ESPON

ET2050
Territorial Scenarios and Visions for Europe

Project 2013/1/19

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MAIN REPORT

EUROPEAN UNION
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This report presents a more detailed overview of the analytical approach to be applied by the ET2050 ESPON project. This Applied Research Project is conducted within the framework of the ESPON 2013 Programme, partly financed by the European Regional Development Fund.

The partnership behind the ESPON Programme consists of the EU Commission and the Member States of the EU27, plus Iceland, Liechtenstein, Norway and Switzerland. Each partner is represented in the ESPON Monitoring Committee.

The approach presented in the report may not necessarily reflect the opinion of the members of the ESPON Monitoring Committee.

Information on the ESPON Programme and projects can be found on www.espon.eu

The web site provides the possibility to download and examine the most recent documents produced by finalised and ongoing ESPON projects.

This basic report exists only in an electronic version.

"Making Europe Open and Polycentric"

Vision and roadmap for the European Territory towards 2050

"To seek Europe, is to make it!"
Zygmunt Bauman, An Adventure called Europe (2004)

June 2014

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Table of Contents

MAIN REPORT

SCIENTIFIC REPORT

Table of Figures

Glossary

Blue Banana	Discontinuous corridor of urbanisation in Western Europe stretching approximately from North West England to Northern Italy
BRIC	Brazil, Russia, India, China
BSR	Baltic Sea Region
CAP	Common Agricultural Policy
Carbon intensity	GHG emissions elasticity in relation to energy consumption
CCS	Carbon Capture and Storage
CEEC	Central and Eastern European Countries (EU12 + Croatia)
CEMAT	European Conference of Ministers responsible for Regional Planning
CF	Cohesion Funds
CoR	Committee of the Regions
CoR COTER	Commission for Territorial Cohesion of the Committee of the Regions
CP	Cohesion Policy
CTP	Common Transport Policy
DG REGIO	Directorate General for Regional Policy
EC REGI	Regional Development Committee of the European Parliament
EFTA	European Free Trade Association, comprising Iceland, Norway, Switzerland, Liechtenstein
Energy intensity	Energy consumption elasticity in relation to GDP growth
EP	European Parliament
ERDF	European Regional Development Fund
ESDP	European Spatial Development Prospective, 1999
ESF	European Social Fund
ESPON	European Spatial Planning Observatory Network
ESPON 1.1.1	ESPON project developed in 2005 dealing with polycentricity. *"Urban areas as nodes in a polycentric development"*
ESPON Area	Countries integrating the EU28 and EFTA countries
EU12	Estonia, Latvia, Lithuania, Poland, Czech Republic, Slovakia, Hungary, Romania, Bulgaria, Slovenia, Malta, Cyprus
EU13	EU12 plus Croatia
EU15	Belgium, Netherlands, Luxemburg, France, Italy, Germany, United Kingdom, Ireland, Greece, Portugal, Spain, Austria, Denmark, Sweden, Finland
EU2020S	Europe 2020 Strategy
Europe 2020	Europe 2020 Strategy
FDI	Foreign Direct Investment
GHG	Green House Gas
ITS	Intelligent Transportation System
Land-take	Annual surface being transformed from a natural state to artificial land
MASST3	econometric and macroeconomic partial equilibrium model developed by POLIMI (Milano), applied for economic prospects in ET2050.
METRONAMICA	dynamic and spatially explicit cellular automata-based land use model developed by RIKS (Maastricht), applied for land-take prospects in ET2050
MOSAIC	integrated modal split and assignment model developed by MCRIT (Barcelona) , applied for transport prospects in ET2050
MULTIPOLES	cohort-component, multistate, hierarchical population projection model developed by CEFMR/IOM (Warsaw) , applied for demographic prospects in ET2050

NAFTA	North American Free Trade Agreement, integrating Canada, USA and Mexico
OD	Origin-Destination (transport matrixes representing trips between different territories)
ODR	Old-age dependency ratio, defined as (Pop > 64) / (Pop 16-64)
pax	Abbreviation of passenger
pkm	Passenger·kilometre. Unit of passenger transportation quantity
PPP	Public-private partnership
RES	Renewable energy sources
SASI	recursive simulation model of socio-economic development of regions in Europe developped by S&W (Dortmund), applied for integrated multi-sector long-term assessment of cohesion policy impacts in ET2050.
SF	Structural Funds
TA	Territorial Agenda of the European Union towards 2020
TA2020	Territorial Agenda of the European Union towards 2020
TEN	Trans-European transport networks
TEN-E	Trans-European transport networks of Energy and Telecomunications
TEN-T	Trans-European transport networks of Transport
TEU	twenty-foot equivalent unit. An inexact unit of cargo capacity often used to describe the capacity of container ships and container terminals
TFR	Total fertility rate (children born per woman)
TIA	Territorial Impact Assessment
tkm	Tonne·kilometre. Unit of freight transportation quantity
ULC	Unit Labour Cost
vkm	Vehicle·kilometre. Unit of vehicle transportation quantity

Presentation

- This document was produced by the "Scenarios and Vision for European Territory 2050" project (www.et2050.eu) of the ESPON Programme (www.espon.eu)[1]. Alternative scenarios for the European territory towards 2030 and 2050 are defined and assessed; a Vision and a political roadmap towards 2050 are proposed[2] .

- The document follows up the tradition on prospective studies and political visions in spatial development elaborated in Europe[3], in particular the ESDP (European Spatial Development Prospective, 1999), developed after the Europe 2000 and Europe 2000+ (DGXVI, now DGREGIO, 1991, 1994), taking into account the evolution of the last two decades and future prospects, in the 2008 crisis aftermath. Most recent European policy framework documents are taken as starting points[4].

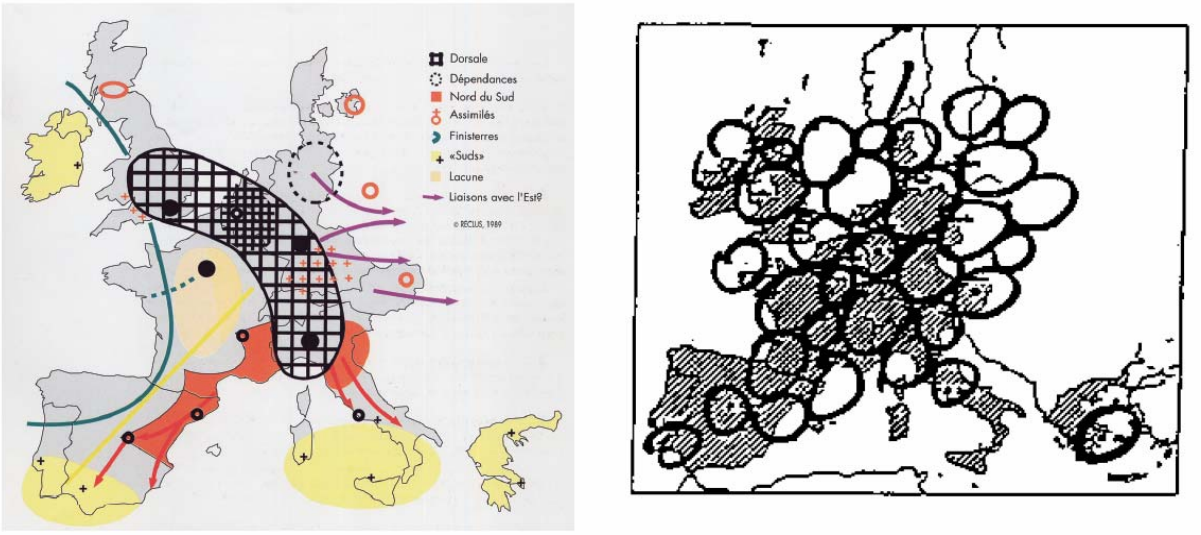

Illustration 1 Representation of European territorial trends (Blue Banana, Brunet 1989) and representation of a Vision for a polycentric Europe (Bunch of grapes, by Kunzmann and Wegener, 1991)

[1] "Europe" is often identified geographically, as the European continent, in this document; politically, it is often referred to the " European Union"

[2] The document was developed in the ESPON Scenarios and Vision project (**www.et2050.eu**), that begin in 2011. In it participated consultancy, research institutes and academic institutions. The project was led by **MCRIT** (Barcelona) and developed by the following public and private European institutions: **IGEAT** (Brussels), **TERSYN** (Strasbourg), **POLIMI** (Milan), **S&W** (Dortmund), **CEFMR/IOM** (Warsaw), **RIKS** (Maastricht), **Nordregio** (Stockholm), **RKK HAS** (Budapest), **WSE** (Warsaw), **UTH** (Thessalonica), **ISIS** (Rome) and **ERSILIA Foundation** (Barcelona). Full information is available at www.espon.eu, and at www.et2050.eu. The work is dedicated to Jacques Robert, Director of TERSYN, involved in European regional policies since late seventies until he passed away, during the early stage of this project.

3 Many prospective studies inspired this document, among them the "**Europe 2000**" project (Hall, 1976), the "**Geography of Europe's Futures**" (Masser, Svidén, Wegener, 1992), the **ESPON 3.2 project** (Robert, Lennert et alt., 2006), and the "**Global Europe**" (Sessa et alt., 2012). Other more recent studies and research project on European foresight were also reviewed, such as TRANSVISIONS, PASHMINA, FLAGSHIP, SCENAR, and LUMOCAP.

[4] Main policy references considered: **Europe 2020 Strategy, Green Paper on Territorial Cohesion, European Territorial Agenda 2020, Common Strategic Framework (CSF), ESIF 2014-2020 11 Thematic Objectives**, as well as the **roadmaps for Maritime Spatial Planning, Transport, Energy, and Resource Efficiency for 2050,** together with relevant European legislative documents, such as the **Single Market Act II**. Visions and territorial strategies defined at regional, national and trans-national scale in Europe, and neighbouring countries, were also considered.

- A participatory process with ESPON Monitoring Committee members representing European Union countries and those associated to the ESPON Programme was carried out in six scientific and policy-oriented workshops in Krakow (2011), Aalborg (2012), Paphos (2102), Dublin (2013), Vilnius (2013) and Nafplion (2014). Stakeholders and independent experts were consulted in a two workshops celebrated in Brussels (2013).

- During the working process, previous versions of the document were presented and discussed in the European Parliament (Regional Development Committee - REGI), the Committee of the Regions (Commission for Territorial Cohesion - COTER) and the European Commission (DG Regional and Urban Policy - DGREGIO).

- Annex 2 of this report documents the overall process of ET2050 until the elaboration of the Territorial Vision. This process is both integrated by scientific work (appraisal of the departing situation in the context of the crisis, implementation of a 2010-2050 Baseline based on modelling work, and design and elaboration of alternative territorial scenarios 2010-2030-2050, also based on modelling); and by political work (organisation of an long participatory process towards the elaboration of a consensus Territorial Vision for Europe in 2050). Annex 2 also provides hints directing the reader towards Volumes in the Scientific Report and other original documents in the www.et2050.eu website providing further detail on all project activities.

Paphos, 4-6 December 2012

Aalborg 13-14 June 2012

Brussels, 28 September 2012

Dublin, 12-14 June 2013

Warsaw 22 Nov 2012

Mrs. Huebner, 26 February 2013

European Parliament REGI, 25 June 2013

DGREGIO EC, 25 June 2013

Vision Workshop, October 2013

COTER, 9 October 2013

Committee of the Regions, 19 February 2014

Illustration 2 Images from a number of participatory activities (see www.et2050.eu)

The need to develop a Vision for the European Territory towards 2050

- ***Territory maters***. Europe is not a flat, empty space, free from development constraints, but an old civilised territory made of hundreds of thousands of small towns and cities of all sizes, a predominantly man-made landscape, an extremely diversified mosaic of regions with different geographic characteristics and lasting memories. Today Europe is a continent fragmented by administrative and political borders and territories in the western end of the Eurasian landmark. Geographic distance plays a different role nowadays; paradoxically, when the economic value of a place as a location diminishes because of de-territorialised information and communication networks, it regains its cultural and ecological values. On the other hand, while social and economic relations become less territorialised, as well as, to some extent, people's identities, governments remain territorialised**.** The urban growth in Europe is not concentrated in few fast growing megalopolis but distributed across complex networks of cities articulated at different geographic scales, from small towns in remote rural regions to global metropolis and gateways, from sparsely populated mountain areas and oceanic islands to densely urbanised coastal regions. Territory matters and European visions for the future should not be territorially blind.

- ***2050 is almost here.*** We live in a world of emerging economies, where the economic gravity centre of the planet has moved from the North Atlantic to the Pacific. A world of fast population growth and massive migrations towards new megalopolises, exponential increases of flows of information, goods, energy and other resources. Hundreds of millions of people are moving from poverty to middle classes worldwide but, at the same time, absolute social and regional disparities grow also in the most developed world, and across many European cities and regions. At the same time, we face amazing technological progress and major global environmental uncertainties. With increasing threats and opportunities, current policy matters and political choices have a paramount importance to prepare a sufficiently satisfying future for all.

- ***"Europe" is a "project" to be made.*** The Vision for the future of the European territory proposed and the political pathways necessary to achieve it, is based on the values and policy paradigms shaping the "European project" in the Treaty of Rome of 1956. But the stepwise process of building it brick by brick may be over after the 2008 crisis. Half a century later, there is today a disillusionment on Europe as a common project for all. The political geography of Europe remains heavily constrained by national narratives and borders. Cross-border relations are still very much limited to those regions where they always existed. Paradoxically, Europeans have become more mobile and social; as a result, economic relations between large cities across Europe and the rest of the world have increased exponentially in the latest twenty years. Nowadays, for many citizens and policy-makers, "More Europe" is not always the most rational, almost unavoidable, solution to any economic and political crisis, as it was perceived by most policy-makers in the late fifties. In the future, the European project will progress to an "ever closer union" only if it becomes closer to its citizens, with the creation of a common citizenship, sustained by an enlarged sense of European patriotism[5].

[5] A large number of European thinkers have analysed the European crisis and future prospects recently: **Anthony Giddens** (in *Turbulent and Mighty Continent*, 2014), **Ulrich Beck** (in *Deutsches Europa*, 2013), **Edgard Morin and Mauro Ceruti** (in *La Nostra Europa*, 2013), **John McCormick** (*Why Europe Matters*, 2013), **Martin Schulz** (*Der Geffesselte Riese. Europas letze Chance*, 2013), **Jürgen Habermas** (in *The Crisis of the European Union*, 2012), **Oswald Mosley** (*Europe: Faith and Plan*, 2012), **Enrico Letta and Lucio Caracciolo** (in *L'Europa e finita?*, 2010), among others.

- In Europe, any policy is local, in the sense that it has local impacts, and people are very sensitive to it. However, the diversity of places and development conditions are yet to be fully recognised and internalised into European policies, and the territorial dimension of European policies only begin to be developed, neither for Structural, Cohesion and Agricultural Funds. European policies are the end-result of a history of decisions taken since late fifties, often during complicated multi-party enlargement negotiations or following rulings of the European Court of Justice, and only shallow reforms were carried out afterwards[6]. Both the Cohesion Policy and the Common Agricultural Policy have no yet the explicit political goals and targets that other European policies have (e.g. monetary, environmental, energy or transport). At the same time, sectorial policies have developed strategies with a more or less explicit territorial dimension such as Transport and Energy (e.g. with the Trans-European Networks), and Environment (e.g. with Nature 2000). In this respect, the aim of developing territorial visions, plans and studies at a European scale is providing an integrated analysis of sectorial policies and therefore contributing to an increased territorial coherence in all of them.

