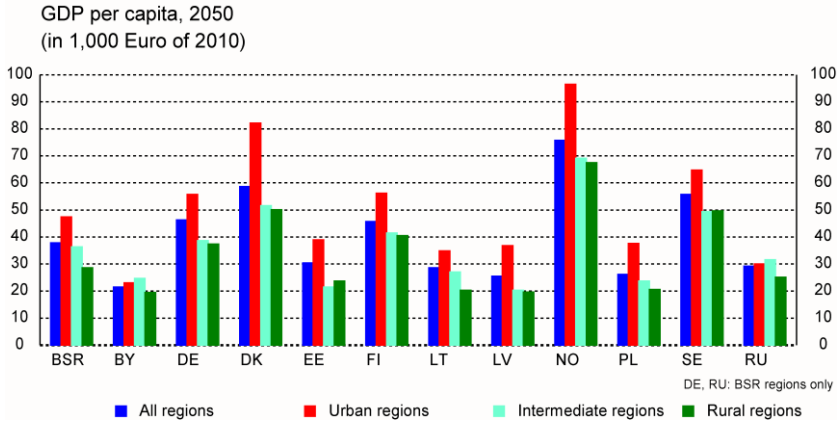


Figure 9: GDP per capita by country and territorial typology in the BSR 2051  
Source: S&W, SASI Model, 2019

As suggested in Figure 10, the development of GDP per capita over more than three decades up to 2050 is a consequence of the higher overall growth in urban areas rather than in intermediate and rural areas. The economic growth gap between urban and rural areas is more significant in Estonia, Latvia and Poland and less pronounced in other countries. In Finland, Norway and Sweden, this gap is even not perceived. Notably, as a result of the political and economic integration of the BSR, the highest absolute GDP per capita growth is seen in Belarus and Russia.

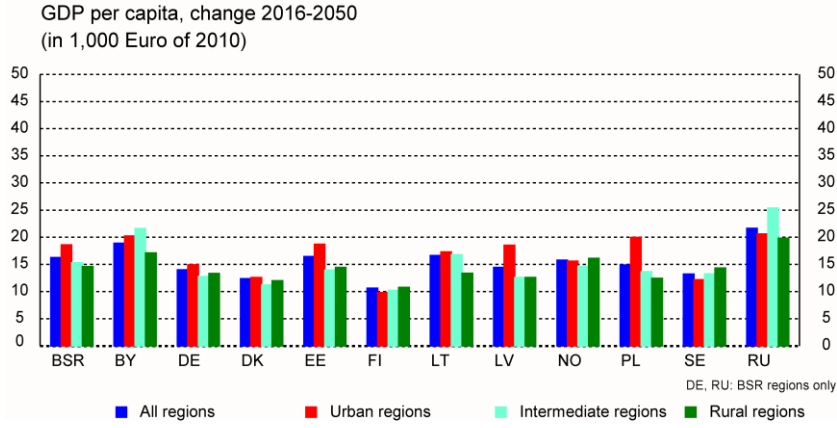


Figure 10: GDP per capita change by country and territorial typology in the BSR 2016-2051  
Source: S&W, SASI Model, 2019

One standard measure of territorial cohesion is the coefficient of variation of GDP per capita. As shown in Figure 11, this coefficient goes downwards since the beginning of the century. This indicates that the overall territorial cohesion within the BSR has continuously improved over the decades. A halt in this positive development is seen with the economic crisis at the end of the first decade. Nevertheless, the development during the following years after the crisis indicates an increased territorial cohesion among the regions of the BSR.

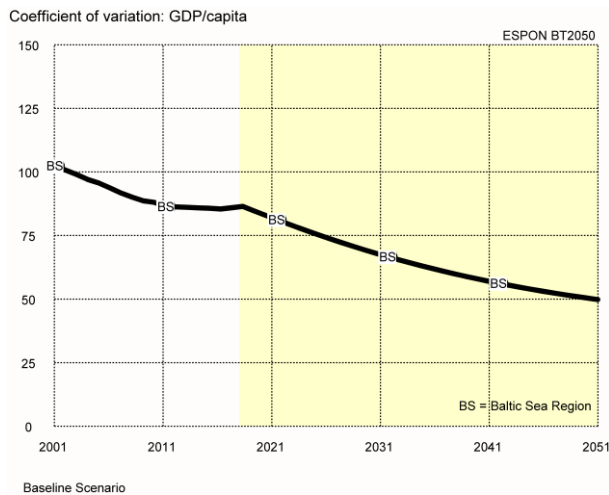


Figure 11: Territorial cohesion in the BSR 2001-2051  
Source: S&W, SASI Model, 2019

To sum up the Baseline Scenario, the BSR presents a mixed picture in terms of balanced territorial structures. In 2050, the main agglomerations of all countries of the BSR flourish in several respects. These agglomerations are the drivers of the national economies, and are the place to live for an even much larger part of the population in comparison to 2020. This happens at the expense of rural areas which, in most countries of the BSR, are economically behind and facing problems of depopulation.

In terms of territorial cohesion, the BSR still yields evident internal disparities. However, the assessment of territorial cohesion at more aggregate levels, suggests that substantial progress has been made during the first half of the 21<sup>st</sup> century. In economic performance, the BSR is on average much closer to the European average in 2050 than in any other period before. Lagging countries of the BSR caught up on the leading countries. This development is, in particular, valid for Belarus, the Russian regions of the BSR and the Baltic States. This diverse spatial pattern is not limited to the BSR but is, in fact, a common characteristic for all Europe, despite the much higher growth rates of the lagging countries. This means that territorial cohesion is even with such diverse growth rates of lagging and advanced regions a decade-long process and requires a strong long-term supporting effort.

The territorial implications of the Baseline Scenario yield two main messages. On the one hand, there will be a further pronounced unbalanced development between urban and rural regions in the BSR as a whole and in all the countries belonging to this macro-region; urban areas will be the economic powerhouses and will attract more population than other types of regions. On the other hand, overall territorial cohesion (measured with GDP per capita) will happen across all regions regardless of the regional type. This calls for specific attention to policies in favour of territorial cohesion but with a view on the different types of regions that might have specific needs for support.

## 2.2 Two territorial scenarios for the Baltic Sea Region 2050

The two alternative territorial scenarios for the BSR in 2050 show two different pathways of how the future of the BSR could look like depending on different future developments to inspire policymakers in their work of policy design and implementation. The two scenarios are of very different nature and focus,

with distinct characteristics and differentiated territorial implications. There is one core topic; however, that stands out in both: environmental protection. This highlights that environmental issues and the quality of the sea remain important topics for action in the region. A further key denominator of the two alternative scenarios regards the relations with the European Union, which do not change until 2050. Cooperation is enhanced, and EU policies influence the Baltic Sea Region priorities and objectives.

The first scenario, 'Well-being in a circular economy – a RE-mind for a good life' describes a future where the BSR has developed into a sharing and circular economy region, where citizens have consciously decided to change the existing linear economic model in favour of a better quality of life. In this scenario, decentralised patterns are observed, where second and third-tier cities and towns become the main centres, reducing the importance and concentration in metropolitan and large urban areas. The second scenario, 'Growing into green tech giants – the ecological footprint clear-up' describes a future where the Baltic Sea Region is a giant in green technology and the achievements of the 4<sup>th</sup> industrial evolution are in the epicentre of everyday life. The mix of innovation and green technology have led to a reduction of the ecological footprint of the region. At the same time, high-end innovation and the race for more growth have led to an increased 'guilt-free' consumerism. An increasing concentration of economic activity around the present metropolitan areas and growth centres, which in most cases are the capital cities, is observed.

Both scenarios are written looking back from the future, i.e. as if today were the year 2050. Hence present and past are used where relevant. Each scenario begins explaining what lies behind each story (text in green), this is followed by explanations about how the future looks like in relation to different aspects (e.g. economy, production, consumption, society, cooperation). The description of each scenario ends with a description of the territorial consequences. A detailed explanation of the methodology employed to develop the scenarios and a fully comprehensive description of the scenario can be found, respectively, in sections A1.5 and B4 of the scientific report.

### **2.2.1 Well-being in a circular economy. A RE-mind for a good life**

**A metanoia<sup>5</sup> to circular economy.** By 2050 the Baltic Sea Region has abandoned the linear economic model that had structured the economy in the region and beyond for several years. Linear economy, summarised as the 'take – make – waste' model, was based on taking natural resources to make products for different uses, to then discard them as waste (Ellen MacArthur Foundation, n.d.). Realising that resources are not eternal and to maintain resource efficiency, the Baltic Sea Region is the first macro-region in Europe to adopt instead a circular economy model, continuing to be a pioneer in environmental protection. A circular economy can operate at different levels, ranging from a macro-level, i.e. at the city, region, nation or beyond level, to a meso-level, i.e. at eco-industrial parks to a micro level, i.e. at products, companies and consumers level (EESC, 2019). In a circular economy, all resources matter and every waste count. Waste can not only be recycled but also transformed into other forms of resources and new materials, while products can be designed to live longer and be repaired. Circular economy, is, however, not only about reshaping the production model. It is all about changing the

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<sup>5</sup> From ancient Greek, a fundamental shift or change, or more literally transcendence ("meta" – above or beyond of mind, "noia", from the root "nous", of mind).



mindset of people towards endorsing a sharing, reusing and repairing culture and transforming their lifestyles for their well-being. The well-being of the Baltic Sea Region citizens does not rely on GDP growth, but instead on de-growth and less intense production due to an advanced repairing and sharing culture.

**Averting an environmental fallout.** The environmental situation in the Baltic Sea Region was at a crucial stage already from the early 2020s. Air pollution created pressure, especially in the urban areas of the region, mainly as a consequence of fossil fuels burning and industrial processes. This had affected especially places in coal transition or highly coal dependant. At the same time, looking at the conservation status of the Baltic Sea marine Natura 2000 habitats, the situation was at risk. Several sandbanks, estuaries and coastal lagoons were heavily endangered in most of the Baltic Sea Region, especially in Germany and Denmark (EESC, 2019). Furthermore, the Baltic Sea used to be the most polluted sea in the world, suffering from eutrophication, where nutrient inputs to the sea resulted in a series of ecosystem changes, mainly due to high shipping traffic and intense agriculture. All these developments stimulated and generated a large civil society action, sparked in 2019 by the 'Fridays for future' school movements initiated in Sweden and spread across Europe. At the same time, the UN SDGs recognised the increased demand for natural resources puts a burden on environmental resources and highlight the need for reducing the material footprint and urged for a fundamental shift towards sustainable consumption and production (United Nations Economic and Social Council, 2019). Following these, a strong political and social movement took the big leap: to transform the status quo so as to improve citizens' quality of life through a paradigm shift to a circular economy.

- **Sharing is more than caring.** The sharing or collaborative economy is the first key notion prevailing in a circular economy. The sharing culture is recognising its hype by the millennials and the generation Z, who choose access to ownership being more reluctant to buy items but rather favour services that give access to different goods (Goldman Sachs, n.d.). This sharing economy can be organised through sharing business models: sharing products, such as sharing of tools within the local community, sharing of washing machines within blocks of buildings, car-sharing in the case of commuting or longer trips. The development of the so-called 'time banks', i.e. a system where people agree to exchange services and different skills without money, using hours as currency, is also one part of the sharing economy. Sharing houses is also common, offering shared apartments, not only as holiday accommodation but as the new living. In addition to these, people do not only share objects and skills. They also share offices working in open work-spaces abandoning the rather centralised working structures of the past.
- **Repairing is now a state of mind changing consumption patterns.** People do not consume uncontrollably favouring the low prices to high quality. Instead, they adopt new consumption behaviours, where they consciously choose higher quality products, designed and crafted with higher quality resources so as to last longer and be repairable. E-waste, for instance, is either recycled or repaired to be sold at lower prices. This repairing culture is adopted by big and smaller industries offering repairing guarantees, and also in-house repairs are possible, especially given the continuous technological progress. 3D printers are available in local shops, allowing to print smaller parts needed to replace and fix in-house and with limited costs. People organise themselves through online platforms, offering repairing services in different local and urban centres. The repairing economy allows for urban and local communities to revive, as small companies and community initiatives are more networked. Additive manufacturing plays a role in, having an impact on the production localisation and costs and the recycling potential of a different material (ESPAS, 2016) when it comes to larger productions.
- **Companies close the circle.** Companies or bigger industries specialised in producing from electrics to furniture to clothing adjust their production to the new sharing and repairing economy and the emergence of the 'prosumer model' (people produce and consume their products in a rather regional or local scale). Companies produce less, higher quality, hence more expensive, products, to ensure they last longer. They

also offer special repair services for the products they produce extending the lives of their products or guarantee that their products can be fully recycled after their use, or that they have used recycled products for the production. Unlike the linear economy where selling of products is the ultimate goal, in a circular economy, companies may rent their materials so that they are returned for reuse, or companies create incentives to guarantee the return (McKinsey Quarterly, 2014). This shift in the different industries is also supported by tax reliefs, allowing them to cope with the competition. Circular-label gives companies more credibility and respect for their social and environmental responsibility. Most smaller shops are also going zero-waste, having abolished any packaging, plastic or paper bags and alike.

- **Re-industrialisation through products 'made in the BSR'**. The new consumption and production models shape and form the re-industrialisation in the BSR, as more products are now produced by local communities, in-house or in small scale productions. Products, now being produced in the Baltic Sea Region, labelled as 'Made in the Baltic Sea Region' may increase competitiveness and resilience of the regional economy, increase business success, create new jobs and reduce the dependence from global resources, making the BSR less dependent on global changes.
- **Digital accessibility is essential**. The 4th industrial revolution is a reality, and continuous technological progress is unavoidable in 2050. There is high speed, and accessible internet in all corners of the BSR and everyone in 2050 is a digital native. Online platforms do not only serve as a basis for services exchange. They also function as online support, providing videos with instructions or interactive sessions on how to repair different machines or items, so that people can repair them at home. This becomes particularly handy for the elderly or people in remote areas. Furthermore, AI accelerates the circular economy process, by allowing rapid prototyping and testing when designing circular products or different components, support to increase product circulation when operating circular business models and optimise circular infrastructure through improving the processes of the circular economy loops (Ellen MacArthur Foundation and Google, 2019).
- **Eco-vation: an ecological touch to innovation**. Eco-vation, i.e. innovation in the area of green economy is also necessary for the circular economy model. Among the eco-innovation leaders have been Sweden, Finland and Denmark, Estonia, but also to a lesser extent Lithuania being average eco-innovation leaders and the rest of the BSR countries catching up. Among the eco-innovation activities belong eco-innovation patents, products exports of eco-industries, value of green early-stage investments and others (European Commission, n.d.) related to building up research on new ways of producing or new solutions to waste management.
- **Technology gives employment a new twist**. Robotization has taken up, with increasing use of machine learning algorithms and AI. Most of these platforms may be organised through automated algorithms and AI machines without necessarily any human interaction. The technological progress has also changed employment types, where more jobs are automated in the BSR in 2050. Hence 'technological unemployment' is also to be expected in the Baltic Sea Region. To balance social inequalities, governments impose higher taxes to the big companies managing the different online platforms. Pigouvian taxes (i.e. taxes on activities generating negative effects) have also be imposed to companies not introducing the circular economy model in their production, or on the contrary give incentives to companies, smaller SMEs or micro-enterprises through tax reliefs or other benefits for introducing circular economy business models (Interreg Baltic Sea Region, 2019).
- **Manufacturing is back on track**. The shift to a circular economy in the BSR opens new employment opportunities. Although the technological advancements may automate a number of jobs, new jobs related to the new model are created (e.g. repairing or related to high-end innovations, where niche professions are needed). The circular economy model in the Baltic Sea results in a more de-scaled production and consumption that increases the repair industry. This requires people and staff with relevant and specific know-how. Jobs related especially to manufacturing or similar handcrafting professions will be necessary to accommodate the new regionalised production systems. In addition to the hand-made, higher quality products, manufacturers are also employed in the repairing industry. Such a reviving manufacturing focus puts older professions and hence older people who used to be employed in that sector into the spotlight. In this case, ageing turns into an advantage as the silver economy here plays a role and older people can, on the one hand, teach younger generations those arts, while at the same time continue earning ends meet. In the line of the sharing economy, a lot of voluntary work is also seen. People get engaged in supporting actions for cleaning the environment, being organised in groups to clean streets or beaches, or mobilising the civil society for similar actions. Furthermore, given the more minimalist, localised and regional production, as well as the lower lose their global character and importance in the region and small shops with a rather regional identity flourish.



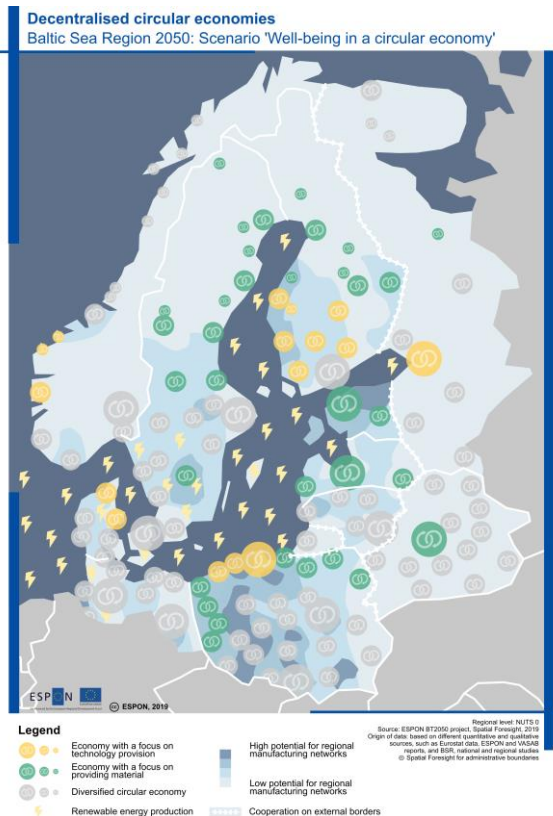
- **Bio and organic agricultural production.** Agricultural practices have become less intense, and producers focus on more sustainable, bio and organic production where pesticides are banned or reduced to the minimum. This results in a healthier and more sustainable production of food with increasing local farming. People responsively have reduced meat consumption, going rather 'beyond meat', vegan or vegetarian and hence reducing the need for arable land (Baltic Ecological Agriculture and Society, n.d.). Sustainable forestry and logging and provision of wood materials are also an important element for the provision of material (ESPON, 2019b). At the same time, urban gardening is also promoted with citizens even in the urban areas being engaged in gardening and very local production activities. Hence, people in the BSR prefer the so-called 'slow' food, supporting local food cultures and traditions. Nevertheless, this limits the available sources and cannot cover the needs of the whole BSR, making the reliance on other countries for the import of primary sources a necessity.
- **Transportation changes.** Due to regionalisation of production, the long livelihood of products, the local food production, sharing culture and the minimalist choice of the way of living, freight transport and logistics become secondary as fewer bulks of products need to be transferred across the region. This specifically regards air, rail and road logistics with the respective hubs losing importance. At the same time, transport becomes more expensive as its importance is reduced. Further logistics means are experimented, such as drone deliveries, especially to the more remote areas. On the other hand, as car sharing is a norm and people choose to use fewer cars and more public transport and bikes where possible, the regional and multi-modal transport increases. Faster, reliable and well-connected public transport is necessary to facilitate people's transportation when necessary. Given the rather regionalised production and less dependency on global markets, shipping has declined.
- **Renewables' added value.** The renewable energies capacity is expanded and the main energy source, with especially bioenergy, wind, solar, hydro energy capacity dominating. Furthermore, given the reduced global connections of the region in this scenario, the substitution of fossil fuels with renewables reduces the exposure of the region to global energy prices and changes. Decentralised energy solutions such as small-scale biomass, photovoltaic, wind and hydropower support the 'prosumer' model. Renewable energy production creates added value in the income and employment, generated from its production, transformation distribution, as well as manufacturing, R&D and trade (Interreg Baltic Sea Region, 2018). Investments in buildings energy efficiency have also taken place, with better insulation material being used and solar panel windows replacing glass windows.
- **The environment is getting better.** Natural resources are highly preserved, and their exploitation is controlled. Also, eutrophication in the Baltic Sea has reached a good status, as people have become more aware of the environmental consequences of their consumption habits. Back in 2015, it was estimated that about 3.8 – 4.4 billion euros were lost in citizens' welfare every year due to eutrophication (based on HELCOM, 2018). The increased citizens' commitment and 'willingness to pay' has played a role in improving the environmental conditions in the Baltic Sea Region and thus, their well-being. Environmental valuation methods are applied to see the changes in human welfare due to the effects of the environmental changes looking at the citizens' willingness to pay for these changes. Furthermore, less mass production, together with the increasing sharing culture and the high % of market share in the collaborative economy, results in a high environmental impact, reducing the environmental footprint of the region in the 2050 (European Commission, 2017). Similarly, the decreased use of cars and aeroplanes and the shift to renewable energy production also resulted in less CO<sub>2</sub> emissions reducing air pollution.
- **Living a healthier life.** A cleaner environment constitutes a precondition for a healthier life. At the same time, technological advancements allow people to live healthier and longer. Specialised medicine built upon nano-, bio- and information technology revolutionise healthcare, delivering high-end and personalised treatment (European Strategy and Policy Analysis System, 2015). This, however, may increase social disparities, as high-end healthcare may be accessible to those citizens who can afford it, causing the reshape of health policies. There is less stress and burnout effects, as a clean and peaceful environment reduces anxiety. 'Horticultural therapies' and gardening practices help in relaxing and de-stressing people (Shechet, 2019). People of the Baltic Sea Region aim for happy and healthy life, following and living in practice well-being trends as 'hygge' and 'lagom' for a life fulfilment and joy, anticipating the UN SDGs of 2019 on ensuring 'healthy lives and promoting well-being for all at all ages' (United Nations Economic and Social Council, 2019).
- **Educating the new state of mind.** A good education is a prerequisite in 2050. First, this is the means towards educating citizens for a more sustainable way of living, starting from recycling to sharing and repairing. Although the education levels remain high in the first levels of education, more specialisation is seen in high school and higher education. Even for the manufacturing jobs, more specialised training and education are

necessary, while for the niche innovation jobs, high-quality education is needed. Given the technological progress, massive online courses are a norm, and the majority of people join online courses, leaving the high end and high-quality education only for those who can afford it.