[6] The **Social Funds, the European Investment Bank** and the free movement of labour was secured by Italy, the weakest economy among the European Economic Community in late fifties, in the Treaty of Rome (1956), as well as the **Common Agricultural Policy**, introduced by France, the most competitive agricultural sector. The **European Regional Development Fund** was created during the British accession aiming to assist its own regions as well as to balance its net contribution to the Community balance (about 80% of the funds are allocated to regions having less that 75% of European average GDP). It was only in 1985, with the arrival of the Single Market, the acceleration of European integration, the accession of Greece (1981), Spain and Portugal (1986), and the Single European Act (1986), that the Community cohesion (or regional) policy was officially launched as such, and the term "**Social and Economic Cohesion**" introduced. In 1988, when the Structural Funds were reformed, cross-border cooperation became eligible for funding from the Structural Funds, and the Community cooperation initiative **INTERREG-I** was set up two years later. The first generation of INTERREG programmes was initiated during the programming period 1989-1993 of the EU structural funds. **Cohesion funds** were created in the Treaty of Maastricht in 1992 to provide for national investments on transport and environmental infrastructure, supporting weakest economies after the adoption of a single currency, and the re-unification of Germany (1990). The process of enlargement to Eastern European countries, net recipients of Structural and Cohesion, and Agricultural funds also required specific reforms. The term "**Territorial Cohesion**" was first introduced in the Lisbon Treaty (2007), as rather ambiguous concept, that was further developed later on in the Green Paper in Territorial Cohesion (2007).

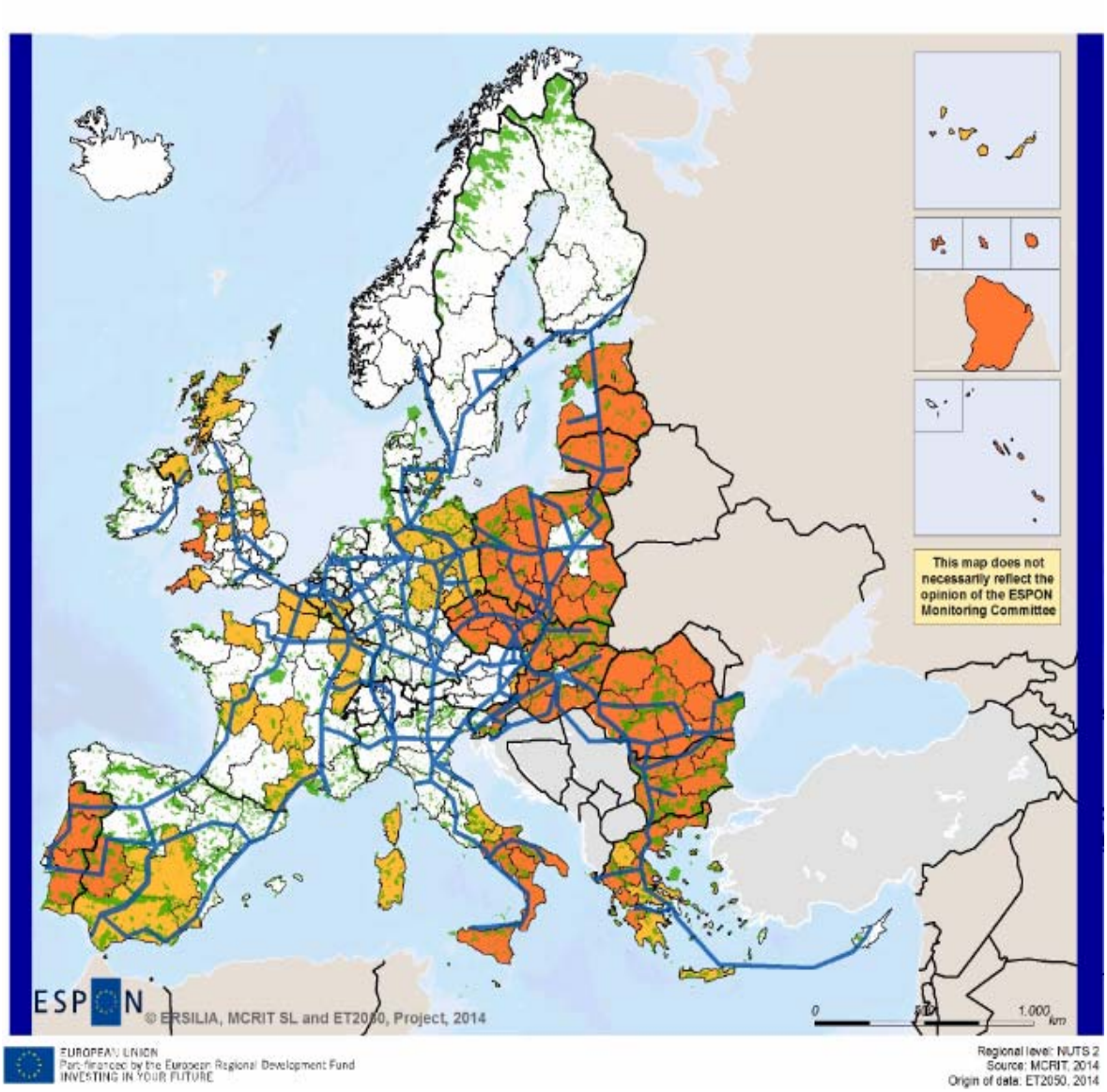

Illustration 3 Map of European sectorial policies with more explicit territorial dimension: Nature 2000 Network, Transport Policy and Structural Funds (2014)

The map above depicts across Europe sectorial policies having a direct territorial dimension: in green the European green network is represented, constituted by spaces of natural interest inscribed in the Natura 2000 network; in blue, the core corridors of the trans-European transport network (TEN-T core) approved by the European Parliament in 2013; areas in light and dark orange represent ERDF priority beneficiaries, in particular less developed and transition regions. Each of these policies has implications for territorial development, but may also represent territorial conditionings

Illustration 4 Collection of territorial visions and plans (2014)
–most visions and plans included in the map are not normative[7].

The first Vision to be constructed is the one coming from National Spatial Development Plans and Visions –a map which is unavoidable ambiguous since many countries do not have such a planning document, or it has very different legal status. The illustration above puts together a number of national territorial strategies across Europe. The resulting map is a fictional territorial strategy for Europe, only one among many possible assembling plans and visions from different countries.

[7] Even if each country, or region, have a different planning tradition and institutional framework there is a remarkable coincidence between by most National Spatial Plans, or Visions, favouring polycentric structures.

Our Lasting Values: "An open Community of equals with strong common institutions"

- The ***Treaty of Rome*** (1956), building up from previous agreements[8], established the first milestone towards the economic integration of European countries. The "European project" was conceived by leading policy-makers as process of gradual political integration, a stepwise process driven by increasing economic interdependency to overcome the nationalistic conflicts that caused the wars that destroyed Europe. According to the Treaty of Rome, Europe has to become ***an open Community of equals with common strong institutions*** promoting peace and deep democracy, sustainable development and solidarity, as well as social, economic and territorial cohesion.

- The ***Treaty of Lisbon*** (2007) states in Article 3 that the Union shall establish the Single Market as well as it shall work for the sustainable development of Europe based on balanced economic growth, a highly competitive social market economy and a high level of protection and improvement of the quality of the environment. It shall also promote economic, social and territorial cohesion, solidarity among Member States, and respect its rich cultural and linguistic diversity. These political aims are in line with the "European model": well governed democratic societies, with efficient public policies promoting prosperity for all which were the basis for the European economic recovery during the 1950s and 1960s.

- ***Deep democracy and good government***: predominance of the rule of law, compliance with the Charter of Fundamental Rights, and the rights of minorities. Transparent and accountable institutions, and a public service oriented to empower citizens and promote participatory government.

- ***Sustainable development, well-being and quality of life***: universally accessible human and harmonious development, encompassing three dimensions: economic, environmental and social[9].

- ***Enabling territorial diversity while ensuring cohesion***: overall harmonious development reducing disparities between regions, through considering both the efficiency and equity dimensions of development, and establishing two interdependent although different policy objectives: all regions must be given the opportunity to achieve their full potential, using their specific territorial assets and all citizens must enjoy an equivalent quality of life[10].

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[8] The first agreement was the **European Coal and Steel Community**, covering the industries that provided the industrial base for a war. Robert Schuman, French Minister, affirmed the 9th May 1950 in launching the agreement, that "any war between France and Germany would become not merely unthinkable, but materially impossible".

[9] In the **Lisbon Treaty**, in Article 3, three dimensions of cohesion are mentioned: economic, social and territorial. In particular the Union shall aim at reducing disparities between the levels of development of the various regions and the backwardness of the least favoured regions (Article 174).

[10] The goal of achieving '**harmonious development of economic activities'** was explicitly included the Treaty of Rome of 1956. The creation of an internal or single market removing barriers to the free circulation of people, services, goods and capital was at the core of the Treaty. Since the economic development of different European countries was uneven, the common market was supposed to generate uneven opportunities and threats across regions, risking to increase the economic gap among them, and their political cohesion. In 1975 the Structural Funds were created to provide infrastructure to less developed regions, after the accession of Denmark, U.K. and Ireland (Structural Funds are mostly allocated to less developed regions, those below 75% average GDP). With the accession of Greece (1981), Portugal, Spain (1986) and, the so-called **center-periphery pattern**, became more evident. The Single Act of 1986 at the same time reinforced the process of economic integration, and created the Cohesion Policy by reforming Structural Funds. After the reunification of Germany (1990), the Treaty of Maastricht in 1992 included both the monetary integration and

- ***Internal Solidarity***: common European space of stability, through shared work and/or diversified financial supports to guarantee financial stability, energy interdependence, migration and EU border management, adaptation to climate change, combating urban and rural poverty and unemployment, including commitments of responsibility by those receiving financial aid[11].

- ***Solidarity with the Neighbourhood regions and the rest of the world:*** promotion of the values of the "European model" –democracy, open and inclusive societies and environmental protection.

Europe now, in the crisis aftermath: Living with growing disparities

1. ***"Steady Decline" concerns vanished***. Looking back, during the 1990s and early 2000s, just before the 2008 crisis, the progress towards the Single Market was considered an overall successful history. The Treaty of Maastricht (1992), soon after the collapse of communism and the reunification of Germany, represented a major step towards economic and political integration; macroeconomic stability improved over the years, strong emphasis on cohesion was preserved and social welfare largely improved in less developed countries and regions in the South, as well as in the East. At that time, concerns were mostly related to the so-called "Steady Decline" of the more developed European economies[12] in comparison with the rest of the world, particularly USA and emerging markets in Asia**.** European more advanced countries seemed mature, slowly declining economies, with limited technologic innovation, not efficient-enough governance systems, loosing political influence at world level; the underperformance of more advanced European economies was considered striking because it contrasted not only with expectations but also with the past performance and the rest of the Western world accomplishments. With the crisis, these views suddenly changed.

2. ***The convergence process was suddenly reversed***. Southern countries, larger recipients of Cohesion and Structural Funds, have reduced their GDP[13] during the crisis, around 10% in Spain

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the so-called Cohesion funds (distributed among States bellow 90% average GDP to finance transport and environmental large projects), additional to the Structural Funds. New challenges grew from the enlargement towards Central and Eastern European counties between 2004 and 2007. From mid nineties, until the crisis of 2008, the process towards the Single Market and Cohesion policies were considered successful: European Union countries had continuous economic growth and relative disparities diminished, overall, while infrastructure and social welfare in less developed regions improved significantly.

[11] A clear distinction has to be made between cohesion policy and other financial solidarity mechanisms to tackle common financial, energy, climate change, migration and social challenges. While the latter are mostly new means of financial redistribution among Member States and Regions, the former is targeted to trigger institutional change and to break inefficiencies and social exclusion traps trough the provision of public goods and services by applying redistribution policies (some places may receive more from interventions than they contribute through taxation) that by nature are temporary and should not be permanent subsidies.

[12] Between 1995 and 2007, the western European Countries (EU15) grow at an average 2.43% yearly, against 3.17% of the USA, and well below emergent economies. Germany grew 1.60% on average, France 2.20% and Italy 1.53%; but 3.22 the UK.

[13] Even if the GDP measure of growth is to a large extent obsolete, it is nowadays the best indicator of economic growth, despite internal contradictions and statistical errors (e.g. the "hidden economy" may represent up to 25% of GDP in many countries). On the other hand, the goal of a socio-economic order is to sustainably improve human well-being and

and Italy, more than 20% in Greece, with very high official unemployment levels, especially among youngsters; at the same time, Central and Northern countries were stagnant or experienced minimal growth. Eastern European Countries have undergone different evolutions, some of them still growing at moderate level, like Poland, or the Baltic countries, after carrying on drastic fiscal reforms. In new member states capital regions have been the winners, while rural and eastern border regions are the losers[14]. Isolated, peripheral, socio-economically weak regions are much stronger hit by the crises than central, export-oriented regions with stronger adaptive capacity to react to external shocks.

3. ***Cohesion Policy funding impact in a period of crisis***. In 2010-2012, because of cut-backs in public expenditure, Cohesion Policy funding was approximately 20% of public investment in the EU, 60% in Cohesion countries and over 75% in some Eastern countries, playing a critical role to avoid further recession. In the past decades, however, in a context of accelerated growth, not always Cohesion Policy funding was wisely allocated to more productive investments. Future European structural intervention based on the European Cohesion Policy should integrate, together with giving priority to the productivity of local activities, concepts like vulnerability and sensitivity to external shocks, and exposure to the possibilities to be harmed. Building adaptive capacity on regional level should be one of key priorities for European Cohesion Policy.

4. ***New concerns on growing regional unbalances***. European concerns suddenly changed with the economic crisis, becoming not much focused on the relatively low growth of more developed European countries but on the increasing North-South and West-East economic unbalances, and their social and political impacts. The insufficient coordination and financial solidarity at a European level resulted in higher costs for all. The rapid growth in Southern countries, leading to great social welfare improvements, proved to be financially unsustainable due to the lack of improvement in productivity. The growth in Easter countries was perceived as vulnerable because of the dominant role of foreign direct investments and their volatility. After one-, one-and-half decades of catching-up period, the comparatively faster growth rates of lagging regions stopped in 2007-2009. Although global financial capital has, undeniably, come to play an important role in all 'transition' economies, many post-socialist countries in the Centre and East of Europe were amongst the hardest hit, and Central and Eastern Europe was falling behind its peers in other emerging markets. The global financial and economic crisis exposed the weaknesses of the post-socialist economic development model in East-Central Europe, as well as in many Southern European regions, where growth and welfare increases were not only related to productivity improvements but also to the inflow of resources, from migrants to foreign investments in many sectors, including speculative markets, and excess of consumption resulting in disproportionate levels of private debt.

5. ***More social disparities and increasing risks of poverty***. Austerity policies reduced social expenditure and further increased social disparities. While more developed countries are growing again because of productivity increases, less developed countries begin to grow because unemployment levels are reduced thanks to wage reductions in real terms. Low-income-based competitiveness represents a development trap that counteracts the accumulation of financial

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quality of life, whereby material consumption are means to that end, not ends in themselves. A new frame needs to be set up to account features of well-being "beyond GDP" (adding measures of the natural, human and social capital, and a better measurement of intangibles assets).

[14] Out of the 132 European regions below GDP per capita average in 2010, 84 are expected to experience further regression from EU average (65%), according to MASST model. Large urban agglomerations in Central Europe already constitute very significant magnets for internal migrations: Warsaw, Budapest, Vienna with Lower Austria, Bucharest, Sofia, but also Athens in the south and Stockholm in the north.

and social capital, hinders upgrading to high value-added production, and encourages migration to higher-wage regions. The reduction of salaries is uneven across sectors and social classes. Risk of poverty is pronounced not only in Southern or Eastern Countries, also in cities and regions in most developed countries. The "informal sector" or "shadow economy" may represent now up to 20% of the GDP in some countries and, together with family ties and non-governmental organisations is responsible for the resilience demonstrated during the economic crisis, but in the long-term the reinforcement of informality is a development trap.

6. ***The economic gaps with Neighbouring countries are excessive***. Towards the Urals, in the east, across the Mediterranean Sea, in the south, the economic development gap is excessive, a major cause of social and political instability. During the economic crisis, many neighbouring countries suffer serious political conflicts. Europe and the South Mediterranean regions, the Middle East and the East of Europe, will have increasing exchanges, in terms of labour migration and tourism, provision of energy resources, and receive direct investments in areas such as manufacture, logistics and tourism. Europe, just because of its ageing population and energy dependency, will rely during the next decades on the Neighborhood countries and the rest of the world.

7. ***Different trade patterns emerge***. In its way out of the crisis, European firms are trading more with the rest of the world. Each European economy has different trade patterns, depending of their sectorial specialisation, traditional cultural links and/or geographic proximity. For European economies, the rest of the world is becoming as important as the Single Market and this should have important consequences for the European policies, particularly the Cohesion policy. Because of the reforms in public institutions carried out, and the more export-oriented firm activities, the European economies are likely to become more competitive, after the crisis. The process of recovery can be very slow in Southern and Eastern countries, , since public institutions hardly will be able to increase their level of investment in the coming years.

Europe in the World, and the World in Europe: Facing Globalisation

8. ***Trade with the rest of the world will be higher than trade in the Single market***. The emergence of Asian economies, followed by South-American, and subsequently by African, will result in a multi-polar, largely urbanised world, linked together by dense communication and transport networks. Free market agreements will be gradually achieved between the European Union and USA and NAFTA, as well as with the Eastern and Southern Mediterranean countries and other regions of the world. The European Union represented in 2010 about 28% of the world GDP, and it is expected to represent no more than 17% in 2050. Therefore, for companies producing in Europe, the Single European market will gradually become less important than it is today, in relation to the rest of the world[15]. To a large extent this will change the traditional balance between pro-competitive policies framing the Single Market (favouring more developed regions in the short-term), and pro-cohesion policies reducing disparities (favouring less developed regions).

9. ***New globalisation based on the internationalisation of value chains.*** The globalisation model based on import-export of goods exploiting country level comparative advantages (e.g. low

[15] The European countries, with an average weight of exports and imports of around 40% of GDP, are more open with respect to the US or Japan, which are at about 15% of GDP. The new 12 member countries of the EU are significantly more open with respect to the old 15 members, with exports and imports at around 60% of GDP. The overall trade balance of the EU is positive, about 1,33% of GDP.

labour costs, availability of land or natural resources, etc.) and cheap transport costs will evolve into a new form of globalisation based on the internationalisation of value chains within regional clusters of countries, in particular in three main "vertical" regions on the globe: the North and South America, Europe-Middle East-Africa (joined in a "triangle of growth" originated by a strong cooperation in the energy sector and a common transition to a low carbon economy), and the Far East Asia and Australia.

10. ***More diverging trade patterns across European countries***. Companies located in different European countries and operating in different economic sectors will take advantage of the growth of emerging markets differently, based on economic specialisation, as well as historical links and geographic proximity (e.g. Germany will soon trade more with China that with France, UK with US and Commonwealth countries, Poland and Eastern regions with Russia and former USSR republics, Portugal with Brazil and some African countries, Spain with Latino America). The increase of exports to the rest of the world will make European foreign policy more complex, since global national economic interests may diverge[16].

11. ***Interdependency with Neighbouring countries.*** Pipelines from Russia, and Algeria, already are connected to networks at a continental scale. Logistic gateways and hubs in neighbouring countries are becoming global hubs feeding Europe, thanks to its strategic position in routes from Asia to Europe and North and South America. Environmental management requires for territorial co-operation with neighbouring countries, in relation with the seas and coasts in the Baltic and Mediterranean, or the Black Sea, as well as in mountains and sparsely populated rural areas.

[16] Exports and imports accounted for about one quarter of GDP in 1995, and have risen steadily afterwards, to about 40% in 2008. The economic crisis has hit this process, and openness decreased in 2009 but recovered in 2010. The trade balance has been fluctuating around 1% of GDP and remained positive throughout the period. Trade partners of the EU have significantly changed over time, the USA going from representing the largest export market for the EU with an almost 28%, to around 18% in just 10 years. Imports from the USA have declined rapidly as well from 22% to 11% in 11 years, and its role as the main exporter towards Europe has been taken by China, which in the same period has increased its share from 7% to 19% of the total.

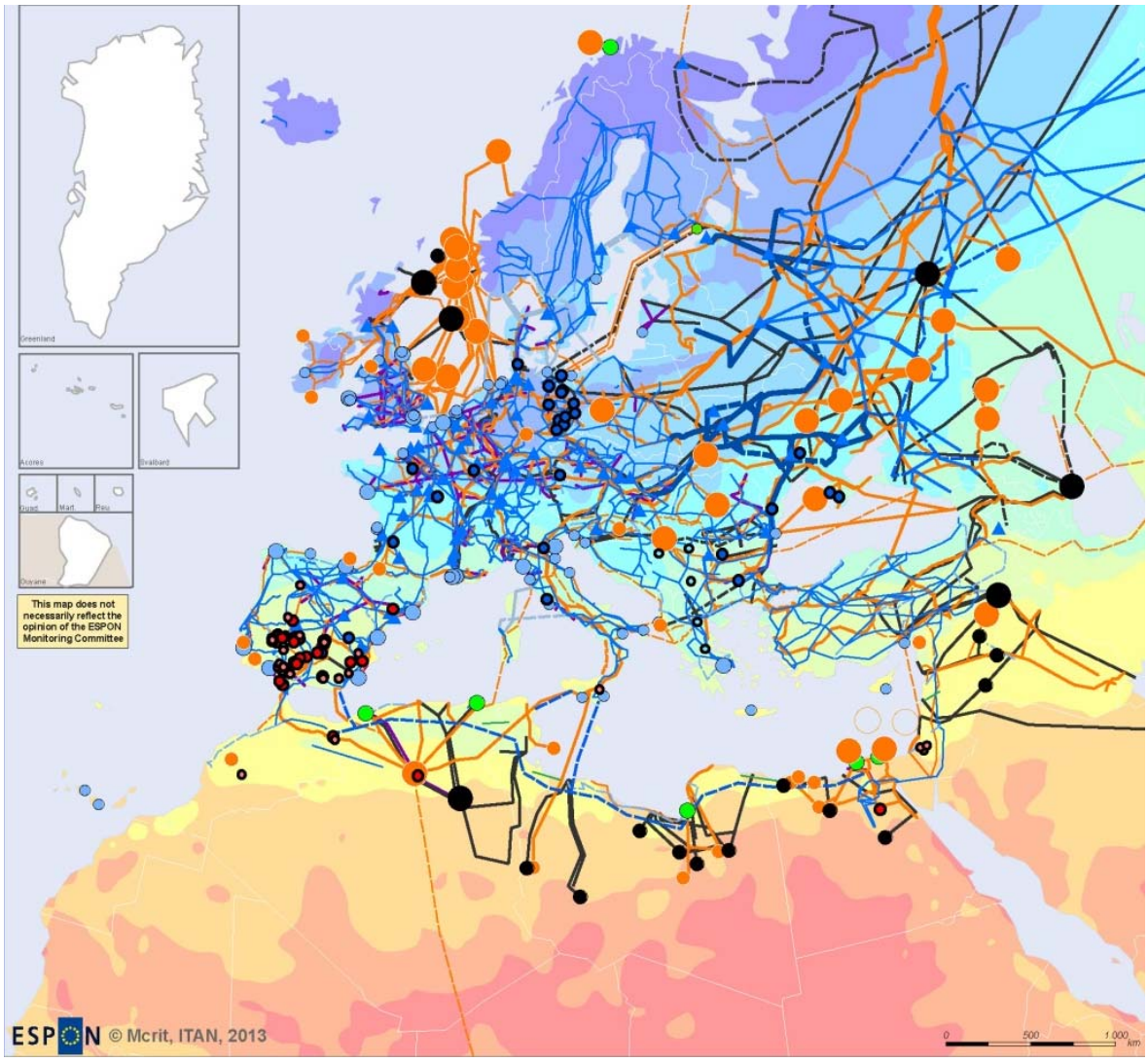


Illustration 5 Energy Networks (oil, gas, electricity, wind, solar) (ESPON ITAN, 2014)

The illustration above reflects how Europe is already open and connected strongly with its neighborhood in the energy dimension

12. ***Exponential increase of global flows*.** Worldwide networks transmitting information and energy, transporting freight and people become interconnected at all scales, from the local to global scale[17]. Standardisation of manufacture process makes easier to move factories looking to reduce production costs. The centralisation of advanced activities is simultaneous to the decentralisation of low-added value activities. The just-in-time integration of worldwide information and financial flows increases vulnerability and should be balanced by local and regional endogenous resources and activities.

13. ***More cosmopolitan and mobile population.*** Labour scarcity will create demand for young skilled and unskilled people from the rest of the world as well as from the neighbourhood countries in the East, and the South. The world as a whole may grow from 7.200 million people to 8.300 or even 10.900 million people in 2050. Most of this growth will be concentrated in Africa and India. Migrations will come to Europe from all over the world, with different cultural backgrounds and skills, and within Europe people will migrate from rural sparsely populated areas to larger urban centres, mostly in Eastern Europe. Europe will have more cosmopolitan and multicultural urban populations.

14. ***Cities will play an increasingly important social, economic and political role at global scale.*** Globally connected cities will continue to attract human capital and cluster higher added-value activities. Europe, while hosting few large metropolis, above 10 million people, has a balanced distribution of small and medium-sized cities all over the territory. Considering the challenges that global cities may have in terms of overconcentration, which could hamper sustainable growth, the polycentric structure of the European territory and the already large fixed social capital investments allocated in many cities, has the potential to facilitate a more balanced growth. European small and medium sized cities will have to increase their European and global connectivity without losing their social inclusiveness and cultural heritage.

15. ***Global warming challenges.*** The impacts of Global warming are uneven in Europe, and so is the response capacity, higher in the North and Centre of Europe (the most affluent regions) and lower in the East and in the South (the less affluent regions). Moreover, local characteristics, as for example the exposure of a region to natural hazards and the population density, are decisive when determining the vulnerability of a region. These include lowland coastal regions subject to sea level rise risks, lowland regions exposed to river flooding, mountain regions with high dependence on winter and summer tourism. Cities are also facing the highest challenges as they are home to a major part of the population and are crucial to Europe's economy as centres of major economic assets and innovative activities, possessing a high damage potential.

Europe towards 2030: Unfolding trends and scenarios

16. ***Facing uncertainty***. Uncertainty is high when looking ahead. The increasing interdependency of global economies also increases their vulnerability. The number of uncertainties (or "wild cards") is overwhelming when looking ahead, from political conflicts in neighbouring countries to new global financial breakdowns, new emerging energy and communication technologies, or environmental issues. In order to be politically relevant, assumptions need to be as realistic and likely as possible.

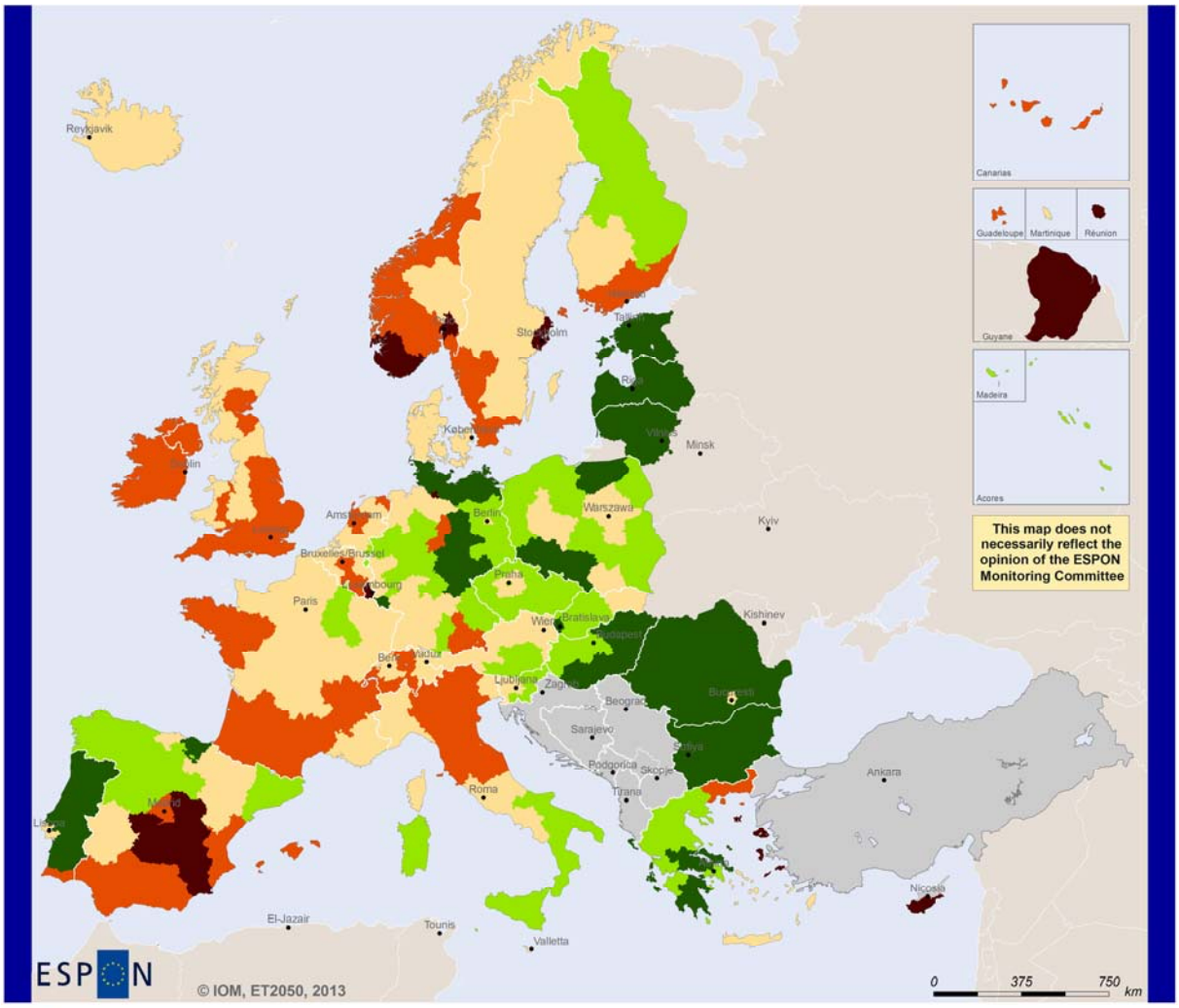
[17] Container shipping has been growing at an average annual 10,6% between 1990 and 2005 at global level, with transhipment traffic growing by nearly 14% p.a. in the same period (source: Drewry). Global air traffics have doubled every 15 years since the 70s and are expected to keep growing at 4.7% yearly up to 2020 (source: Airbus).

17. ***Overall stability, internal unbalances***. With stable and more cosmopolitan population and moderate economic growth, transport and energy demands are slowing down because of increasing market efficiency and technologic progress, limited land-take at aggregated scale and more conscious resource consumption, Europe most likely future looks relative balanced. Nonetheless, many internal unbalances are also expected: increasing internal migrations, and perhaps also external (necessary because of the ageing population), growing social and regional economic disparities, energy dependency and rising costs, and divergent trade patterns.

18. ***Ageing Population*** [18]. Ageing is and will be the most universal demographic trend across Europe, but the scale of the phenomenon differs between countries and regions. Ageing will be fuelled by continuous increase in life expectancy, to 81 years for men and 86 years for women in 2030 and to 85 years for men and 90 years for women in 2050, combined with long lasting below replacement fertility[19]. International extra-Union migration tends to mitigate this process, whereas international intra-Union migration and internal migration tend to reduce ageing in large urban agglomerations and affluent, highly developed regions and increase it in peripheral, poorly developed regions. In Eastern regions, ageing combined with migration and limited savings will place a significant burden on national budgets; in the medium term, this will be compounded by a cohort of minimum-waged or 'informal economy' residents reaching pension age. In terms of total population, a moderate growth is expected from 510 to 530 million people in 2030.

[18] MULTIPOLES (developed by CEFMR/IOM, Warsaw) is a cohort-component, multistate, hierarchical population projection model, capable to model population and labour force (by sex and 5-year age group) for multi-country, multiregional systems or for multi-ethnic systems. It can be used to produce projections, simulations and forecasts of complex hierarchical population systems and to analyse the impact of various scenarios concerning migration, fertility, mortality and economic activity on population and labour force size and structure. MULTIPOLES was specifically designed to model the impact of three categories of migration: internal, international within the system (e.g. within EU) and from outside of the modelled system.