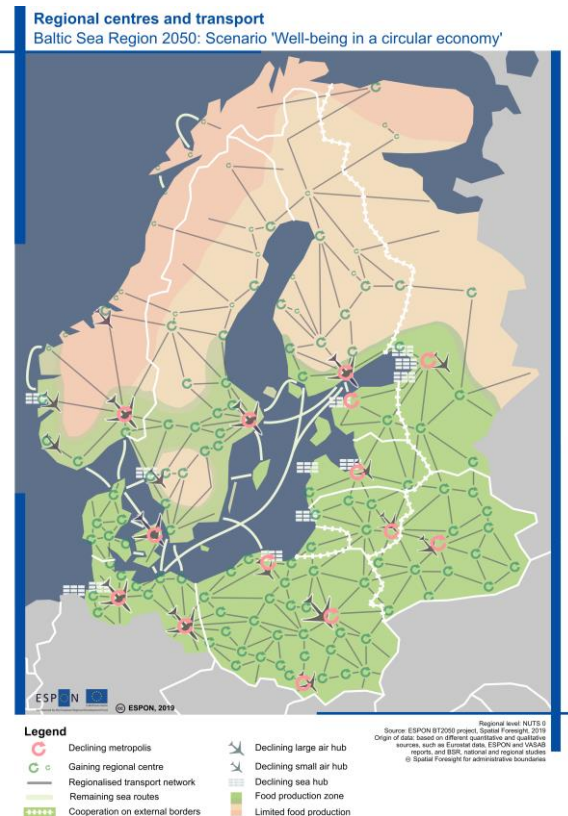
- **Well-being in a circular economy.** In a circular economy, prosperity and well-being are of utmost importance and goes beyond GDP. It is achieved through improving especially the environment quality, health and government. Especially the latter, together with trust, are key aspects for a circular economy implementation. In a world where technology accelerates and digital technologies prevail, more openness and participation of citizens is possible, bringing at the same time more responsibility, accountability and transparency of the different players of society (European Commission, Joint Research Centre, 2019). Hence a political and social will are necessary to achieve a mindset shift towards a circular economy that goes beyond resource management and waste reduction (ESPON, 2018b) and finds eudaemonia in a 'less is more' attitude.
- **New virtue values?** Peoples' lifestyles have transformed towards a way of living that is in full accordance with nature. This virtuous life, following the virtual ethics as expressed by the Stoic philosophers, aims at improving the quality of life and the well-being of people, who have chosen to live in harmony with their overall environment. A new societal model has emerged, where people share more and consciously change their consumption habits for the common good and environmental sustainability. Good government has contributed to achieving better life fulfilment by introducing policies that support such actions and improve the life index of people through caring about the environment, housing, income, jobs, work-life balance for more life satisfaction and community building. (based on OECD, 2017)
- **Neighbours relation: together we stand.** Cooperation on the transition towards a sustainable economy was highlighted as a common priority focus area for the Baltic Sea Region in the Baltic 2030 Action Plan. The Sustainable Development Goals related to 'zero hunger', 'industry, innovation and infrastructure', 'clean water and sanitation', 'responsible consumption and production', 'affordable and clean energy', 'life below water' and 'decent work and economic growth' have taken up and cooperation both within the Baltic Sea Region, as well as with its Russian and Belarussian neighbours has increased so as to reduce waste, adopt more sustainable production and consumption patterns and lifestyles, more sustainable agriculture, protect the ecosystems and reduce water pollution, support among others, green and blue economies (Council of the Baltic Sea States, 2017). Furthermore, there is still energy dependency from the Russian market, to a much lesser extent, though, than 30 years ago.
- **United in diversity in the European Union.** The BSR is not an island. European Union policies continue playing an important role in the BSR in 2050 and shape the future where possible. Policies related to improving waste management, recycling, plastic bans and circular economy are largely taken up by Baltic Sea Region policymakers, as also do new developments in the Common Agricultural Policy, towards more sustainable agriculture and policies around renewable energies and reduction of CO<sub>2</sub> emissions. Cooperation with other regions and involvement in transnational and cross-border programmes within the BSR, but also beyond are necessary. Cohesion Policy needs to be further strengthened in the region to reduce spatial disparities that are also possible in this scenario. At the same time, policies that can strengthen the competitiveness of the region are needed, given the highly decentralised and regionalised territorial character of the circular economy.

### **Territorial implications of the 'Well-being in a circular economy' scenario**

Where in the Baltic Sea Region are the effects of this scenario more visible? What types of territories are more affected in a scenario with a limited ecological footprint? Drawing upon the scenario described in the previous section, this section presents the territorial implications.



Map 8: Decentralised circular economies, Baltic Sea Region 2050: Scenario 'Well-being in a circular economy.'



Map 9: Regional centres and transport, Baltic Sea Region 2050: Scenario 'Well-being in a circular economy.'

**A regionalised small and medium-cities focused Baltic Sea Region.** The sharing and repairing character of a circular economy model, does not only require a fundamental shift in the mindset of people but also places that can have the critical mass to adjust and materialise this new way of thinking. In a world where GDP growth has a secondary place to well-being and quality of life, in this scenario less concentration in the metropolitan areas and the traditional big growth centres are observed. Instead, there is a gradual territorial shift towards second and third-tier cities in the Baltic Sea Region that have the critical mass for manufacturing activities in the framework of a repairing economy. The sharing economy is also more dominant in regional and local centres rather than in big urban centres. At the same time, other cities that focus more on providing technology towards new solutions for the CE play an important role. An urban-rural shift is also possible as more people choose to live closer to nature.

**Regional centres gaining ground and are in the centre of developments.** Regional centres allow citizens to organise faster and more efficiently in their sharing economy exchanges. Gaining regional centres can be found across all small and medium-sized cities.

**Declining capitals and metropolises.** Capital cities and metropolitan areas are slowly but surely losing out as the GDP growth poles or the places 'where things happen'. Instead, they rather face a decline in their overall economic growth with the GDP in the traditional growth poles of the region declining, given that in 2050 GDP is no longer a key indicator for growth in this scenario. Among those declining centres are hence the metropolitan areas of Stockholm, Copenhagen, Warsaw and Krakow, Berlin and Hamburg, Vilnius, Riga, Tallinn, Helsinki, St Petersburg and Minsk.

**The potential lies in the manufacturing networks.** *The revival of manufacturing is a key element in the repairing economy and play an important role in the 'backshoring' of European production. Hence regionalised product life cycles in places with a high manufacturing potential are the backbone of the repairing economy. Regional manufacturing networks with high potential are found in the north and the west of Poland, around the regions of Wiekopolskie, Dolnoslaskie and Pomorskie, in the northeast of Estonia (Kirde-Eesti), but also in some parts in Latvia and Lithuania, as well as south of Sweden and South of Finland.*

**Material and technology economies: the production background.** *Manufacturing is not the only necessary sector that is of importance in this scenario. The background of the production of high quality and long-lasting products lies in the use of proper material and new technologies. Economy centres providing either of the two play a crucial role in the production of local products in the region. Hence, technological regional centres are to be found in Aarhus and Aalborg in Denmark, in Gdynia and Gdansk in Poland, but also in Bergen, Norway, and in Finland, among others in Turku, Tampere and Kuopio. Regions providing material can be found in several second-tier cities across the BSR. This is highly related to the available resources of the places that are relevant to the CE concept. These regards, for instance, Tallinn and Tartu in Estonia, Riga, Jūrmala and Liepaja, smaller cities across the western polish borders, such as Poznan, but also Skane, Umea and Lulea in Sweden. Overall, regional centres are organised across the BSR in smaller and bigger regional centres.*

**Logistic centres depart, regional transport networks arrive.** *The production is highly regionalised. At the same time, the high-quality products last longer, reducing the production needs, while drones and other self-driving vehicles serve the remotest areas. This has a fundamental consequence in the logistic sector, as the transport and accessibility picture of the BSR changes, whose transport and logistic centres lose their global profile and become rather rationalised. Road accessibility connects the different regional centres, serving as the main logistic function.*

**No global air and port gateways.** *The importance of global and European airports in the region declines, with the airports of Copenhagen, Hamburg, Berlin, Warsaw, Krakow, Stockholm and St Petersburg serving smaller freight and passenger flights with a lower frequency than before. At the same time, sea hubs are also declining, which is more visible in places where ports have shaped their economies, such as mainly St Petersburg, Gdansk, Riga and Klaipeda.*

**Renewables potential to untap.** *Although in a CE the energy demand is lower due to less production and consumption, the potential of the energy supply from renewable resources needs to be untapped. Regions with high potential are the frontrunners to more renewable resources shift. Such potential is located around Denmark and Germany, coastal areas between Sweden and Finland, but also in Lithuania and Latvia.*

**Slow food in slow motion.** *The movement of slow food, focusing on local food and traditional cooking that has spread in the BSR opposes the extreme use of pesticides to increase farm production. Instead, organic and bio food production is the core focus of agricultural production. Given the special geomorphology of the region, places where a bio and organic production is possible, are limited. These*

mainly regard the agricultural and arable land in the southern part of the Baltic Sea Region, namely Poland, Lithuania, Latvia, north of Germany, parts of Russia and Belarus.

***In neighbourhood relations cooperation is a must.*** The improvement of the environmental situation of the BSR is a priority of the citizens and governments in the region, with the aim of improving the quality of life and eudaimonia of the people. Cooperation is a prerequisite for such a priority, both within the countries of the BSR, as well as with the EU and Russia and Belarus, considering that environmental protection, is one, if not the main, sector which cannot be addressed single-handedly but needs strong cooperation and commitment.

## **2.2.2 Growing into a green-tech giant. The ecological footprint clear-up**

**In 2050 green is the new black.** Today, in 2050, the Baltic Sea Region is a global giant in *green-tech*, where innovation, growth and green technology are in the epicentre of work and everyday life. Building on its innovation leader profile of the 2010s (European Commission, 2019b), places in the Baltic Sea Region continue being a worldwide player in innovation, research and green technology, attracting businesses and business angels to invest in the region. Already between 2012 and 2017, the venture capital funding to start-ups with an artificial intelligence specialisation grew at a global level by a compound annual growth rate of 85%, while it more than tripled between 2016 and 2017 elevating this technology to a priority for private investors (European Political Strategy Centre, 2018). This went hand in hand with the 4<sup>th</sup> industrial revolution and the latest technological advancements, which has shaken the technological progress over the last 30 years. Industrial evolution has been a continuous process in the history of modern humanity. The advancement of technology and innovations have revolutionised the industry and the 4<sup>th</sup> industrial revolution or industry 4 is now a reality in most aspects of life. Industry 4 incorporates a set of different technological advancements that influence manufacturing, services and everyday life of citizens through a fusion of technologies blurring the lines between physical, digital and biological systems (ESPON, 2019c). The term encompasses the technological trends of cyber-physical systems, Internet of Things, cloud computing, cognitive computing and artificial intelligence (European Parliament, 2016) with robotics, autonomous automobile systems, additive manufacturing are not only well established, but also shape the production and consumption patterns. With growth and competitiveness being a primary goal for governments and industries, production is reaching a peak. Global relations are boosted so as to consolidate the Baltic Sea Region as a worldwide tech giant region. Advanced green technology and innovation turn production 'greener' and limit environmental problems. Due to this, people tend to consume more, resulting in a guilt-free apogee of consumerism.

**Cooling down the global warming.** Climate change was according to a 2017 Eurobarometer report a serious concern for the Europeans (European Commission, 2018). Europe had faced a sequence of extreme weather events, ranging from heat waves and droughts to floods and typhoons, with the temperatures above the Arctic Circle increasing. The Intergovernmental Panel on Climate Change reported in 2018 (Intergovernmental Panel on Climate Change, 2018b) that global warming of +1.5°C would have severe consequences on the sea level rise and ecosystems in the world. Such developments have rung the caution bell to adopt stricter climate change mitigation policies, and the European Union put forward a strategy to achieve a climate-neutral net-zero greenhouse gas emissions.

In 2050 Europe is a global climate change actions leader having reached the goals of the 2018 vision to achieve a net-zero greenhouse gas emissions (based on European Commission, 2018). The Baltic Sea Region became a pioneer of this transition, given its strong innovation background, which has developed and implemented green technology to address environmental issues. This has been largely supported by both governments and industries, which have seen green innovation and technology as both a means for growth and profit and a panacea for improving the environmental conditions in the Baltic Sea Region and meeting the European and global climate requirements and policies.

- **Who is afraid of industry 4.0?** In 2050 the 4th industrial revolution is embedded in everyday life in the BSR, where the lines between physical, digital and biological systems are blurred through a fusion of technologies. Cloud computing has revolutionised IT platforms and services, with companies using enterprise or public clouds not only because it is more cost-efficient (European Strategy and Policy Analysis System, 2015) but also for easier data storage and mining, as well as for cryptocurrency exchanges, as the latter functions as the new monetary system. At the same time, AI has brought the biggest changes in the production and economy (e.g. machine learning, text and speech recognition, tailored news and web surfing suggestions). The use of AI has a strong impact on production and consumption. Algorithms can predict what people want to shop, what to watch or read and production and services are tailored according to these needs. Robotics and AI have replaced most of the repetitive production jobs in the BSR, which already from the 2020s had a high risk (of about 70%) of automation (ESPON, 2019a).
- **Becoming the Baltic eco-silicon valley.** Given the commitment of the BSR to achieve by 2050 a zero-emissions policy, this advanced technology has been used and implemented in 'greening' the economy. The use of 'Greentech' in the BSR has decreased pollution to the minimum, reaching the goal of the zero-emissions with a positive impact on the overall environmental condition of the air and sea of the region. Green technology has been applied both at the production business models, but also in the energy, transport, farming and resource efficiency sectors. This has increased competition of the industries and companies which wish to satisfy their customers and at the same time increase their profits. Such high competition and practices have also increased the greenwashing phenomena in the region, where companies were deceptively marketing their products as environmentally friendly, overall, the implementation of advanced technology in the different production sectors has allowed an almost zero CO<sub>2</sub> emissions, resulting in a more massive production and growth.
- **Businesses go green and make money.** In response to the citizens' demands and in anticipation of stricter regulations, businesses accelerated their innovation developments for low carbon transition. Business activities range from investing to renewable energies to cutting their own GHG emissions, by adopting new technologies, increasing their operations resilience and contribute to the market of environmental goods (Bartlett et al., 2016a). This move did not only minimise costs, increased the profits and economic growth of businesses in the BSR<sup>6</sup>, but also improved the reputation of the companies, as they contribute to better health and environment, increasing their consumers' loyalty. Nevertheless, phenomena of misusing eco-labels, or scandals around reporting low carbon emissions happen and are hardly traceable.
- **New jobs created, new forms awaited.** The rise of the AI is not only linked to technological unemployment. Instead, it has been a motor for generating new jobs, adjusting in the new model. Studies from the late 2010s anticipated that new technologies are not only replacing some existing jobs, but also increase them or creating the need for new ones. At the same time, the increase use of technology and online connections also create new forms of employment, where people work rather from distance, in home offices without necessarily being present in an office space. In addition, people may have more quality jobs, allowing them to have time on more important and personally fulfilling tasks (European Commission, 2019a) or engage in voluntary work. To cope with the changes, companies need to be ready for continuous innovations and to adjust. Given the high automation of jobs, the production is also more efficient, more accessible and in full speed, having an impact, first and foremost on the consumer.
- **Tailor-made design: a personalised production.** AI and wide use of algorithms shape the design of products, which are specially designed according to the needs of people, based on a thorough big data

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<sup>6</sup> Already for 2011-2012 it was estimated at global level that overall the sector of low-carbon and environmental goods and services would worth about US \$5.5 trillion, growing more than 3% per year (Bartlett et al., 2016b)

collection and analysis by the companies. This means that every product purchased is tailored to the customer. Already from the late 2010s, surveillance in stores, such as Bluetooth beacons, could track from the location of the customers in the store, which products they prefer, the path they follow in a store, so as to later send targeted advertisements or organise the branding of the shop (Kwet, 2019). Further to this, AI can develop the customers' identity, analyse the purchase history and suggest items that interest the customer, matching his own preferences. Nevertheless, it is not only industries that can offer tailor-made design, but 3D printing also is available in most houses, enabling people printing from clothing, to daily products to office material just at home and recycle them or throw them away when they are not needed anymore.

- **E-commerce versus brick-and-mortar.** Online shopping is now more accessible, faster and reliable, as products can be tailored to the needs of people, AI can remember previous purchases and provide suggestions that match with the style of the people. This has a consequence in the rather more traditional shops, the brick-and-mortar shops which start losing ground in the BSR. Few that remain are rather the commerce environment. People do their shopping through online services, which are also more tailored to their preferences, from their nutritious needs and allergies to being tailored to their size and preferences. Smaller shops and local productions are gradually disappearing, making local shopping identities harder though creating a more universal consumption profile.
- **How do we react?** Social inequalities have been a consequence of this transition, especially between skilled personnel who are able to be employed in niche jobs and those which due to the full automation of manufacturing works are unemployed. The state has been responsive, and after several experimental trials, trying already in the 2010s in Finland has developed and issued a universal basic income for all citizens. This universal basic income is generated by the profit gained through the job automation and the taxes imposed globally exposed industries. Especially people fully relying on the universal basic income may invest their free time to social activities or new innovation and patent ideas, given that the civil society and democracy in this scenario is high. Also ageing, in this case, turns into an advantage. First, due to technological advancements, people are healthier and live longer. This means that they can support with taking over different jobs, i.e. be that 'older' more traditional jobs, or supporting in the different other activities.
- **Hyper consumerism in place.** As robots have taken over several jobs for faster and more efficient production and the use of innovation for green technology, an apogee of guilt-free consumerism is observed. In parallel, the 3D printing has allowed for more printing material at home, which, together with high recycling opportunities, makes consumption easier and faster. People have the tendency to consume more and more as everything is more environmentally friendly, and more things get recycled. In that case, we see a link between consumerism and the need to look for more resources becomes necessary due to the large exploitation of the existing ones for production. In response to this resource scarcity, the recycling industry becomes more important, where material from electronic devices to biodegradable goods can be recycled or biodegraded. Especially today, where more research on technologies on using cellulose or lignin to produce plastics, a trend already discussed in 2019 (World Economic Forum, 2019), which allows a more effective recycling, gives higher hopes to people for a 'guilt-free consumerism'.
- **Continuous learning and new skills are vital.** The education system has been adapted to the new needs and improved so that citizens are able to meet the skill requirements for the new niche jobs. Being digitally literate is another prerequisite of 2050, where the majority of people are already digital natives, compared the to late 2010s there was a gap of e-skills supply of about 900,000 people by 2020. People need to constantly upgrade their skills and learn throughout their lives to be able to adapt to the different requirements (European Strategy and Policy Analysis System, 2015). They change jobs often, and hence continuous learning is necessary (European Political Strategy Centre, 2017). In that respect, online courses are a key lifelong learning opportunity, at least for the masses who cannot afford more tailor-made and specialised private education.
- **Agriculture and natural resources.** Given the focus on growth and mass productions, agricultural production and forestry need to cope with these developments. Green technology allows for increased production of crops and vegetables. This is mainly possible through smart farming, which uses advanced technology such as IoT to manage farms and increase the quantity and quality of products and optimise the human labour that is necessary for agricultural processes (Sciforce, 2019). In 2050, genetically modified crops prevail, so that they can resist pests, grow in the demanding climatic conditions and reduce production losses, through genetically editing the code of crops (World Economic Forum, 2015). Bio and organic agriculture is very limited and hence very expensive; instead, a lot of vegetables and fruits are produced in greenhouses thanks to clean energy, which are built across areas that in the 2010s were not arable. The last decades, citizens favour

vegetables based nutrition, reducing their red meat consumption. Trends such as 'beyond meat' and veganism prevail, while new food concepts such as insects and bacteria emerge.