[19] In the Baseline, it is assumed that family friendly policies will prevail but fertility will remain low in Europe, with total fertility rate (TFR) increasing from 1.61 to 1.66 in 2030, then turning stable. In all ESPON countries, total fertility rate will be below the replacement level of 2.1 births per woman both in 2025-2030 and 2045-2050. Future life expectancy, underestimated in most forecasts up to now, is assumed based on ESPON DEMIFER LSE scenario, increasing from 77 to 81 years for men and from 83 to 86 years for women in 2025-30 and to 85 years for men and 90 years for women in 2045-50, narrowing the gap in life expectancy between men and women. Convergence in regional and national life expectancies is expected in consequence of cohesion policies.



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Regional level: NUTS2
Source: IOM, 2013
Origin of data: MULTIPOLES Model
© EuroGeographics Association for administrative boundaries

Annual population change (Units: %)

Results obtained by MULTIPOLES forecast model

- < -0,5%
- -0,5% - 0%
- 0% - 0,5%
- 0,5% - 1%
- > 1%
- No data

European population growth will tend towards stabilisation.
Total population (ESPON Space) will grow from 514 million in 2010 to 530 million in 2030.

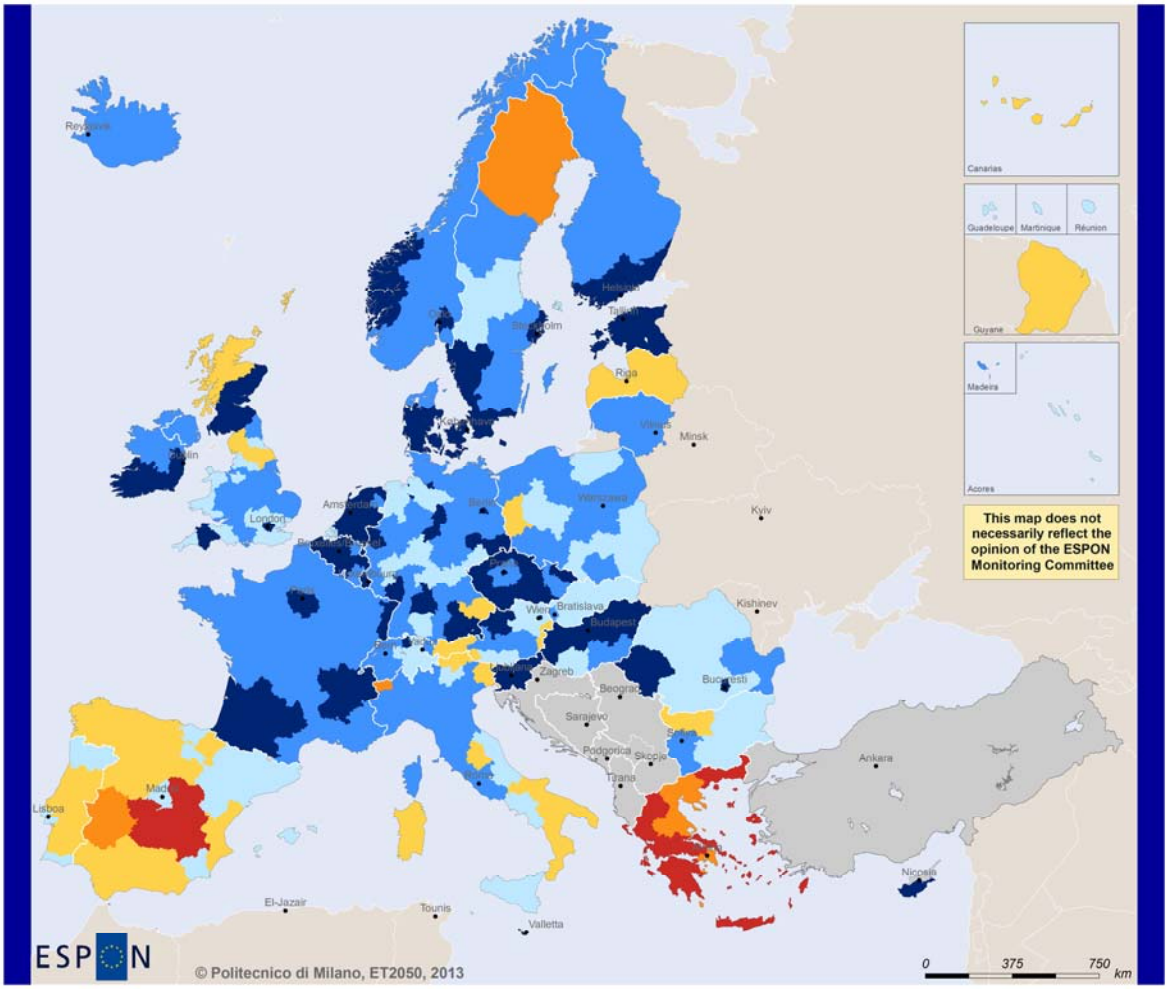
MULTIPOLES is a cohort-component population dynamics model. It is used for the simulations of complex hierarchical multiregional, multi-country population systems; for analysing impact of various scenarios concerning migration, fertility, and mortality.

Illustration 6 Annual population change according to MULTIPOLES model for the Baseline scenario (2014)

19. ***Moderate economic growth in average***[20]***.*** The annual growth for Europe may be around 1,90%[21] in average between 2010-2030 if actual policies and technologies do not suffer significant changes, and the rest of the world follows a baseline trend. Even if an average growth is foreseen for Europe, it is expected to be uneven territorially, with 44 regions growing less than 1% or even having negative growth over the whole period (mostly less developed Southern regions). Eastern European regions may grow around the European average, but growth is mostly focused on capital cities. The least developed regions won't probably catch-up with the rest of Europe before 2030. In a business-as-usual or baseline scenario, the more developed a country or region is now, the more chances it will have to keep growing in the coming years: the catching up processes that happened in the previous decades will not necessarily happen in the future at the same speed, at least during the next decade.

[20] MASST (developed by Politecnico di Milano, Milano) is an econometric and macroeconomic partial equilibrium model. In the frame of ET2050, MASST model has been upgraded in-depth. Version 3 of the model includes public expenditure growth rates (based on the relative difference between deficit/GDP ratio and stability pact targets), innovation rates (function of human capital and R&D intensity), urban growth (function of traditional and unconventional urban benefits and urban costs, e.g. quality of life, social conflicts…), and regional unemployment growth (dependent among others on labour market, structural funds policies, FDI). The MASST upgrade allows also to explicitly take into account fiscal policies and therefore the impact of the current economic crisis.

[21] Monetary policies considered by MASST in the Baseline scenario include, in Western European countries: stability of interest rates, ULC, exchange rates, inflation; Progressive convergence of Eastern EU towards Western European Countries values; Decrease of interest on bonds: end of speculation periods. Fiscal policies assumed in the Baseline include: Increase of tax rates in the Western and Eastern Countries. Debt/GDP remains constant.



GDP Growth annual average rate (Units: %)

Results obtained by MASST3 forecast model

- < 0%
- 0% - 0,5%
- 0,5% - 1%
- 1% - 1,5%
- 1,5% - 2%
- > 2%
- No data

Economic growth at very different speeds, leading to an increase in inter-regional economic disparities. Number of regions below to 1% of GDP growth: 45 (16%). ESPON Space annual average GDP growth rate:1.89%

MASST3 is an econometric, macroeconomic, sectoral, social and territorial model. It has been upgraded to explicitly take into account the impact of the current economic crisis.

Illustration 7 GDP Growth 2010-2030 according to MASST3 model for the Baseline Scenario

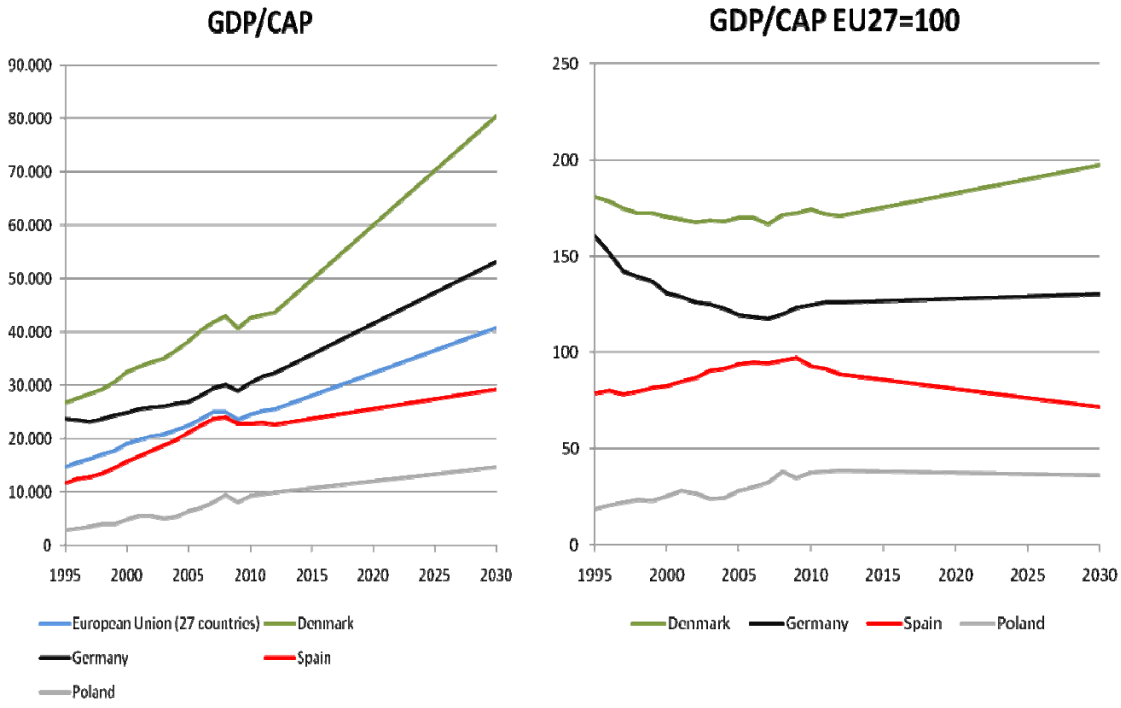


Illustration 8 GDP per capita in absolute terms and relative to EU27 for a few selected countries as sample.

Note that disparities within countries also grow (e.g. capital regions in Poland are likely to have higher GDP/capita than the average Spanish region in 2030, catching up some East German regions).

20. ***More Jobs and Lower Salaries***. The unemployment level in many European regions will keep driving salaries down in real terms at least for the next decade and will also induce labour migrations towards more developed and ageing regions, with much higher salaries and better social welfare systems. More jobs are expected to be created elsewhere in Europe, overall, if the actual trend towards lower salaries will continue for the next decade. Employment will grow even in regions with low economic growth, where such growth will result from workforce increases rather than by higher productivity, as it happened in many Southern regions from 2000 to 2008 when a large number of jobs were created and occupied by low-skilled immigration. During the crisis, the hidden economy has grown up to 25% in many Southern regions, as well as informal labour and family support, and will last for a longer time than in Eastern European regions, where the hidden economy will tend to gradually diminish since it is mostly related to self-sufficient agriculture in rural areas.

21. ***Jobs are likely to be created in both the manufacturing and service sectors across Europe***. A reindustrialisation process is expected in traditional industrial areas in the centre of Europe, recentralising high-quality and technologically advanced production, as well as in Southern regions where salaries will remain relatively low, making already existing industrial investments profitable enough to remain there for a longer time, and delaying delocalisation plans. Eastern regions, that received a large inflow of foreign investments during the latest decade, from both Central European and Southern European regions, may see this inflow slowing down, that can be compensated by a net increase in the service sector, clustered in main cities. Nevertheless, growth in non-metropolitan regions will maintain a significant industrial element.

22. ***An average moderate economic growth is expected in the Central and Eastern European Countries[22].*** If a low growth of 2,2% is the case for CEECs towards 2030, the existing economic gap would hardly be modified and Central and Eastern Europe will remain on the European periphery. CEECs followed the pattern of a dependent market economy type of capitalism which is characterized by high dependency on imported foreign capital. The role of foreign savings in promoting economic growth in the EU12 countries was undoubted in the short run and in a growth environment but this is rather not true in the long run and in crisis times therefore the strong correlation between higher FDI increase and higher growth cannot be proved. Foreign investors not only contributed to the modernisation of the economy, but also increased its structural and spatial segmentation created by the "dual economy". Sustainable catching up process is jeopardised by the dualistic feature of the transition economies, unveiling the weakness of domestic sectors. Low-income-based competitiveness represents a development trap that counteracts the accumulation of financial and social capital, hinders upgrading to high value-added production, and encourages migration to higher-wage regions. Despite European catching-up processes, the large economic and territorial inequalities cannot be eliminated in dependent economies due to constant capital scarcities. At regional level, we may see disparities growing more than before. In the new member states capital regions are the winners, while rural and eastern border regions may likely be the losers. A continuation of the present situation towards 2030 years is a likely outcome, if there are no significant political or technologic changes. Clashes between growth- and sustainability-oriented policies are to be expected, and development may involve different sectoral mixes than in developed regions.

23. ***Insufficient productivity in the Southern regions***. The analysis of the GDP per capita performance reveals that Southern regions will hardly be able to recover from the crisis in the coming years, with Greece, Cyprus, South Italy, most of Spain and Portugal facing severe problems of economic instability and trouble in public finances. The growth in many of these regions was triggered by relatively high in-flows of capital and labour (in cases on speculative markets), instead of an improvement in productivity. The challenge for the coming decades is being able to value the important social capital investments realised, often because of European funds, to generate productive economic activities. The importance of the informal markets is high, up to 25% of GDP in many regions, explaining why large unemployment levels can be afforded. In the coming years salaries will tend to be reduced, and employment may recover as a consequence. Industrial delocalisation, often towards Central and Eastern Regions may not continue, in this case. How many of these regions may support the welfare improvements during the latest two decades remains as a paramount challenge until 2030.

24. ***Increasing importance of the "Silver Economy"***. Ageing will result on transformation of the provision of social services, such as health and long term care, for which demand may grow substantially. Silver economy will have to be absorbed into mainstream economic activities, both on regional and national levels. Provision of social security, in particular retirement benefits will be a substantial problem for national governments, as many of the national social security systems either already are or may become insolvent from the actual perspective. These challenges will have to be met under the conditions of a decreasing labour force related to the exit from the labour market of the retiring post-war baby boom cohorts, combined with relatively

[22]The historical trajectory of Central and Eastern Europe differed significantly from that of the West and it was characterized by perpetual attempts of catching up. The nineteenth and twentieth centuries were characterized by three major periods (waves) of catching up with the West. Central and Eastern Europe in relative terms, comparing to Western Europe, is still behind its 1910 relative level. One-, one-and-half decades of gradual catching-up period with the West started in the late 1990s with faster growth rates and productivity increase, but this stopped in 2007-2009. Our calculations reflect less than half (40%) of the Western level achieved in Central and Eastern European countries by 2010.

small entry of young cohorts. The shrinking labour force and population ageing will have to be counterbalanced by an increase in labour productivity and delayed exit of older workers (increased statutory retirement age and increased labour force participation).

25. ***More labour migration within Europe***[23], between and within countries, will still be low in comparison to the USA, which has a much younger population. Migration in Europe is expected to grow because of economic reasons: if less developed countries do not catch-up with more developed European countries, they will not be able to offer better jobs and higher salaries to most of their population. At the same time, population ageing in more developed countries will create need for young foreign labour. Most developed cities will compete for more skilled and creative persons. The large volume of the labour migration from East to West and from South to North can be a serious threat to societies and economies of sending countries. Since migration is highly selective (migrants are usually young and equipped with better human capital), it will also have a substantial impact on age structures and pool of skills. Skilled and qualified people will be attracted to large global cities all over Europe in search of better job opportunities but favouring particular skill groups which are in high demand. This mechanism will have a powerful detrimental effect on sending regions, increasing regional disparities.