- **Transforming transport.** As more products are being produced, transport and accessibility play a vital role in their transportation. Hence transport accessibility is the core of logistics. Through the development of the cyber-physical systems, automobiles and autonomous vehicles and drones, together with the electric and hydrogen engines, but also satellite navigation systems now shape not only the urban mobility (European Strategy and Policy Analysis System, 2015), but such technologies revolutionise also the transportation and delivery of different goods. At the same time, thanks to the clean energy, transport has become faster and cleaner, allowing for more exports and imports of goods with new technologies used for aviation. Trends already discussed in 2015, such as 'fuel cell' cars running on hydrogen are now mainstream, with the latter being clean-burning with only water vapour as waste, reducing air pollution (World Economic Forum, 2015). As a result, there was an increase in the use of cars is also to be observed, given the cleaner fuel technologies. Congestion remains a problem in the urban areas, as the increased efficiency of public transport has not decreased the use of electric and hybrid cars. Furthermore, new transport modes such as solar planes are also being considered and experimented for passenger connections (see as an example from the 2016s, Carrington, 2016).
- **Green Shipping.** In the BSR technology is used for an emission-free maritime transport (based on Green Ship of the future organisation, n.d.), for eliminating accidents and improving safety, navigation routes, emergencies, through e-navigation and other relevant technologies (EUSBSR, n.d.). As ports are overloaded with traffic, the role of rail and roads that connect the ports to the mainland has also been increased, creating a transport spillover effect (VASAB, 2018). Shipping, at the same time, is highly dependent on global factors. For instance, globalisation and the increasing international competition for resources, markets and consumers influence shipping in the BSR (Interreg Baltic Sea Region, Baltic LINes, 2018).
- **Energy in demand.** The increased production and growth require increased use of natural resources, resulting in an increase in energy consumption in the region. Already in the 2010s, it was assumed that by 2030 energy consumption would reach 30% higher than in 2010, with the natural gas market increased to 50% in 2035 (European Strategy and Policy Analysis System, 2015). Green technology has allowed for a cleaner and 'greener' energy production which reduces the environmental footprint. Renewables are widely exploited and used. New forms of energy are also experimented, such as fusion energy, which could bring a revolution in the way energy is produced and solve globally the climate change effects (European Strategy and Policy Analysis System, 2015). Given this increased need for natural resources, the recycling industry is gaining attention, as goods and material are being fully recycled so as to save resources and reuse them in future. The recycling of thermostat plastics, a seed trend in 2015 (World Economic Forum, 2015), is under further development to reduce plastic waste and support a form of circular economy.
- **Clearing up the ecological footprint.** Green technology developments in the BSR managed to eliminate carbon emissions contribute towards mitigating the temperature increase and its possible effects in the region. Furthermore, the eutrophication in the Baltic Sea has considerably been reduced over the last decades, improving and minimising the ecological footprint in the region. In 2050 climate change is overall anticipated and action has been taken so that the region is the first one to adjust to the risks. Risk management is also advanced in the region with the latter being able to deal with natural disasters.
- **Tech Health.** The technological advancements have also revolutionised healthcare, through the nano- and biotechnologies, which results in people being healthier for a longer period and living longer. Genome editing in humans is also part of health developments. Radical health treatments have been invented where diseases formerly incurable can now be cured. Given, however, the costs of this healthcare this is also targeted to those who 'have'. Unemployment and inequalities, but also the high pressure at work increase the risks for health problems, such as stress and mental problems or burnouts and depressions. Technology investments have also a more direct impact on people's everyday lives. Tech implants to people become a reality, for tracking health or fitness trackers, devices serving as the new IDs, companies check-ins, or event mobile phone transplants. Tele-medicine and medical support through drones, especially in remote and sparsely populated areas are part of everyday life, while robots support the elderly at home.
- **New virtual values?** Dilemmas related to ethical and societal values are emerging due to the mass use of technology in different aspects of people's lives. Although green technology mediates the environmental concerns and mitigates climate change, still ethical constraints remain in society. These mainly regard the extent of the technological use, the accelerated production, the limited data protection, which pose questions on people's fundamental rights and freedoms (based on European Strategy and Policy Analysis System, 2015) especially when it comes to e-governance which is today what shapes current politics. New rules on

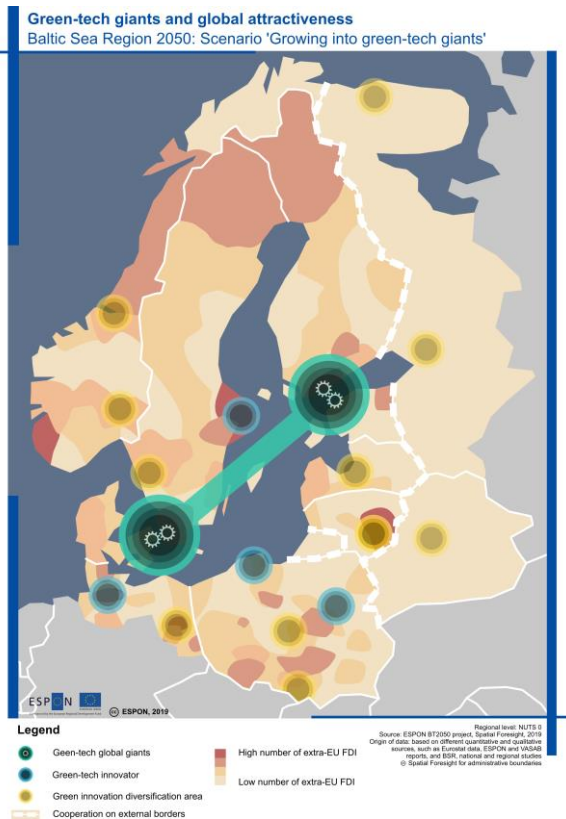


participatory governance mechanisms and creation of trust are necessary (World Economic Forum, 2018). This becomes relevant when social inequalities emerge due to the 'unlimited growth', with elite groups participating in and shaping decision making. Cyber-attacks are a common threat with not only businesses being hacked but also resulting in harming the global economy (World Economic Forum, 2018). Thus, cybersecurity has been elevated to a top priority, with blockchain technologies in support, while the development of ethical guidelines for the global competition seems necessary (based on European Strategy and Policy Analysis System, 2015).

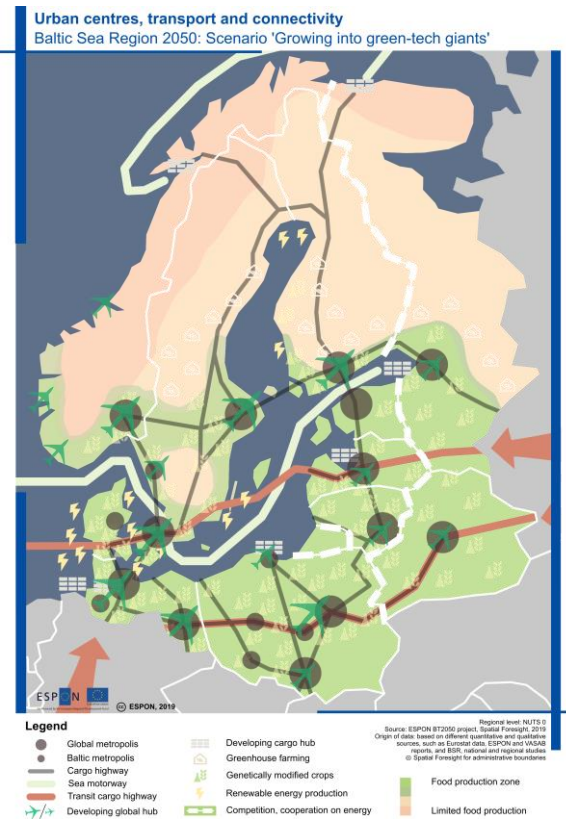
- **The neighbourhood relationship: A global 'coompetition'**. In 2050 the BSR is a global key player in green technology to increase its growth and development. Given the high growth prospects, the region is very attractive to FDI, increasing its global stand (based on ESPON, 2018). Overall, European and cooperation values are much respected where relevant; nevertheless, there is high global competition, e.g. with other technologically advanced regions in the European Union, as well as other global players in technology, such as China, India or the United States. The relationship with Russia is characterised by limited cooperation, given especially the fact that the BSR is still dependent but to a lesser extent on energy supply from Russia than 30 years ago. Cooperation is mainly structured, along with cybersecurity issues and data protection.
- **To EU and beyond.** Despite a grand opening to global investors and markets which has enhanced the profile of the Baltic Sea Region, the European Union remains an important partner. The Baltic Sea Region follows closely the EU policies and in some cases is a frontrunner in implementing them or even an initiator to them, especially when it comes to technology. Policies related to growth and green growth, job creation and innovation are among those of the highest interest. Cohesion Policy needs to be strengthened in the region, as more cohesion and inclusiveness is needed, given that social and spatial disparities have increased over the last years.

### **Territorial implications of the 'Growing into green-tech giants' scenario**

Where in the Baltic Sea Region are the effects of this scenario more visible? What types of territories are more affected in a scenario with a limited ecological footprint? Drawing upon the scenario described in the previous section, this section presents the territorial implications.



Map 10: Green-tech giants and global attractiveness, Baltic Sea Region 2050. Scenario 'Growing into green-tech giants'



Map 11: Urban centres, transport and connectivity, Baltic Sea Region 2050. Scenario 'Growing into green-tech giants'

**A polarised urban Baltic Sea Region.** Green technology requires high tech innovation and a knowledge-based economy, which are not to be found in every place in the BSR. In this scenario, an increasing concentration of economic activity around the present metropolitan areas and growth centres, which in most cases are the capital cities is observed. The highest polarisation is to be seen between capital cities of the North Baltic Sea states and those in the south. In economic terms, a steep growth is seen in the present tech hubs. These come up with high added-value economic activity, mostly in knowledge-intensive sectors. While less innovative regions, have a more labour intense focus, but also higher chances to leapfrog directly to green economy innovation, lagging behind in other innovation forms.

**Green-tech-four global giants.** This scenario boosts the global profile of the region and accelerated growth. Innovation is to be found mainly in larger urban areas which concentrate resources, capital and skilled personnel. Green technology specialisation is located in regions that have had the potential for growing innovation with a focus on greening the economy and have had a leading innovation profile. The four global Greentech giants of the BSR are the urban areas of Copenhagen and Malmö and Helsinki and Tallinn. The cooperation network between and among the four key global green giants is observed, to foster green technology and exchange knowledge.

**Other urban green innovators follow.** Besides the core four global Greentech giants, other places that are still strong innovators and have the potential to innovate further on green technology follow. These are again urban areas in Germany, Poland and Sweden, and more specifically Hamburg, Gdansk, Warsaw and Stockholm with this potential.

**Green innovation happens more in urban centres.** A green diversification area is built across a number of urban areas in the BSR. These are urban centres which are rather more moderate innovators, with high potential to develop technologies for a greener economy. This diversification area is comprised of the urban centres of Trondheim, Gothenburg, Berlin, Lodz, Krakow, Vilnius and Riga.

**FDIs a global investors attraction.** Certainly, innovation needs capital, and private investors from anywhere in the world need to be attracted to the added value of the region to invest. FDIs are an indication of where capital is invested in the BSR and can show an indication of where further innovation potential can be developed. A high number of foreign direct investments is concentrated in the area of Helsinki-Uusima, Stockholm, Malmo, some of which are also among the green tech giants, followed by Vilnius and Krakow. Less potential is seen in the rest of Finland and southern parts of Norway, excluding Stavanger, and Sweden, excluding Malmo and Stockholm.

**Transport hubs gaining importance.** Transport and accessibility play a fundamental role in this scenario. Goods need to be transferred across and beyond the BSR, and good connections are vital. Furthermore, new routes are developed linking more efficiently and effectively the West to the East markets and more specifically China, through extensions of the Belt and Road initiative. Transit cargo highways stretch from the East either through the Baltic Sea or through Poland, towards bigger harbours in the Netherlands or Belgium. New sea highways are also designed beyond Norway, Finland and Murmansk, facilitating accessibility to the East through new Arctic paths.

**Global air connections stay global. The rest follows.** The role and connections of the airport hubs that serve as freight gateways of the region are increased. Hence, the airports of Stockholm, Copenhagen, Helsinki remaining global hubs and increasing further. The airport of Warsaw, in particular, has gradually become a global gateway, being a bridge between the East and the West. Smaller airports continue playing a role in other major cities of the region, while they mainly serve for passenger flights.