26. ***External migrations will continue to increase***. Since no major changes in demographic policies across Europe are expected[24], the number of immigrants will be growing to respond to the labour shortage related to the ageing of Europe. Migration from third countries, especially from the neighbouring countries will grow towards European Union regions with relatively large agriculture, construction or tourism sectors, as well as to large cities. It is assumed that until 2030 extra-European immigration may increase by 2 per cent every 5 years, and that afterwards it will remain constant. In the most crisis-hit countries the increase will be delayed by some years.

27. ***Internal non-labour migration***. In Southern regions migration due to residential tourism is already high (some 800.000 people in the Spanish Mediterranean coastal regions, with a significant variation over the year), and will likely grow. It is becoming a positive social and economic development driver of health and other advanced personal services. Demographic trends are extremely heterogeneous and unstable across Southern regions. While in some regions migration was extraordinary since 2000s, and is currently reduced or even reversed, other regions suffered depopulation. Towards 2030 these trends may be even exacerbated; on the one hand coastal areas will be extremely attractive for residential tourism and large cities may be able to attract skilled people, while rural inner areas may face depopulation.

[23] In the Baseline, it is assumed low economic performance favouring anti-immigration positions. The number of immigrants is assumed growing slowly to respond to the labour shortage related to aging of Europe. Until 2030-35 extra-Europe immigration is assumed to increase by 2% every 5 years, then to be remain constant. In the most crisis-hit countries the increase is delayed by five years. For international intra-Europe migration (age and sex-specific emigration rates) it is assumed that in the least crisis-hit countries the rates will be constant, as estimated for 2010 based on the MIMOSA project (*Migration Modelling for Statistical Analyses*, funded by Eurostat), the IMEM project (*Integrated Modelling of European Migration,* funded by NORFACE Migration) and the most recent Eurostat data

24 The Treaty of Amsterdam (1997) and the Tampere European Council (1999) gave the EU responsibility for setting a Common Immigration and Asylum Policy, with the principal aim of making migration safe and legally controlled. Since 1997, EU member states will have to progress in developing a common position on these issues, The Lisbon Treaty (2007) strengthened the ability of EU authorities to determine member states' immigration and asylum policies. Advances towards developing a common migration policy are being made, in particular by developing various directives (eg single permit directive, directive on the right to family reunification, directives concerning students and researchers …).

28. ***New forms of sustainable tourism*** in areas such as education and training, health and leisure, cultural and business will emerge. Tourism will grow as much as middle classes also grows at world level. Many European cities and regions will become destinations for tourism and many cities and regions will have to manage massive flows to avoid stereotyping their cultural and ecological assets, by creating exclusive or segregated zones. In their way out of the crisis, it is likely that land-use restrictions preventing the urbanisation of sensitive areas, mostly coastal areas, be relaxed, and therefore tourism also represents a serious threat for the preservation of natural and cultural landscapes.

29. ***Transport demand will be more diversified and will increase below economic growth***[25] Transport demand may be decoupled from economic growth, at least for urban and short-distance mobility in more developed cities and regions, but it is not likely neither for freight and passengers not for long-distance, particularly for intercontinental transport. More diversified trip purposes and specialised transport modes are expected, while transport costs for passengers and freight may remain stable in relative terms if social and environmental externalities are included in the price of transport somehow compensating savings from technological innovation[26]. Market inefficiencies inside Europe will gradually likely diminish because of the completion of the Single Market on transport and other network industries, and there will be a gradual opening of global markets to more competition. While in most Eastern European regions still there are important infrastructure deficits constraining economic growth, in many Southern regions infrastructure endowment is already high, in part because of Cohesion and Structural Funds, to the point that infrastructure is one of the main assets for future development[27]. Excessive investment on infrastructure results on market distortions and have important opportunity costs associated, but infrastructure scarcity heavily constrains development. Most sustainable regional economic development patterns are based on the valorisation of endogenous assets in the European and global markets.

30. ***Energy intensity will gradually decrease*** because of the more service oriented European economies and the increased energy efficiency and savings. Carbon intensity (GHG emissions elasticity in relation to energy consumption) is expected to decrease due to improved technology, especially wind and solar sources. More in general, renewable sources are expected to grow[28] and nuclear facilities gradually dismantled, diversifying energy sources and reducing the energy

[25] MOSAIC (developed by MCRIT, Barcelona) is an integrated modal split and assignment model originally applied to TRANS-TOOLS trip distribution matrices. MOSAIC has been upgraded to generate future transport demand based on regional increases of GDP and population. MOSAIC is designed to analyse the impact of alternative transport policy-scenarios (pricing, taxation, infrastructure, fleets…). MOSAIC integrates modal split and traffic assignment in one so the modes do not compete to carry trips but contribute to form multi-modal chains, and modal split is the end result of the process, not the starting point. MOSAIC is built upon a multimodal transport graph integrating road, rail, air and ferry networks, for Europe and its neighbourhood

[26] MOSAIC determines future travel demands based on the following assumptions: elasticities of trip generation vs GDP/capita for interNUTS3 trips are derived from TransTools 2010/2030 matrices (TENConnect, 2009) and TV+ metamodel, with a quadratic formulation fitted between the variation rate of GDP/capita and the variation rate of trip generation, then applied at NUTS3 level using GDP and population growth assumptions 2010-2030 from MASST and Multipoles. A doubly constrained Growth Factor model is used to distribute the trips, ensuring the sum of trips originated equals the sum of trips distributed. Resulting trips per OD are divided in 4 trip purposes proportionally to original Transtools 2010 matrix.

[27] Given the scarcity of public funds, investments in transport infrastructure will likely be reduced, from 1,04% of EU GDP in total concerning transport investment, to about 0,80% (about 1.970 billion up to 2030 in total, with 330 billion allocated to TENs, 60% of the required investments to complete the networks), depending Private-Public Partnerships.

[28] 20% of gross final energy consumption from renewable energy sources by 2020, 50% by 2050 (EC Energy Reference Scenario, DG Energy 2014)

dependence of European Union's countries, even if the energy costs in Europe may remain higher than other developed world regions, particularly USA. More interconnected and decentralised production will bring higher efficiency. New energy technologies (e.g. nuclear fusion) seem unlikely in the next decades but they will provoke a revolutionary change, if they happen.

31. ***Urbanization and land-take may increase***[29]***.*** The urban surface may still grow rapidly (898 km2 per year of new artificial land between 2010 and 2030, on average[30]), often in the form of uncontrolled urban sprawl. Main drivers for urbanisation are people migrating from rural areas to cities and people using more residential space per capita (e.g. larger houses, less people per family). Although industrial and commercial land use tends to become denser, the overall process is towards increasing urban surface. The problem is not just the increase in sealed soil, but even more where does development take place (e.g. on fertile soils, with the risk of losing these and the nature and the ecosystem services related to it) and how does development take place. Tourism is the greatest consumer/user of the Mediterranean coast. The crisis is inducing the relaxation of planning regulations. Overall, the attractiveness of the region because of cultural heritage and weather remains as a precious asset to be protected and valorised.

32. ***Large decline of pastures and perennial crops.*** Over the past decades there has been a large decline in agricultural areas, especially in pastures and perennial crops. This process is expected to continue for a few more years, with the strongest declines being expected on marginal lands. Conversion from agriculture to all other land uses is expected throughout Europe, with large changes from low productive lands to natural vegetation[31]. This brings challenges regarding rural depopulation and stewardship of the land, but can also be seen as an opportunity to restructure and strengthen the rural areas. Europe is at a crossroad to decide the future of agricultural areas. Should food security be a crucial aim or should more space be devoted to energy crops, or does the decline in agriculture area offer possibilities to connect high value natural areas into a green infrastructure throughout Europe.

Scenarios for Europe towards 2030: Impacts on Eastern and Southern regions

33. Alternative scenarios for the future development of Europe towards 2030 have been defined[32]: "***market based growth favouring large metropolis***" (Scenario A), "***public policies***

[29] Metronamica (developed by RIKS, Maastricht) is a dynamic and spatially explicit cellular automata-based land use model that allocates regional land use demands to local grids. The model is used for scenario studies, policy analysis as well as research projects. It has been applied worldwide. Applications include stand-alone versions as well as integrated systems (such as Xplorah, MedAction and WISE) that include the Metronamica land use model.

[30] Although the rate of change has an overall tendency to diminish, considering that the rate of land-take amounted 973 km2/year between 1990 and 2000, and peaked at 1598 km2/year between 2000 and 2006.

[31] For the Baseline scenario, Metronamica land-use model assumes similar general land-take behaviour (rules) as that of the historic period 1990-2006. Demographic and economic evolutions are based on Multipoles and MASST models, translated into land-use demands and allocated using assumptions based on historical developments. New infrastructures and accessibility assumptions are based on MOSAIC.

[32] Scenario A is a market driven variant, where welfare system is fully privatized; financial debt repaid in 2030; budget reduced for cohesion policies; concentration of investments in European large cities. Scenario B assumes public policies mostly at national level; actual welfare system reinforced through increased taxation; financial debt not fully repaid in 2050; budget maintained for cohesion policies; concentration of investments in second rank cities. Scenario C is a social policies variant, with strong public welfare system; financial debt repaid in 2050; budget significantly increased for cohesion policies; concentration of investments in rural and cohesion areas

promoting secondary city networks" (Scenario B) and "***public policies with more social and regional redistribution at European level***" (Scenario C)[33]. The impacts of these scenarios on the development of Eastern and Southern regions are assessed.

34. According to the forecast models applied, based on the assumptions for framework conditions and policies established, the B scenario is the most expansionary in terms of GDP (+2,30% yearly), followed by the A scenario (+2,20% yearly), and C achieves 1,80%. The higher expansion of growth in B can be explained by more efficient exploitation in this scenario of territorial capital elements, of local specificities, present in both large and second rank cities that allow local economies to achieve higher competitiveness. Development based on second rank cities implies the existence of an integrated and equilibrated urban system, made of efficient second rank cities working with first rank cities in providing quality services and allowing the latter to avoid strong diseconomies of scale that can be detrimental to growth. The weak presence of equilibrated and efficient urban systems in the Eastern countries may explain why these countries register very similar growth rates between scenarios A and B, being both the result of growth supported only by first rank cities.

35. A more detailed analysis for Cohesion countries in the East and South of the European Union reveals the structural unbalances of the fast economic development during the latest twenty years, and the difficulties these regions may have to catch-up the development level of central and northern European regions.

36. ***Central and Eastern European countries development towards 2030.*** Scenario A offers little in the way of integration possibilities for a large share of post-socialist space. Flows will orient even more towards national capitals, and resource concentration in mega-centres can be expected to encourage not only the backwash of local resources from the periphery (capital and human resources alike) but further de-industrialisation and accelerated tertiarisation; the clear winners are the capital-city regions resulting in a dramatic increase in regional disparities. CEEC countries would benefit vastly from the implementation of Scenario B. However, in Eastern regions the relative weakness of secondary cities may be a hindrance factor. In order to achieve this more territorially balanced vision through polycentric development the critical mass of second rank cities have to be promoted partially through the complex multifund integrated territorial investments. CEEC having more numerous peripheral regions takes particular advantage of the Scenario C in which New Member States grow faster than western countries; the promotion of rural and peripheral regions in the new member states in Eastern Europe is stronger. A vision of integrated rural and urban areas might be the most favourable approach to mitigate regional inequalities and bring EU12 industrial milieus closer to Western Europe, since it would offer institutional incentives for the spreading-out of production and the reindustrialisation of the peripheries[34].

37. Employment-wise, cohesion policies positively affect both rural and peripheral areas in the CEEC, which are expected to benefit the most from scenario A. This does not imply industry can retake its former employment share, but knowledge-intensive production can be more evenly spread, bringing along further socio-economic advantages for smaller cities, towns and rural areas. The relevance of industrial development and its territorial differences maintain a key role in catching-up processes in the EU13. Under the baseline, industry can be expected to have a slowly diminishing share in employment and economic output, although its significance will stay above

[33] These three scenario variants for 2030 are in line with the A, B and C Scenarios defined for 2050.

the Western European level. Development will continue to be FDI-dominated, although the gradual emergence of mid-tier companies in the EU13 is to be expected. With the dominant role of A scenario, resource concentration would be expected to encourage further de-industrialisation. The B and particularly C scenarios emphasise a higher significance of industry within the space economy, and more balanced growth patterns. Large cities can serve as integrators of industrial production and business services, while also maintaining spreading networks towards smaller centres. The C scenario offers the strongest vision of "spatial justice", although at certain trade-offs. More dispersed patterns of innovative manufacturing can emerge, dominated by flexible small and medium-sized firms. In the Central and Eastern European Countries, the urban network shows a weakness on the tier of cities with 400-600 thousand inhabitants. It is unrealistic to propose to develop regional seats to Western European levels, but they must be able to fulfil their roles as regional centres. Urbanisation is compounded by the demographic decrease facing the macro-region, which has both natural and migratory reasons, and results in workforce shrinkage and the decline of economically active population. This puts brakes on the macro-region's growth potential, and represents long-term capital loss, with specific areas "hollowing out". The different scenarios do not imply radical differences from the baseline. The A scenario would lead to the highest degree of internal differentiation, while the others show similarities in offering a territorially balanced vision through polycentric development.

38. ***Southern European countries development towards 2030***. According to the baseline scenario (2010-2030) the gaps between regions within Southern countries will grow, creating explosive social and political conflicts at national and European level. These countries are expected to show the same demographic diversity as today with a high net migration and a mild overall increase in old age dependency in comparison to the northern Europe. In terms of GDP per capita, the economic crisis is likely to have continuing impacts in most regions of the Southern European countries, however, with a positive total employment growth rate and diverse results in manufacturing and service employment. Overall passenger and freight accessibility is expected to increase below EU average with a few exceptions around important cities.

39. Southern European population is lower in Scenario A than in the Baseline, despite increased immigration, because of lower fertility. The comparatively high immigration in this scenario results to a strong reduction of the speed of ageing in the promoted regions of southern Europe. GDP growth is higher than in the baseline scenario in all southern countries of Europe with minor exceptions while the gains of employment growth (also in service and manufacturing) in almost all regions are positive due to increased external demand. Road will remain the main mode for passenger transport but Scenario A causes rail share to decrease by one half. The Scenario also shows a 32% average speed increase compared to Baseline 2010. Southern European population is slightly higher in Scenario B than in the Baseline due to higher immigration. It is the most expansionary scenario in terms of GDP due to the higher and more efficient exploitation of territorial capital elements and local specificities in both large and second rank cities. Employment growth rates seem to be comparable between the southern European countries and the rest of ESPON area and among the southern countries while service employment is more expansionary than manufacturing. Road will remain the main mode for passenger transport but Scenario B provides for moderate rail modal share increases. Scenario C will lead to a more balanced distribution of population between various categories of regions with a reduction of ageing in the peripheral and rural areas mostly due to a reduced emigration of working age population. This scenario presents on average a relatively slower rate of GDP growth with respect to the Baseline scenario driven mostly by slower growth in these countries where rural and peripheral areas tend to benefit more. Employment growth in this scenario takes place mostly in the most promoted regions while there is a clear distinction of regions in terms of

manufacturing and services employment growth. Road will remain the main mode for passenger transport but rail has the highest growth potential in this scenario, up to 12% in 2030 compared to 6% in 2010. Finally, in all scenarios, long distance mobility is expected to grow below average from 2010 to 2030 and because of an increase in energy-saving techniques, the whole of southern European countries presents a noticeable decrease in CO2 emissions (especially in Scenario C).

40. ***A Territorial Impact Assessment (TIA) covering the whole of Europe was run for all scenarios at the 2030 horizon***[35]. The trend towards a two-speeds Europe and a north-south divide is confirmed on the ground of many socioeconomic impact criteria, encompassing both economic (GDP, employment, available income) and social indicators (risk of poverty concentrated in many southern but also eastern regions; attractiveness for in-migration in core and central European regions). Many northern and central European regions (e.g. in Germany) may encounter some new tensions on the unemployment side.