**All eyes on the sea harbours.** Ports and harbours have always played a pivotal role in the BSR. In this scenario, ports continue playing a key part in the economic growth of the region. Therefore, places that have big global ports continue having a role in 2050, or even gaining more importance with new sea routes. This is particularly the case of the ports in Gdansk and Riga, but also the German ports in Hamburg and Bremen. Ports in Russia, such as the Ust-Luga port remains a high calibre gateway.

**Renewables production in limited places.** Places with potential on renewable energies or with adequate infrastructure for renewable energies have a higher potential to produce cleaner energy. Such potential is mainly located around Denmark and north of Germany, the South of Sweden, in the coastal area between Sweden and Finland. At the same time, regions that are coal transition regions face more difficulties towards a cleaner energy footprint and hence, more innovation in that respect is needed. Research in new energy forms facilitates cleaner activities.

**Smart farming is for all and gives a solution that affects most territories.** Although the food production zone regards mainly the south part of the BSR, excluding the large northern parts of Sweden and Finland and most of Norway, these places can apply smart farming solutions and new technologies to change this pattern. It is not only more genetically modified crops that are more widespread, nor the monitoring of the different agricultural activities and changes so as to adjust through the smart farming solution. It is also the expansion towards the north of the region and application of greenhouse farming, which, thanks to the cleaner energy, is available also in the least agricultural production parts of the region.

**External relations in 'coompetition'.** Cooperation and competition in the region are interchangeable, meaning that business and industries in the region cooperate in topics of interest and profit while competing when their interests are different. The relationship with Russia and Belarus is in tension, especially regarding cyber-attacks, sanctions and connectivity.

## **2.3 Analysing the BT2050 scenarios**

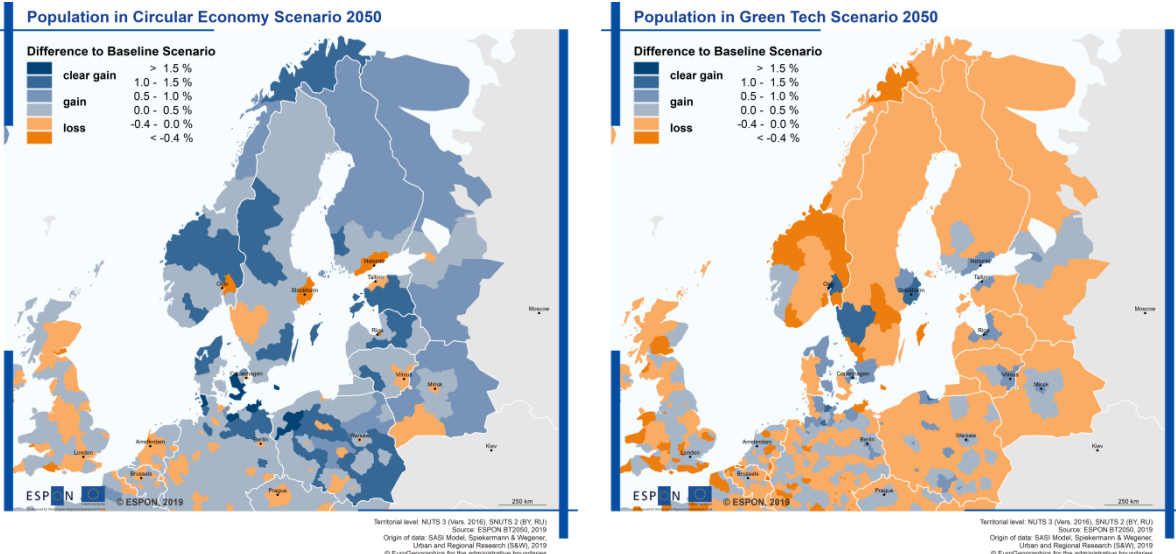
In this section, the Baseline Scenario is used to benchmark the territorial scenarios for the future of the Baltic Sea Region in 2050. It follows a discussion about the BT2050 and ET2050 scenarios.

### **2.3.1 The Baseline Scenario and the territorial scenarios**

As the Baseline Scenario describes a likely development if existing trends and policy practices continue being in effect until 2050, it is used as a reference for the two alternative territorial scenarios. The comparison between the scenarios (baseline x territorial) was carried out, adjusting some of the parameters of the SASI Model to provide projections also for the two territorial scenarios. This aggregate model, however, is not capable of incorporating all the assumptions made for the two scenarios. But some of the guiding principles for the two scenarios could be translated into changing assumptions in the SASI model. For example, adjusting the behaviour of certain economic sectors in the two scenarios, adapting the way transport and accessibility might develop, changing the education level of the population, modifying the importance of R&D investments as well as aspects concerning to the quality of life and political integration with neighbours outside the EU. It should be highlighted, however, that this exercise was highly explorative, to provide further impressions on how the BSR might develop territorially considering the main assumptions of the two alternative scenarios. These territorial development pathways are presented as deviations from the Baseline Scenario.

As Map 12 indicates, the two alternative scenarios might lead to somewhat different population development. Nevertheless, the overall magnitude is quite small and represents only a few per cent difference to the Baseline Scenario. For example, the 'Well-being in a C-E' describes a development that benefits the population development in rural and peripheral regions. Nevertheless, in relation to the rural population in the Baseline Scenario, the difference is only up to two per cent. On the other hand, cities, in particular in capital cities, would have fewer inhabitants; however, the comparative loss would be less than one per cent. The 'Growing into a green-tech giant' yields a different pattern. Here, the metropolitan areas are drivers of the economy and, as such, are expected to have a higher urban population, whereas the remaining, mostly rural areas might have somewhat fewer inhabitants than in

the Baseline Scenario. Again, the changes to be expected from such a scenario by 2050 are relatively small.



Map 12: Population difference to Baseline Scenario in 2050, Circular Economy Scenario (left), Green-Tech Scenario (right)  
 Source: S&W, SASI Model, 2019

Looking at the population differences to the Baseline Scenario from the urban-rural typology, the observations made above are underpinned (Figure 12). In the BSR as a whole, but also in each country, rural areas would have clear population gains at the expense of urban areas in the ‘Well-being in a C-E’ scenario. The ‘Growing into a green-tech giant’, with its focus on metropolitan areas, would lead to population gains in cities, and losses in rural areas. It is to be noted that mainly based on the assumption that the BSR would do the economic reorientation better than the rest of Europe, the BSR would see slight population increases in both scenarios compared to the Baseline Scenario.

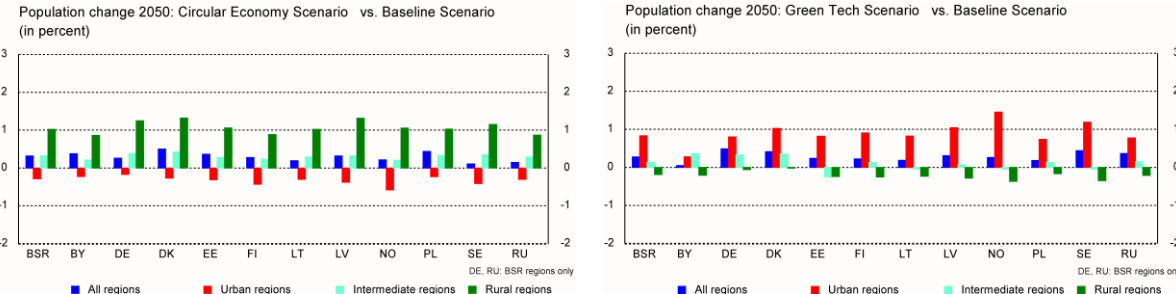
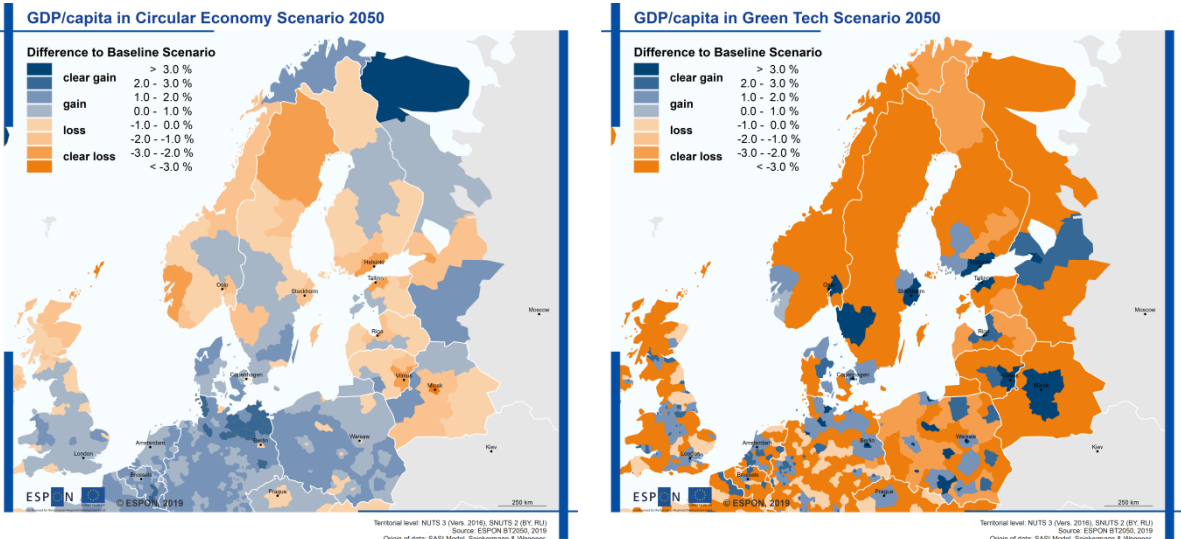


Figure 12: Population difference to Baseline Scenario in 2050 by country and territorial typology in the BSR, Circular Economy Scenario (left), Green-Tech Scenario (right)  
 Source: S&W, SASI Model, 2019

Also, the economic development paths of the two alternative scenarios lead to a differentiation of areas in the BSR benefitting or not (Map 13). However, the territorial pattern of the ‘Well-being in a C-E’ scenario is less clear than its population development. Capital regions, in particular in the Nordic Countries are having lower GDP per capita than in the Baseline Scenario; rural areas, in particular, those in Poland and the Russian and German BSR regions are relatively gaining. However, this seems to be overlaid by a core-periphery pattern as some of the more peripheral rural regions are not gaining.

For the 'Growing into a green-tech giant', on the other hand, a very distinct spatial development pattern is to be expected. The metropolitan areas are the drivers of this new economy and also the areas benefitting most. This is at the relative expense of the non-metropolitan areas that apparently do not benefit from the economic performance of the forerunners.



Map 13: GDP/capita difference to Baseline Scenario in 2050, Circular Economy Scenario (left), Green-Tech Scenario (right)  
 Source: S&W, SASI Model, 2019

The GDP per capita differences to the Baseline Scenario seen from the urban-rural typology are giving different messages for the two scenarios (Figure 13). In the BSR as a whole, but also in each country, rural areas would see comparable gains in GDP per capita in the 'Well-being in a C-E' scenario, in particular in the German and Russian parts of the BSR, and in Poland, Lithuania and Belarus. Cities would have lower economic performance than in the Baseline Scenario, in particular in most of the Nordic countries, but not in Poland and German BSR regions. Completely different is the relative performance of region types in the 'Growing into a green-tech giant' scenario. Urban regions in all countries would have addition in GDP per capita of more than five per cent compared to the reference; rural areas would have less of up to minus three per cent. Again, it has to be noted that the BSR as a whole would have higher GDP as the assumption is that the BSR would do the economic transition towards the scenario-specific new economic base better than the rest of Europe.