41. The assessment of impacts on the environmental and cultural dimensions sheds light on other relevant and likely processes. Natural assets, cultural heritage, creativity potentials will become crucial territorial capital elements, particularly in the southern (and partly eastern) European belt, providing both development opportunities and people's wellbeing. A major impact could be related to a new upswing of the tourism sector but also to an increase in local, non-economic wellbeing and the search of new regional "vocations" based on traditional knowledge and values, exploiting the catching up potentials of innovation diffusion. These new aspects will partly rebalance the negative outlook that is generally forecasted on strict economic (GDP) and social (unemployment) grounds, particularly in the baseline scenario.

42. ***The TIA points out the relative higher desirability of the B and C scenarios in the 2030 horizon.*** Computing an overall summative indicator of impacts on the European space, scenario B shows high benefits on the economic and identitarian dimensions while scenario C the highest benefits on the social and environmental ones. Scenario A lags behind due to its excessive environmental and social costs. The B scenario shows up as the one capable of better exploiting the potentials of a dispersed - but mainly urban - territorial capital, embedded in economic capabilities and also in highly differentiated regional specificities. It turns out to be the scenario in which at the same time the highest cohesion and the highest competitiveness are achieved, emphasising that the preconditions for development widely lie in a hugely differentiated and scattered endowment of "territorial capital", made up of natural and artificial specificities, varied settlement structures, cognitive and relational assets at different degrees of complexity and development. Referring the TIA results to a spatial typology of regions (megas-agglomerated-urban-rural) an interesting image emerges: European future will be based, on - and at the same time will bring the highest benefits to – medium-size cities regions and secondly to megas regions; almost all scenarios confirm this forecast. No doubt, our future will be an urban one, but not just a giant city one. But rural regions will not be lagging behind: in wide economic terms they will benefit from relevant spillover effects and tourism development and show the best performance in quality of life and environmental sustainability. The challenge they will face will refer mainly to the shock of modernity and cultural *transformation.*

[35] Impact criteria (20) and relative weights were agreed with the ESPON MC members during the policy workshop celebrated in Paphos. Values for the different impacts come from the modelling exercise, complemented by qualitative expert judgement. Among economic criteria, employment was considered the most important one, followed by GDP growth; among social criteria, risk of poverty was the criterion considered of most relevance; among environmental criteria, air quality and land-taken were ranked first than other criteria; finally, concerning territorial identity, cultural heritage was ranked as the most relevant. The relative weight of economic criteria as a whole was 28.4/100), social (26,8/100), environmental (25.2/100) and territorial identity criteria 19.5/100).

Europe towards 2050: Territorial Scenarios

43. The three scenarios developed for 2030 (A, B and C) were prolonged for 2050 by keeping the same core socioeconomic and environmental dimensions and being more explicit territorially. To deal with the increasing uncertainty of a longer time horizon, these three alternative territorial scenarios were evaluated against different extreme framework socioeconomic and environmental conditions[36]. The purpose of the exercise is not to predict likely futures but to assess the alternative territorial strategies in terms of economic growth, regional disparities, land-use and the environmental impact derived from transport activities, in energy and emissions. Next, the three territorial scenarios are defined by further emphasising goals and policy-options already stated in *Europe 2020*, and developing consistent territorial strategies inspired by Europe 2000+, ESDP and the Territorial Agenda 2020.

44. ***The promotion and networking of European Metropolises towards 2050*** (Territorial Scenario A) would involve the further development of capital and global metropolis, as well as existing global gateways. It follows to a large extent the *Europe 2020* strategy of promoting global competitiveness of Europe by facilitating the economic development of the largest metropolitan areas of global importance in Europe, i.e. of the 76 Metropolitan European Growth Areas (MEGAs) defined in ESPON 1.1.1 (2005, 118). The policies applied are mainly investments in MEGAs supporting of high-level R&D as well as European transport infrastructure, such as high-speed rail, and enhancing connections and long distance networks and global gateways. Integrated transnational zones emerge by the networking of cities in cross-border areas, and transport and energy corridors link major European centres of production and consumption with neighbouring countries and the rest of the World. The scenario assumes that for the European global competitiveness it is crucial to take full advantage of the connectivity to international networks and the agglomeration economies of larger European metropolis.

[36] The forecast has been carried out with the SASI model, a recursive simulation model of socio-economic development of regions in Europe subject to exogenous assumptions about the economic and demographic development of the European Union as a whole and transport and other spatial policies. SASI model is especially well prepared to analyse policy impacts in long-term scenarios since it is a dynamic integrated model. For the land-use modelling, METRONAMICA model was used.

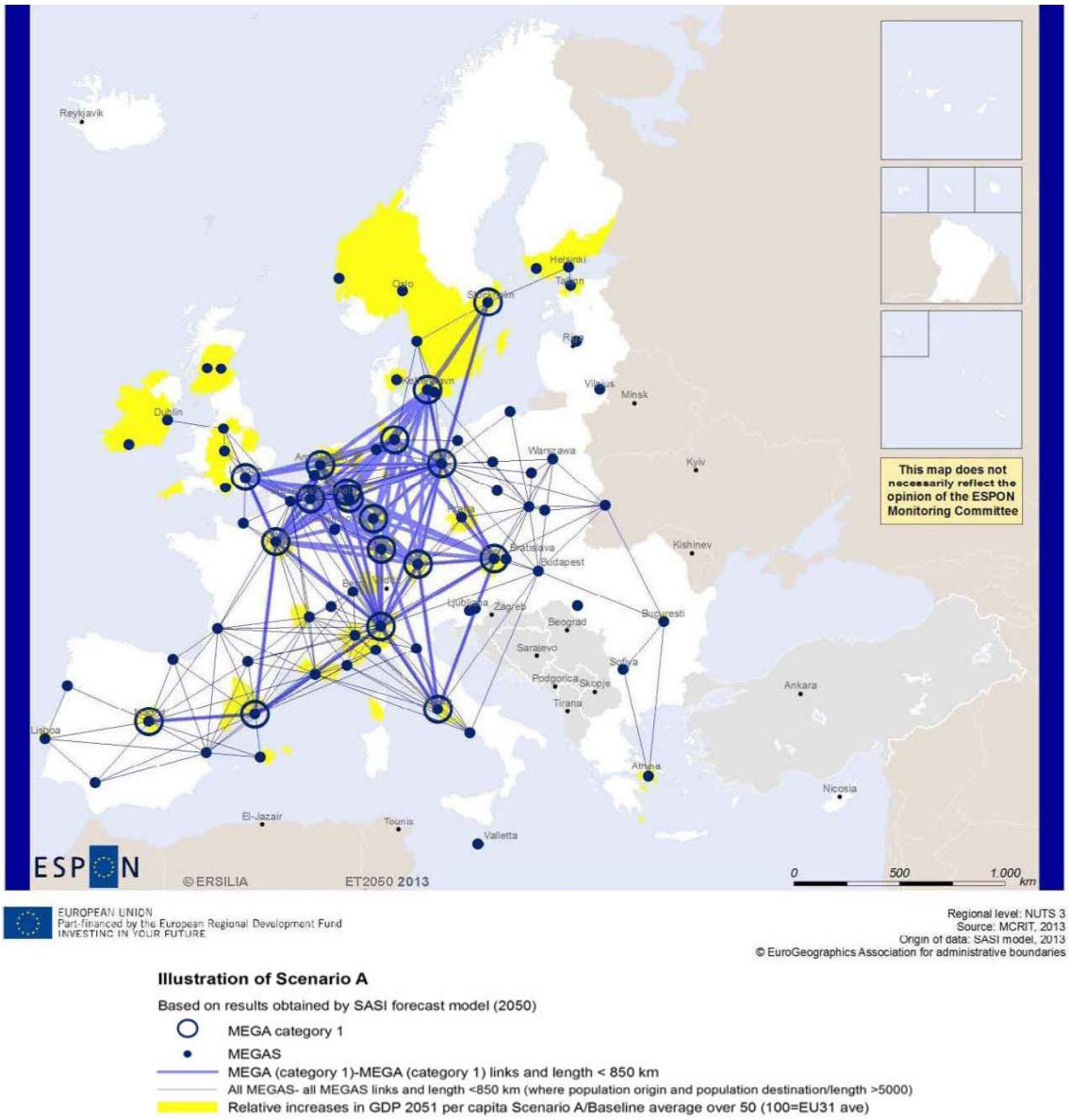


Illustration 9 (A) Territorial Scenario towards 2050

45. ***The promotion and networking of cities towards 2050*** (Territorial Scenario B) provides an image of the European territory in which economic and population growth, as well as most private and public investments, take place within national capitals and major regional capitals, and there is a geographic reorganisation and specialisation of global gateways. It aims to integrate *Europe 2020* with the European Spatial Development Perspective (1999) and the two Territorial Agendas (2007; 2011) proposals for more balanced polycentric urban systems at the macro-regional or national scale for the 261 cities of European or national significance defined in ESPON 1.1.1 (2005, 114). Cohesion and Structural funds are mostly targeted to cities, including urban renewal and reurbanisation, R&D investments, and promotion of regional and inter-regional transport networks. The increasing concentration of added-value activities in cities does not necessarily imply a process of rural decline, but its increasing functional dependency on large cities. In this scenario, large cities attract both more people and activities because of the effective public policies promoting them. Internal migrations take place from sparsely populated areas to larger urban centres.

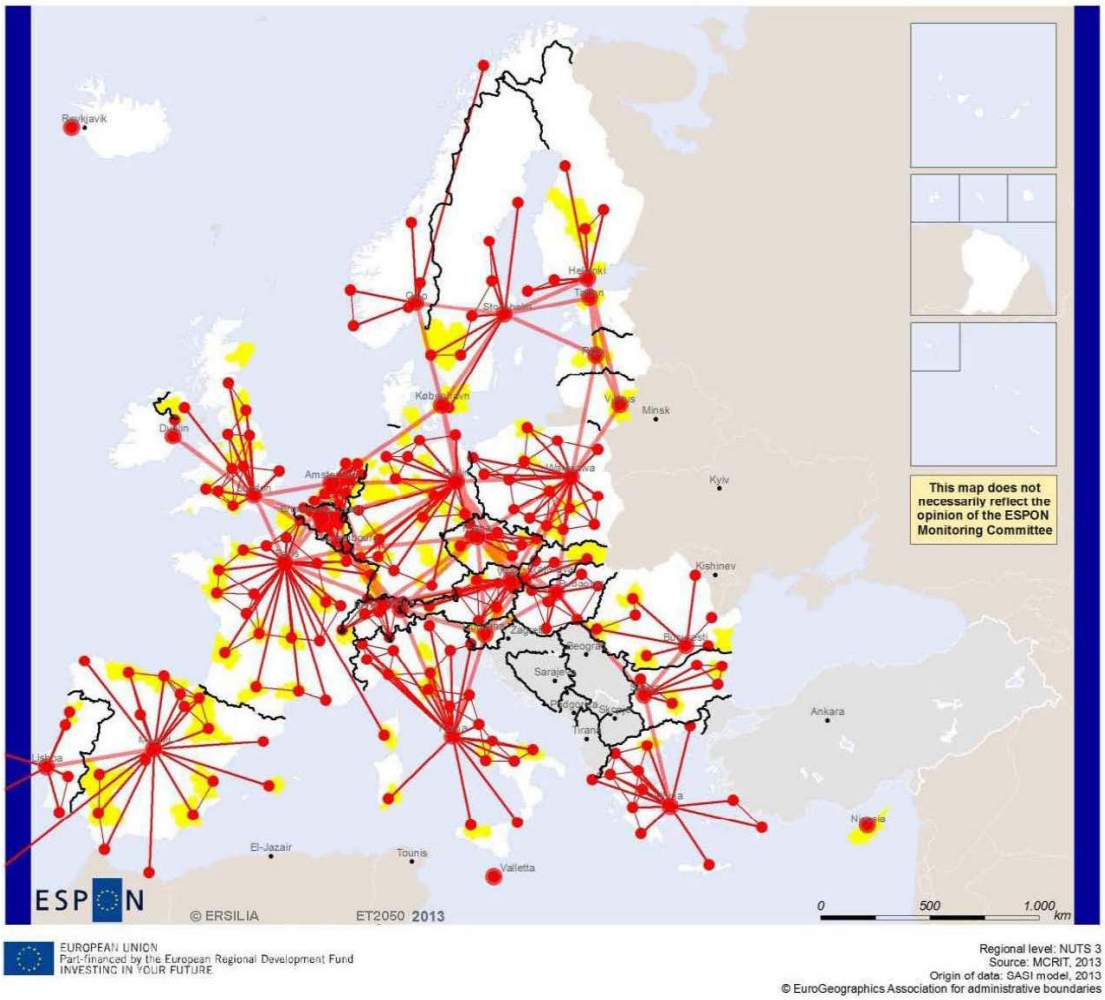


Illustration of Scenario B

Based on results obtained by SASI forecast model (2050)

- Capital NUTS0
- Capital NUTS2 (NUTS1 only Germany and United Kingdom)
- NUTS0 boundaries
- NUTS0-NUTS0 links and length <650km
- NUTS0-NUTS2 links intra NUTS0 (except Germany and United Kingdom)
- NUTS0-NUTS1 links intra NUTS0 (only Germany and United Kingdom)
- NUTS2-NUTS2 links intra NUTS0 and length <200km (except Germany and United Kingdom)
- NUTS1-NUTS1 links intra NUTS0 and length <200km (only Germany and United Kingdom)
- Relative increases in GDP 2051 per capita Scenario B/Baseline average over 100 (100=EU31 ave)

Illustration 10 (B) Territorial Scenario towards 2050

46. ***The promotion of small cities and less developed regions towards 2050*** (Territorial Scenario C) provides an image of the European territory in which urban and rural territories form a mosaic of different regions and types of territories with identities nourished by local and regional governments able to cooperate in areas of common interest. This scenario involves a paradigm-shift and responds to the challenge of sustainability stated in *Europe 2020* and the energy scarcity and climate change expressed in the Territorial Agenda 2020 (2011) by promoting small and medium-sized cities as centres of self-contained and economically resilient regions with more sustainable mobility patterns yet taking account of the necessary economies of scale of services of general interest and the prospects of an ageing society. Policies applied are mainly from the fields of Cohesion and Structural Funds targeting mostly rural less developed areas, and transport investments focused on local and regional networks, with a larger number of global gateways, geographically distributed. The focus lies on promoting medium-sized cities and reducing the existing imbalances at the medium and lower level of the urban hierarchy and their

functions for the surrounding regions. Local production and local markets gain much importance, migration of skilled people from large cities to rural areas accelerates localism, and large cities become further decentralized into more productive, and liveable neighbourhoods. Policies are focused on reinforcing the social and economic balance of Europe at the regional level in a strong place-based approach, promoting endogenous development and empowering regional institutions leading to a more efficient provision of public services. Changes in consumer behaviour favouring proximity and self-sufficiency. Intense decentralisation at local and regional level. This scenario requires changes of values and behaviour of new generations, and policies to become a support for these, rather than a substitute. In this scenario, small and medium-size cities attract people based on their cultural and environmental quality, and public incentives. Only limited external migrations are expected.

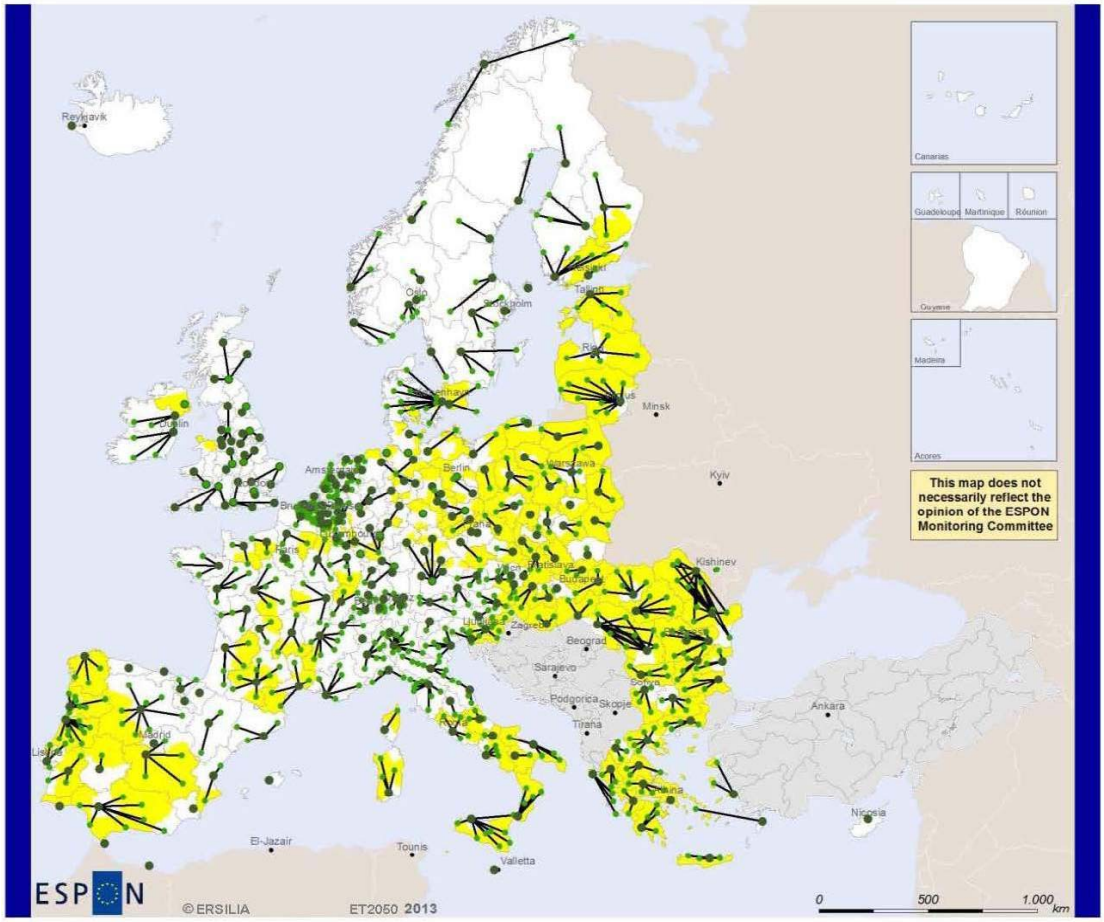


Illustration 11 (C) Territorial Scenario towards 2050

47. ***The long-term average growth of Europe is not reduced by redistributive policies:*** Economic growth in the long-run is not significantly affected by the promotion of any of the three strategies presented (A, B and C)[37]. A similar average growth can be obtained in the long-run with alternative policies-favouring either metropolis and larger cities in developed regions, or medium and small cities in peripheral regions[38]. Economic development mostly depends on technologic changes leading to increases in productivity, and public policies such as fiscal and monetary policy. Therefore, towards 2050 scenarios A, B and C would result in a similar average economic growth for Europe as a whole[39], under the same framework conditions, meaning that, under these conditions, agglomeration economies will have in Europe a relatively minor role as growth drivers.

48. ***Relative regional development gaps are significantly reduced by redistributive policies***. Policies transferring resources into second tier cities and peripheral regions as defined in B and C scenarios are effective to reduce economic gaps without diminishing the overall economic growth of Europe, even if they are not above the current levels (0,4% of European GDP). A basic modelling assumption is that resources being transferred are allocated to services and infrastructures that effectively contribute to increase the productivity of the regions.

49. ***Absolute regional gaps will likely remain***. Gaps are only reduced in relative terms; in absolute terms, the current gap will hardly be reduced unless much stronger redistributive policies (than the present 0,4% of European GDP) are applied.

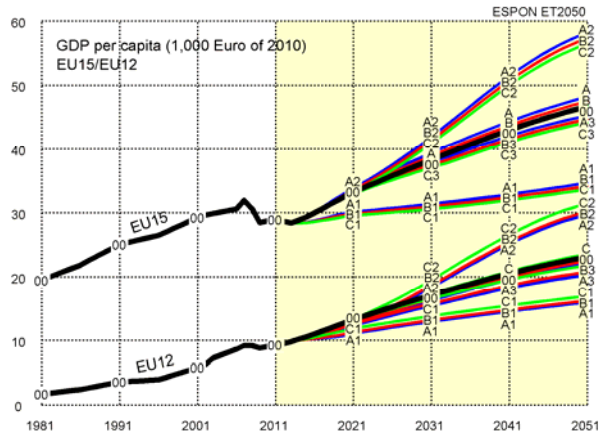
50. ***Polycentric territorial structures induce more balanced growth***. If polycentricity is measured by combining population size and economic growth distribution among the cities in a given region or country, then polycentric structures provide for better distributed growth in the long run. Where the most developed cities and regions within Europe cooperate as parts of a polycentric structure, adding value and acting as centres that contribute to the development of their wider regions. Polycentric territorial development policy should foster the territorial competitiveness of the EU territory.

[37] The modeling of scenarios by MULTIPOLES, MASST3, MOSAIC and METRONAMICA for 2030 (with insights for 2050) was complemented by SASI model for 2050. In addition to the Baseline Scenario and the exploratory scenarios A, B and C, scenarios, SASI modelled three additional alternative framework conditions (resulting on nine scenario variants): (1) Economic recession, where globalisation and growth of emerging economies lead to stagnation and almost decline of the European economy; (2) Technologic progress, where new innovations in labour productivity and transport technology result in significant increases in labour and transport system productivity; and (3) Energy/climate variant, where rising energy costs and/or greenhouse gas emission taxes lead to strong increases of production and transport costs.

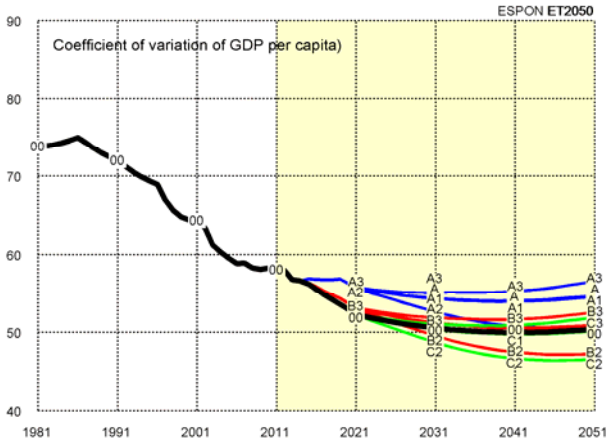
[38] Policies favouring the three alternative scenarios were modelled by SASI both as Cohesion and Structural transfers between regions at NUTS3 level (up to the current 0,4% GDP of the European Union), and accessibility improvements based on selected transport investments favouring the different type of regions.

[39] The spatial policies investigated make a difference of not more than 1,5% to 2,0% of average GDP per capita per year. If one considers that this amounts to between 600 and 1,100 Euro per capita per year that may not be totally irrelevant. But, as the relatively low cohesion indicator shows, these benefits will not be distributed evenly but may be much larger in the regions being promoted and much lower in the remaining regions.

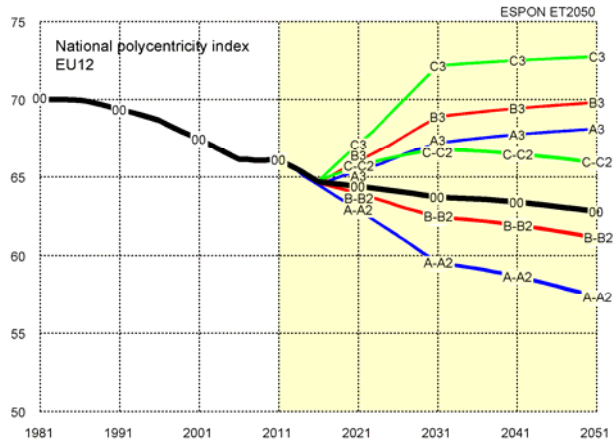
GDP per capita (1,000 € of 2010)



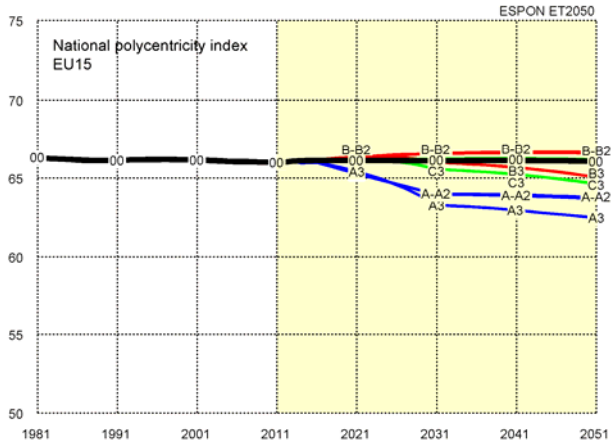
Coefficient of variation of GDP per capita



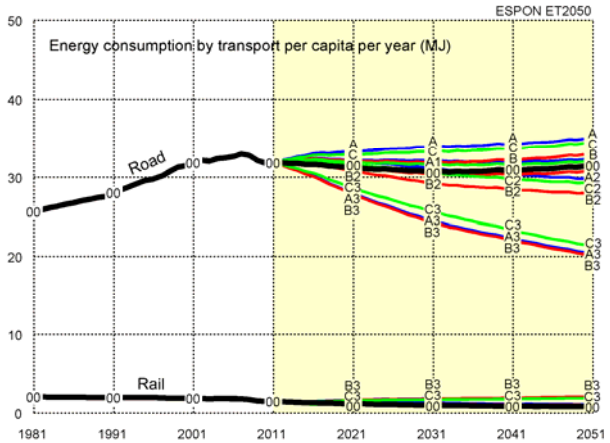
EU12 National polycentricity index



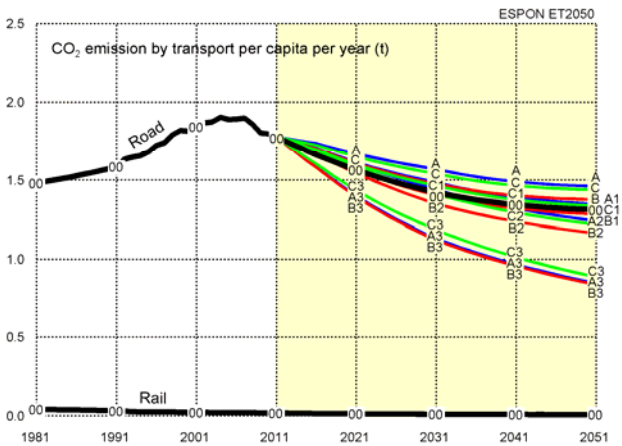
EU15 National polycentricity index



Transport energy consumption per capita



Transport CO2 emissions per capita



Source: SASI

Illustration 12 Evolution 1981 to 2051 (GDP per capita and variation) according to SASI model. Scenarios are combinations between Territorial strategies A, B and C and framework conditions 1 (Economic decline), 2 (Technologic progress) and 3 (Energy scarcity). See annex for a more detailed description.

51. ***Land-use planning will face more pressing challenges.*** Due to the attraction of the metropolitan areas, rural areas are not too much impacted by the expected land uptake if the (A) territorial scenario is applied. Also the development of high-rise buildings expected in this scenario will result in a densification of the urban areas and limit land uptake. The main threats of the large metropolitan regions are the diseconomies of scale, as well as large urban sprawl in the sub-urban environments of these metropolis, to be avoided by strict land-use regulation. Furthermore with a main focus on the metropolitan regions, there is a risk of depopulation of the countryside (abandonment of the less productive areas) and as a result, good stewardship of the land. The main impacts of implementing the B scenario will be to balance growth throughout Europe and the ability to keep cities land-use change manageable. Cities are expected to fulfil an important interaction with their hinterland and thus provide a balanced landscape in which both urban and rural areas can thrive. In the C scenario it is expected a bottom up approach to maintain the rural areas. Main benefit of Scenario C is the ability to maintain and protect valuable ecosystems, and enhance a vibrant hinterland. It is the scenario where most policy interventions in land-use management are required. Good stewardship of the land and cohesion are promoted through stimulating Less Favoured Areas. The main threat linked to the C scenario is an increasing fragmentation of the landscape due to less dense diffused developments throughout Europe.

52. The results of the assessment carried out confirms that assuming productivity increases in the coming decades (because of both new technologies as well as better labour skills and organisation), together with more resource efficiency (avoiding transport and energy increases), then redistributive policies at regional level (at the level of 0,4% EU GDP) will result in a significant reduction of the disparity gaps while the overall growth is not affected.

53. Results also demonstrate, however, that this evolution is not delivering a reduction of disparities at absolute level. For this reduction to happen, intense redistributive policies are needed beyond the 0,4% European GDP assumed, according to the regional economic forecast model applied. These results provide for the basis to define the European Vision.

54. In conclusion, the evolution of Europe from A2 (2020) to B2 (2030) and C2 (towards 2050) is identified as a convenient territorial scenario among all studied. Under this scenario a significant reduction of regional disparities is achieved at relative terms, with the highest overall growth, with more limited environmental impacts in terms of land-take, transport and energy demand.

Envisioning a desirable future for Europe towards 2050

55. Towards 2050 the incertitude in terms of technologic progress and productivity increases, behavioural changes of new generations, and effectiveness of public policies, grows exponentially. During the next decades technologic progress may reduce production costs enormously and facilitate mass production of clean and fully customised goods and services, or it may further increase environmental externalities and social conflicts; technology may also dramatically improve health and living conditions, empowering people, promoting more inclusive societies and participatory government, cosmopolitanism and environmentally conscious behaviour, or have just the opposite impact, further centralising world power in few large corporations, damaging the environment and modifying human condition beyond any social control. To deal with a wide range of uncertainty of future developments, an appropriate conceptual tool to frame the

foresight exercise is the *Three Horizon Technique*[40]. With this approach a Vision of Europe in the space of possible futures – the Third Horizon - is proposed as a feasible evolution from the present situation to a desirable future.

56. ***Smarter Cities and Territories***. In the Digital Age, the development and broadening application of powerful digital technologies will accelerate the pace of economic and social transformation across Europe and around the world. The "Internet of Things", with the spread of sensors enables the gathering of huge amounts of data about the real world, and the sharing of this data through the cloud. Big data will be widely used to improve the efficiency of management systems at urban and regional scale. The integration of Internet with smart energy and transport technologies (smart grids, and new storage capabilities, including those given by electric vehicles connected to the grid) will change the way we consume electricity, from passive consumers to active customers. Most of the households will be associated to active electricity demand schemes, with their home appliances connected to smart boxes that enable optimized consumption/saving schedules. In addition to humans mediated interactions on the web. New smart vehicles and urban transport management systems, that will likely be more customised to user needs, such as systems of individual use and collective management, have the potential to radically change the landscape of European cities, most of them already engaged in ambitious traffic calm plans and promoting public transport. The reduction of pollution, noise and stress will make European cities even more attractive for people to work and live. Beyond "things", "vehicles" or "energy", a planet wide electronic communication grid will connect the thoughts and the feelings of almost all human beings, together with more intelligent and sensitive machines, changing human sociability in unexpected ways.

57. ***More Fluid Sociability***. People will be increasingly disconnected from a single place for their production and consumption activities, due to the increasing flexibility and ubiquity of work, education, leisure and other personal activities enabled by the mobile Internet and cloud technology. Virtual communities and new forms of deterritorialised identities will emerge. A vast flow of accessible information will change our way to understand our relations with others, as well as our inherited prejudices and stereotypes. The virtualization of life and work and the increasing importance of teleworking, e-shopping, electronic communication and social media will establish new lifestyles, habits and mobility behaviours. Lifestyles will become more versatile, leisure activities more widespread, and the everyday life will become more irregular and quickly changing. A better fit between working time and leisure will likely increase residential mobility (more frequent changes of permanent residence as well as better use of secondary residences).