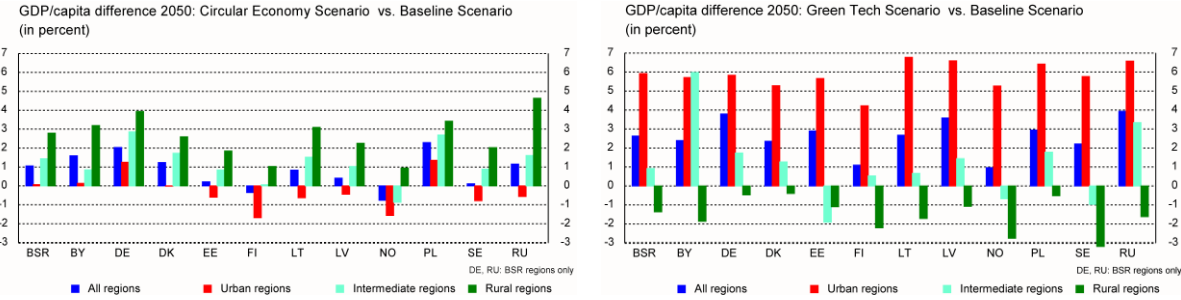


Figure 13: GDP/capita difference to Baseline Scenario in 2050 by country and territorial typology in the BSR, Circular Economy Scenario (left), Green-Tech Scenario (right)  
 Source: S&W, SASI Model, 2019

The territorial orientation of the two alternative scenarios is very distinct. On the one hand, the rural orientation of the 'Well-being in a C-E' scenario leads to a relative catching up of rural areas. Such a scenario might help to reduce spatial imbalances between different region types within the BSR. On the other hand, the metropolitan orientation of the 'Growing into green-tech giant' scenario leads to a further upturn of cities and urban areas in the BSR; such a scenario would increase the spatial imbalances between different region types within the BSR. However, if aggregate territorial cohesion within the BSR is assessed with the same indicator as for the Baseline Scenario, the two scenarios do hardly differ from the Baseline Scenario. The 'Well-being in a C-E' scenario does a little bit better while the 'Growing into green-tech giant' scenario is a little bit less cohesive. But all three scenarios are clearly leading towards territorial cohesion within the BSR, and the main reason is that lagging parts of the BSR are growing faster in all scenarios than regions better off today.

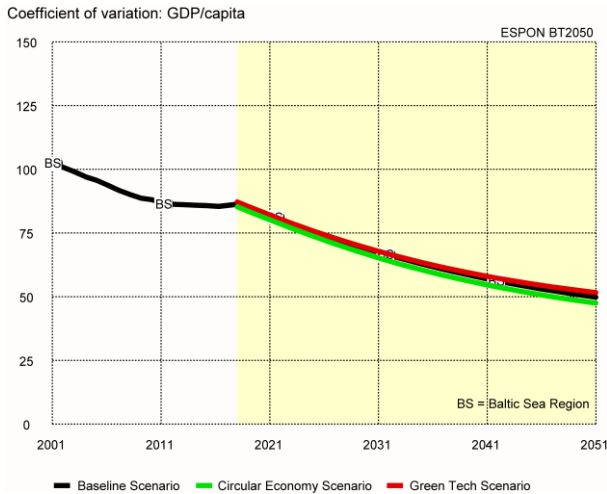


Figure 14: Territorial cohesion in the BSR 2001-2050, Baseline, Circular Economy and Green Tech Scenarios  
 Source: S&W, SASI Model, 2019

### 2.3.2 BT2050 and ET2050

The first scenario of the ET 2050 project describes a market-based growth favouring large metropolises in Europe. According to this scenario, capital and global metropolitan regions and existing global gateways grow and develop further. This development is related to high economic growth and increase in global competitiveness, as one of the Europe 2020 goals. In this case, international connectivity networks play a paramount role. As regards the Baltic Sea Region, it is mainly Stockholm, Copenhagen, Hamburg and Berlin the key economic drivers and key global gateways of most importance, with other metropolitan areas or capital cities following (ESPON, 2014b)

The 'Growing into tech-giants' scenario also sees a strong concentration in urban and metropolitan areas, with a strong focus on green technology and innovation. These areas are the key drivers of the economy through green technology. In this case, there are two cross-border global green technology networks that are global players, namely Helsinki-Tallinn and Copenhagen-Malmö. Other urban areas with innovation and technology focus follow. As in the ET 2050 scenario, transport hubs and accessibility are of utmost importance.



A second scenario of the ET 2050 project describes local and European initiatives promoting small cities and less developed regions. In this scenario, there is a strong place-based approach focusing on urban and rural territories play an important role in developing a paradigm shift of changing consumption patterns in response to energy scarcity and climate change challenges. As regards the Baltic Sea Region, such regional networks are rather seen across these types of territories within different member states, rather than across them. (ESPON, 2014b)

The 'Well-being in a circular economy' scenario also sees a strong role in small and medium-sized cities and regional networks, within or across regions. As in the ET 2050 scenario, a more rationalised territorial pattern is observed, where second-tier and small and medium-sized cities are the epicentres of territorial development. Transport hubs become secondary in this scenario, reflecting on the reduced budgets for long-distance transport of the ET 2050 scenario.

The last scenario of the ET 2050 project looks at public policies promoting secondary city networks, where state and regional capital are the key territorial changes receivers. Here, links between the different centres across the Baltic Sea Region regions and cities, give a balanced and polycentric territorial picture. Although inter-regional networks and intra urban links are visible in both scenarios, especially through transport, there is no further commonality between the different territorial scenarios. (based on ESPON, 2014)

Such a reflection does not aim to compare the different scenarios or make any selection. It aims to show that also at a broader picture, a combination or not of different paths or policies may have similar or distinct territorial implications.



### 3 Policy recommendations

The BT2050 scenarios – baseline and territorial – were the means to inform BSR spatial policy. This section gives an account of the process and outcomes of the policy recommendations to update the VASAB Long Term Perspective.

#### 3.1 Assessment of VASAB documents

Two VASAB documents are the reference to the proposition of the policy recommendations: The VASAB- LTP (VASAB, 2010b) and the “Background Synthesis Document VASAB LTP for the Territorial Development of the Baltic Sea Region” (VASAB, 2010a). The first document – VASAB-LTP – is structured around three main goals: (i) Promoting urban networking and urban-rural cooperation, (ii) Improving internal and external accessibility, and (iii) Enhancing maritime spatial planning and management. Based on these overarching goals, 22 specific actions are proposed, meant to achieve territorial cohesion. In 2014, during the 66<sup>th</sup> CSPD/BSR meeting in Helsinki, this document was updated, and five actions were dismissed. Some of the contents of the remaining 17 actions, were slightly modified. As Figure 15 illustrates the 17 specific actions from VASAB-LTP are correlated to the nine thematic areas outlined in the VASAB LTP Background Synthesis Document (VASAB, 2010a), which are: (i) economic integration, growth and trade; (ii) metropolises as main hubs and centres of innovation; (iii) small and medium-sized cities; (iv) urban-rural shift and relations; (v) relations with EU east neighbours (vi) accessibility/transport (vii) energy; (viii) technology - Internet and (ix) sea use and maritime spatial planning. With the aim of acknowledging urgent challenges two other thematic areas were included in the analysis: (x) environment and (xi) society.

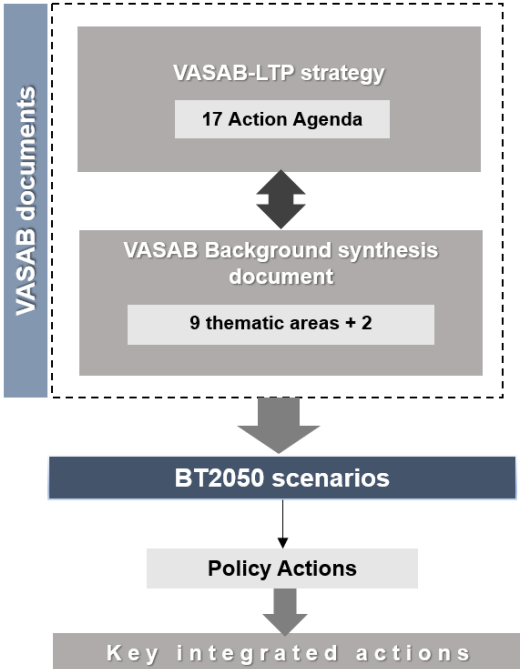


Figure 15: Framework for policy recommendation

As the key integrated actions were designed considering the BT2050 scenarios and, as such, they acknowledge possible events that may take place in the future, the comparison between these and the current VASAB- actions is likely to indicate which current actions seem irrelevant, which ones should be continued in their current form and which should be adapted to the new situation.

The comparison between the key integrated and the current VASAB actions relied on the analysis of the document, as well as on the opinions of the stakeholders who participated in the focus group in Copenhagen. Among other exercises, the stakeholders assessed the level of performance and timeliness of the actions proposed in VASAB LTP. On this basis, the researchers have made a final assessment of the convergence of VASAB LTP recommendations and integrated actions. Table 1 describes the main outcomes of this exercise. The third column in the table indicates in which direction the existing actions should be modified (defined in VASAB LTP).

Table 1: Analysis of the key integrated actions concerning VASAB LTP actions

Key integrated actions	Relevant VASAB LTP actions (maybe continued)	Main directions of changes to the proposed actions
Strengthening the network of Baltic medium-size cities	<p><b>Action 5.</b> Create and spread within the BSR a model solution on using a stakeholder approach in enhancing the potential of small and medium-sized cities and towns within the metropolitan areas as international centres of innovation and specialised services.</p> <p><b>Action 8.</b> Activate transnational networking initiatives to facilitate the foreign direct investments into small and medium-sized cities outside the metropolitan areas, based on the documented success stories in the BSR and other macro-regions;</p>	Focus on medium-size cities
Supporting cross-border- service networks based on new technologies	<p><b>Action 6.</b> Consider launching cross-border cluster cooperation initiatives with North-West Russian entities in the economic branches with high BSR integration potential.</p> <p><b>Action 8.</b> Activate transnational networking initiatives to facilitate the foreign direct investments into small and medium-sized cities outside the metropolitan areas, based on the documented success stories in the BSR and other macro-regions;</p>	Not only new investments for economic development, but also the development of the public services (SEGI) More emphasis on the use of new technologies
Connecting the Baltic infrastructure at the regional level	<p><b>Action 10.</b> Address the obstacle of cross-border deficits in primary (TEN-T) and secondary (interregional connections) transport networks of the BSR countries for developing cross-border labour markets in the Region.</p> <p><b>Action 11.</b> During the revision of the EU transport policy and follow-up work on the EU Strategy for the Baltic Sea Region, consider the following examples of road and rail links, the current state of which pose the challenge for the integration of transport networks in the BSR from the macroregional perspective.</p> <p><b>Action 14.</b> Develop the Motorways of the Sea in the Baltic Sea Region as a systemic solution to enhance the cross-border scale integration and a transfer of goods between the EU, the eastern neighbours, Central Asia and the Far East.</p> <p><b>Action 16.</b> Analyse the territorial development implications of more East-West connections to secure a fully integrated BSR transmission grid</p>	More focus on the regional (secondary) networks

	<b>Action 17.</b> Consider a BSR Energy Supergrid to interconnect the power plants producing renewable energy in the BSR sea areas as a possible component of actions towards a fully integrated BSR transmission grid	
Supporting cross-border metropolises	<b>Action 1.</b> Develop and implement a BSR cooperation strategy for the metropolitan areas <b>Action 7.</b> Launch joint transnational and cross-border initiatives to combine the development of metropolitan areas and their rural surroundings in a better way	Continuation
Using the Baltic Sea assets wisely	<b>Action 15.</b> Initiate work on the intelligent sea transport corridors in the BSR (separated and electronically monitored traffic routes) by activating at least one pilot project for a corridor with high traffic volumes in an environmentally sensitive area <b>Action 18.</b> Analyse and demonstrate solutions for better utilisation of renewable resources on the pan-Baltic scale and thus a higher energy independency of the Region. <b>Action 21.</b> Prepare and implement demonstration projects for some Baltic Sea areas of severe use conflicts. <b>Action 22.</b> Initiate joint capacity building actions in maritime spatial planning to ensure the exchange of experience, promote education availability and to increase competence in that field at the BSR level.	More focus on the local endogenous assets
Adapting to climate change, water and green cross-border cluster	<b>Action 17.</b> Consider a BSR Energy Supergrid to interconnect the power plants producing renewable energy in the BSR sea areas as a possible component of actions towards a fully integrated BSR transmission grid <b>Action 18.</b> Analyse and demonstrate solutions for better utilization of renewable resources on the pan-Baltic scale and thus a higher energy independency of the Region.	More focus on climate change adaptation, water resources and renewable energy
Attracting migrants to the BSR (potential action)	<b>Action 9.</b> Organise a pan-Baltic conference to work out measures for counteracting the impact the demographic trends and labour market development have on the urban-rural polarisation and social cohesion in the Region.	More focus on the residential attractiveness (for migrants)
Improving BSR integration through data integration, monitoring, research and spatial planning	<b>Action 2.</b> Implement transnational networking actions to connect the research and development potentials of the eastern and western BSR metropolitan areas and thereby to enhance the innovation potential of the Region. <b>Action 20.</b> Arrange a BSR conference together with relevant stakeholders in order to develop a common approach for the Baltic Sea Maritime Spatial Planning. <b>Action 22.</b> Initiate joint capacity building actions in maritime spatial planning to ensure the exchange of experience, promote education availability and to increase competence in that field at the BSR level.	Indicators for Blue Growth, as the overall social-economic monitoring on the Baltic Sea currently are missing and are needed

### 3.2 Key integrated actions for the future of the BSR

The eight key integrated actions address the challenges that the BSR is currently facing and will probably face in the perspective of 2050. The proposal of these integrated actions was based on the following assumptions: (i) their spatial character and the possibility of implementing policies at particular territorial unit; (ii) their significance from the point of view of more than one thematic area; (iii) their cross border character of the problems being addressed; (iv) their possibility of implementation at the macro-regional

level; and (v) their compatibility to BSR specific features described in VASAB documents. The eight integrated actions are briefly described below.

**Strengthening the network of Baltic medium-size cities.** The medium-sized cities are in many BSR countries threatened with depopulation and loss of their functions, mainly to the advantage of the large metropolises. Ceasing this process is important irrespective of the socio-economic changes, described in the territorial scenarios. With the increase of importance of the circular economy and the renewed development of the production functions (e.g. manufacturing), the medium and small-sized towns may become the centres of territorial management, the locations of redistribution of goods and services. The objective is then to prepare these centres for their new role. If the further development of the BSR region relies on the spatial concentration of research and innovations in bigger cities, the small and medium-sized cities will need support to maintain their demographic and economic potential. The objective then is to stimulate the development of new functions and finding adequate niches on the new product and services markets. Besides, the zones of influence (FUAs) of the medium-sized towns within the BSR often exceed the national borders, including also the outer boundaries of the EU. Thereby it is important to remove the barriers, which might hamper the potential of the FUAs in the international dimension.

**Supporting cross-border service networks based on new technologies.** Technological advancements are an important element of both territorial scenarios for the BSR. The fundamental objective is to ensure that the BSR territories will benefit from these advancements. This implies the use of technology to improve quality of life while limiting the negative consequences for the environment (ecological footprint). The development of integrated – unified technologies and social standards for the entire BSR – and cross border systems of Services of General Interest (SGIs) is vital for ensuring adequate access to services to sparsely populated areas and/or to regions that face challenges with an ageing population. Support may be extended to technologies of the service systems such as Internet of Things, 3D printing, the international and national delivery systems with the use of drones, electromobility, alternative transport systems, virtual mobility, e-learning, e-medicine, self-sufficient regional energy supply.

**Connecting the Baltic infrastructure on the regional level.** The BSR has witnessed fast development of the transport and power infrastructure in recent decades. There has been a significant improvement in the accessibility, especially in the southern part of the macro-region. The projects currently underway shall contribute to the further extension of the network and the improvement of connectivity. Nevertheless, the extension of infrastructure may, indirectly, be one of the reasons for the polarization of development. In the BSR, one can observe, regions that profit and loose from the developments in transport infrastructure. In the scenario “Growing into green-tech giants”, the large projects underway shall be useful for the economy. If the development of the macro-region tends towards the regional structures, based on circular economy, the pan-European corridors and local network, should be prioritised. For particular regions, mainly peripheral, not only the connections with metropolises are necessary, but, especially, the internal connections and those with the directly adjacent areas. For a balanced territorial development, the finalisation of the main continental projects can be followed by the support of the BSR secondary networks. This may prevent the tunnel effect on peripheral areas.

Nowadays, the EU takes effectively advantage of the CEF (Connecting Europe Facility) instrument to support transport projects. Establishing a similar instrument at the BSR level (going beyond TEN, CBF – Connecting Baltic Facility) could be an alternative.

**Supporting cross-border metropolises.** Currently, most of the BSR population is concentrated in metropolitan areas, especially in the southern and eastern parts of the macro-region. Regardless of measures that aim ceasing depopulation and concentration of the economy in the larger cities, it is wise to extend support to the Baltic metropolises in the context of: structural changes (shift towards green economy), neighbourhood networking (enhance cooperation between metropolises located closer to each other), and full use of the functional areas, located on the other side of the political boundaries. If the current polarisation process continues, epicentres of green technologies may be established. Given this, the objective will be developing competitive advantages of the Baltic metropolises and also improve the quality of life in these metropolises. If the BSR future territorial development tends more towards the regional and local structures, based on circular economy, preventing the economic collapse of the large cities and safeguarding social inclusion of their inhabitants, shall remain significant. Limitation of the spatial scale of the socio-economic interactions shall be the prerequisite for the support to the cooperation between the neighbouring metropolises.

**Using the Baltic Sea assets wisely.** The Baltic Sea is the ecological, the economic, and, increasingly, the social basis (residential attractiveness, quality of life) of the macro-region. The focus on the sea as the main asset and the natural link between the different countries of the region facilitates the implementation of the EU policies at the macro-regional level. This allows countries to cooperate to manage issues that cannot be dealt at the national level (e.g. environmental). Drawing upon the scenarios, it is important to support initiatives enhancing local and cross border cooperation favouring the sustainable use of resources, in particular, the improvement of living conditions of the local communities. These activities include, for instance, sustainable fisheries, sustainable tourism that cares for the preservation of local assets, local cabotage (support for small havens), implementation of the local power systems based on renewables, revitalization of coastal settlements in connection with blue bio-economy (e.g. mussels, algae, seaweeds, aquaculture, tourism). Cooperation networks of the isolated areas (islands, peninsulas) is also an important element.

**Adapting to climate change: water and green trans-border clusters.** The effects of climate change (e.g. melting polar ice shields, floods, increasing sea levels, and temperatures) are expected to intensify in the coming decades. Like any other region in the world, the BSR will be affected by these threats. Therefore, policies to cope and minimise the effects of climate change are of prime importance for the future of the region. In the case of an increased significance of the circular economy, the contribution of governments and the cross border organisations, including VASAB, to the activities aiming at both mitigation of and adaptation to climate change is fundamental. Some measures may include financial incentives for climate-oriented actions (tax reliefs and other similar benefits), and also the introduction of additional taxes that aim at inhibiting unsustainable practices (e.g. Pigouvian taxes). Joint international initiatives with the purpose of sustainably protect and manage of resources at the local level and cross-border level (biodiversity) and also cooperation at the international level for the Baltic

Sea basin in case of extreme events (droughts, floods, fires, hurricanes) should be prioritised. This also applies to areas at risk due to the sea-level rise and may include the development of common standards (e.g. for road construction and other facilities in such regions). Common policies guiding the management of limited resources (e.g. water), sustainable forestry, including mutual assistance in emergency services (e.g. fire brigades) should also be coordinated at the international level. Further, it is also essential to boost cooperation to create and/or maintain ecological corridors and joint reforestation programmes across national borders.

**Attracting migrants to the BSR.** The expected territorial changes will most probably result in further intensification of migrations and the associated shifts in the demographic structure. Cultural transformations (decrease in childbearing), internal migration towards large metropolitan areas, suburbanisation processes, international migration within the EU (including those inside the BSR), migratory pressure from the third countries, destabilisation of the demographic structure in regions with out-migration (e.g. ageing, gender unbalance) are some of the current processes. These processes, however, take place unevenly over the BSR.

At the BSR level, the actions ought to strive for a balanced demographic and spatial population structure in the macro-region. This may require measures to enhance residential attractiveness of the particular regions, so as to, prevent depopulation, attract migrants from the outside of the BSR and the EU. Facilitating migration between Russia and Belarus is an important dimension of this action.

**Improving BSR integration through data integration, monitoring, research and spatial planning.** Environmental demographic and economic changes, occurring in the area of the BSR, influence the spatial development of the region. This applies not only to the whole macro-region but also to the regional and local units, including the cross-border areas. There is an increasing need for comprehensive monitoring, in-depth studies, and integrated spatial planning, as the foundations for effective territorial governance. Therefore, it seems wise to undertake actions that ought to encompass: (i) constant monitoring of the socio-economic changes in the BSR including flows (e.g. people, financial, knowledge) within the macro-region and between the macro-region and the rest of the EU and other countries; (ii) perform territorial impact assessment (TIA) for the strategic documents, concerning BSR (EUS BSR) (iii) integration of the spatial development plans for the maritime areas, elaborated in particular countries of the BSR and (iv) to develop indicators also for Blue Growth, as the overall social-economic monitoring on the Baltic Sea currently is missing.

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