58. ***More Responsible Values.*** New generations will likely live longer and have healthier lives, thanks to molecular medicine and health care real-time monitoring. Europe's ageing population will reflect the improvement of living conditions. This will have profound social and political implications, since values attached to older generations used to be more prudent. The impact of ageing on growth is not limited to labour supply, as it also affects potential job growth via the higher demand for health and long-term care (where productivity advances are limited), and

[40] The ***Three Horizons*** technique is an established technique to organizing how we deal with uncertainty. ***Horizon 1*** **is the space of the imminent future** - already somewhat determined by our present readiness, resource commitments and institutional capacities to make adjustments etc. ***Horizon 2*** **is the space of willingness and change** and one's assets are actively shifting to be able to realize opportunities and to adjust to new pressures. Here it is desirable and usually possible to both *forecast* by examining the implications of trends and drivers of change; and *backcast* by rigorously asking what would have been required to create the conditions for the aspirations and vision of Horizon 3. ***Horizon 3*** **is the space of possible futures** of *what if…what could be…* and how we might recognize and realize opportunities, it is where powerful and compelling visions are described so they can enable leaders to break the inertia and fear of change that pervades most organizations. By enabling many stakeholders to collaborate on shaping the inputs to the Third Horizon, the process has already begun to proactively build the future.

pressure on public finances due to the higher numbers of people living on pensions and incurring long-term health care expenses.

59. ***Better educated workforce, more free-lance jobs*****:** Possessing adequate cognitive skills will be increasingly necessary to enjoy life, for self-esteem, for increasing income and for finding new jobs or founding new companies. A relative higher level of cognitive skills will also be required also in the less knowledge intensive services. A wider range of diversified jobs will be created mostly in the creative workforce, in eco-industries and in personal service sectors across Europe. However, a relative reindustrialisation may also occur in traditional industrial areas in the centre of Europe, recentralising high-quality and technologically advanced production. Industry will remain as a backbone of competitiveness in non-metropolitan Eastern regions, shifting to deeper territorial embeddedness and higher local added value.

60. ***Further decentralised, highly interconnected networks***. The energy and transport sectors will be fully integrated, with fleets of electric vehicles providing energy storage capacity when they are parked into urban and peri-urban solar parks connected to the grid. Thanks to these developments, Europe will be in a new era of *localized energy independence*, with entire neighbourhoods or factory development being served through distributed renewable power. In the short-term, more sustainable energy sources and means of transport will likely emerge, leading to more decentralised networks and hybrid solutions, such as modes of transport neither private nor public, individual but of collective use. Breaking trends, such as energy fusion or teletransport even if unlikely in the coming decades, indicate the human wish for infinite energy, and instant mobility.

61. ***Renewable energy***. In the North of Europe a ring of offshore wind-farms in the five territorial waters of the North Sea, as well as several offshore wind-farms in the north-western Atlantic, connected to the European super-grid, and in the South of Europe high-voltage transmission lines crossing underneath the Mediterranean to connect the European grid to centralised solar plants built in the Sahara desert. The potential energy from the winter winds in the North (especially in the wintertime) and from the sun in the South (especially in the summertime from Southern Europe, but almost permanently in the Sahara desert) will be connected and available through the grid, improving the overall balance of the electricity system in Europe.

62. ***Lesser energy dependence.*** European energy security is going to be enhanced through a better interconnection of the energy grids that will allow to fully access the renewable resources from the North (wind) and South (solar) Europe, plus a residual nuclear production and gas, and shale gas, production from the North Sea and South-East Mediterranean (near Cyprus) sea basins. This is however not enough to ensure self-sufficiency, and Europe will still predominantly depend, although less dramatically, on gas imports from the Eastern (Russia) and Southern neighbourhood countries. Security will also be enhanced also through the diversification of gas imports, as a share of these imports come from the US. Energy security demands – particularly in Eastern regions – will encourage the growing western, but also north-south integration of energy networks, leading to increasing density.

63. ***Transition towards a Low carbon economy***. Energy intensity (energy consumption elasticity in relation to GDP) will decrease due to more service oriented economies and the increased resource and energy efficiency in production and consumption. Carbon intensity (GHG emissions elasticity in relation to energy consumption) is also decreased thanks to improved technology. A transition will take place from a system characterized by high fuel and operational

costs to a model based on higher capital expenditure and lower fuel costs. Impressive energy savings will be achieved during the first half of the century.

64. ***Successful socio-ecological transition.*** The European domestic economy will enter in a phase of qualitative, rather than quantitative, growth. This stems from three main factors: the European demographic structure, which includes a high percentage of inactive population (below 25 years and over 70 years, with an average life expectancy of 85 years, gives 40 years of inactivity for a working period of 45 years); environmental constraints, which regulate growth while improving its quality and sustainability; and a larger share of low-productivity services (including personal services to ageing population). However, Europe will restore its competitiveness through an industrial rebirth of high productivity activities derived from technological innovation. The whole economy increasingly operates with the contribution of the social sector, including organizations funded from private, public or hybrid sources, geared to the needs of people and ecosystems, while not driven by market forces or the exclusive profit motive.

65. ***More productive and ecological agriculture***. Climate change is expected to decrease the productive capacity of agricultural land in other regions of the globe, while increasing it in the North of Europe, thus providing Northern Europe with a competitive advantage. As a result, the productive capacity of Europe's rural areas has become a yet more valuable resource, with a stronger emphasis on food production. Rural areas no longer invest in traditional crop-farming and stock-rearing industries, but instead focus on a new rural economy (e.g. tourism, local trade and products) and manufacturing and service industries directly associated to bio-resources and organic agriculture.

66. ***Increasing reliance on efficient management of local resources.*** In areas such as food production, energy or water management, production and resource management will tend to become more efficient and reliant of the use and recycling of local resources. Europe will successfully tackle the challenge of decoupling resource use from economic growth by essentially using less and yet continuing to allow economies to grow and complete a socio-ecological transition towards a low carbon economy. Integrated management of water resources will become a key-component of territorial cooperation strategies applied by Euregional and macroregional authorities to transboundary river basins, and succeed in developing a sense of solidarity between upstream and downstream areas of these basins. Sparsely populated areas will still be land reserves, highly convenient to locate extensive activities, often with environmental impacts, while many southern coastal zones maybe densely urbanised and face important environmental conflicts.

67. ***Green areas refurbished and cultivated within the urban boundaries*** will help to increase urban biodiversity. Due to integrated land use planning and facilitated by policies to combat urban sprawl net land take will be almost negligible. Urban agriculture, redevelopment of brown fields, greening of the city by green rooftops, vegetated walls, enlargement of urban green, enhancing the quality of the green urban areas, and connecting urban green to the wider green infrastructure network are all initiatives that have improved the quality of life and increased biodiversity in cities.

68. ***The sea becomes a valuable source of economic development***, constituting a key pillar for trade, growth and employment. These valuable marine potentials are explained by the richness of the European seas in energetic, mineral and food resources as well as by their transport possibilities. There are six seas in Europe, the Atlantic Ocean, the Arctic Sea, the Baltic Sea, the Black Sea, the Mediterranean Sea and the North Sea. Towards 2050, the marine potentials from the European seas will be exploited and the related challenges tackled.

69. ***Mitigation and adaptation of territories to Climate Change***. The physical, social, economic and environmental assets of several categories of European regions are impacted in various ways by the effects of climate change (sea level rise, more frequent river floods, heat, etc.). Working with nature instead of fighting against it is seen as common practice. Besides the challenges that need to be faced with regard to climate change, new opportunities also arise for cities and regions. This includes new business opportunities, enhanced forest growth, increased crop variety and yield and additional summer tourism in Northern Europe, even the possible opening of new shipping routes in the Arctic.

70. ***Closer integration with Neighbouring Countries***. The European Union will continue the gradual enlargement process, geographical widening the boundaries, and having closer relations and association with Neighbouring countries and the rest of the world. Eastern and Southern countries are part of the European history and share the same geography. Because of security, migration, energy and resource provision, logistics and environmental management, as well as just because of geographic proximity, the European Union and Neighbouring countries will necessarily be increasingly interdependent and more politically integrated.

71. ***Globalisation and citizenship become main drivers for the "European project"***. We now enter in a new period where European political integration will not likely progress because of the economic interest of achieving a Single Market, which is well advanced despite important gaps in different sectors[41]. The advancement of the "European project", and the reinforcement of common values and policies will likely be related more than to the Single Market to the role that European countries would decide to play at global scale, jointly leading the world in areas such as free trade, climate change and peacekeeping. It will require a deeper involvement of citizens, only possible if nationals of all Member States become European citizens and Europe, and enlarged patriotism is promoted, and the European Union becomes, beyond a union of countries, a community of people.

72. ***European common institutions are reformed and become stronger.*** The European Union institutional framework is the result of a stepwise approach that has been successful in building up common policies and institutions overtime, but needs to be in part re-designed to become more legitimate and efficient dealing with new problems and opportunities, particularly in relation to policies closely linked to the territory, such as Cohesion and Agriculture. The European institutions need to solve actual "democratic deficits", and practice multilevel governance based on a new understanding of the subsidiary principle: until now, the 'European added-value' of actions and initiatives had to be demonstrated and justified taking care of not changing pre-existing political institutions with territorial jurisdictions (municipalities, regions, countries) but rather defining a framework within which these levels interact. In the future, it will be the "national added-value" the one that will have to be demonstrated in relation to the local and the European scales. On the other hand, the political culture of the Member States is excessively compartmentalised and only very few countries have been able to organise any kind of horizontal coordination of sectoral competences within their institutional systems.[42]

[41] The European Parliament has evaluated the "cost of-non Europe" in € 800 billion every year, or 6% of the European Union GDP. This is the estimated cost due to incompleteness of the Single Market

[42] The same was true of the Commission; aware of this gap, it took stock of the territorial dimension of Community policies in its internal report entitled *Community policies and spatial planning* in 1998. This finding was confirmed during the preparation of the *White Paper on Governance* (2000-2001), which mentions the need to analyse the territorial impact of policies such as those for transport, energy or the

Territorial Vision: Making Europe Open and Polycentric

Policy-goals

73. ***Openness*** to the rest of the world and to the neighboring countries is a necessary condition for all European cities and regions to take advantage of the development opportunities created by global growth and technologic progress[43]. The long-term sustained development of the European territory is linked both to valorise and exploit endogenous assets and promoting a balanced developed as well as to remove internal borders, reinforcing co-development strategies with the Mediterranean and Eastern Neighbourhood, as well as further integrating European cities with the rest of the world[44]. Making Europe open requires to connect Europe globally and promoting co-development with neighbouring regions.

74. ***Polycentricity*** is necessary to spread development opportunities across European cities and regions, promoting endogenous sustainable development, unleashing regional diversity and gradually diminishing regional disparities[45]. A gradual evolution towards more polycentricity at all scales across Europe, sensitive to the geographic conditions of each territory, will achieve the best regional balance without diminishing the overall economic growth. Policies must be focused on city renewal, and networking, linking cities at both regional and global scale. Improving the sustainable management of resources requires compact settlements and smart cities. Making Europe Polycentric requires unleashing regional diversity and endogenous development as a mean to reduce regional disparities, to support a balanced urban structure and a sustainable management of natural and cultural resources.

75. ***Making Europe Open and Polycentric*** is the territorial vision consistent with the competitiveness, social cohesion and sustainability goals stated on *Europe 2020*. The efficiency and quality of the European territory lies in networking cities of all sizes, from local to global level,

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environment: indeed, it is by analysing this territorial impact that we highlight the contradictions and conflicting effects of the different policies.

[43] The Openness policy-aim is related to the Green Paper on Territorial Cohesion "Connecting territories" goal, based on "integrating the economy of places with the economy of flows", and to the Territorial Agenda 2020 "Improving territorial connectivity" for individuals, communities and enterprises as an important precondition of territorial cohesion, a strong factor for territorial competitiveness and an essential condition for sustainable development, "Ensuring global competitiveness" of the regions based on strong local economies as a key factor in global competition preventing the drain of human capital and reducing vulnerability to external development shocks, and "Territorial integration in cross-border and transnational functional regions" as a key factor in global competition facilitating better utilization of development potentials and the protection of the natural environment.

[45] The Polycentricity policy-aim is related to the Green Paper on Territorial Cohesion "Concentration and density" i.e. better exploiting regional potential and territorial capital, "Cooperation" by overcoming division i.e. promoting co-operation cross boundaries but also better consistency between various EU and national policies with a territorial impact and supporting "Regions with specific geographical features" i.e. policy differentiation to accommodate the specific features of different territories, including regions with some geographic development challenges. In relation to the Territorial Agenda 2020: "Promoting polycentric and balanced territorial development" as an important precondition of territorial cohesion and a strong factor of territorial efficiency, Encouraging integrated development in cities, rural and specific regions to foster synergies and better exploit local territorial assets, and Managing and connecting ecological, landscape and cultural values of regions, including joint risk management as an essential condition for long-term sustainable development.

as well as empowering people and local activities to valorise their own assets at a European and global scale. The roadmap to make Europe smart, inclusive and sustainable requires the European territory to become more open and polycentric[46]. This strategy can be presented in five complementary policy-aims, as follows:

Policy-aims

76. The territorial Vision "Making Europe Open and Polycentric" is developed into five complementary policy-aims: Connecting Europe Globally (1), Promoting co-development with Neighbouring regions (2), Unleashing regional diversity and endogenous development as a mean to reduce regional disparities (3), Supporting a balanced urban structure (4) and Sustainable management of resources (5).

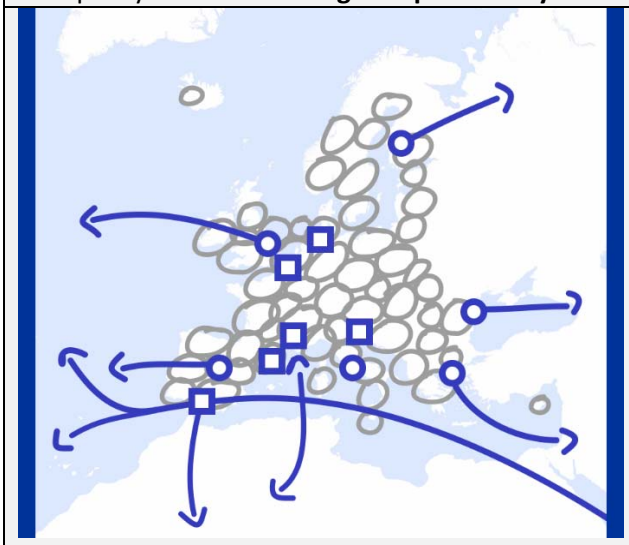
77. Policy-aims are based on an "open endogenous development paradigm" that reconciles a "place-based" and community-led development approach, together with the imperative openness to global markets and neighbouring countries.

78. For each policy-aim, policy-options are suggested, as well as possible pathways to implement them.

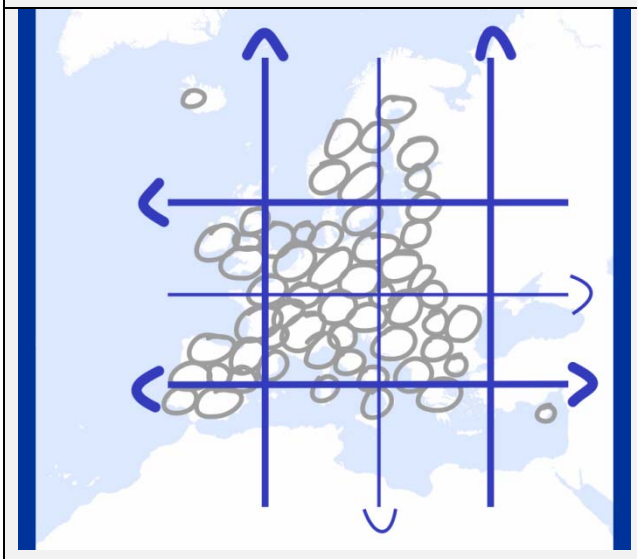
79. The implementation of such policy-options would require to reinforce urban and regional governments, as well as to develop stronger common European institutions operating in a multi-level borderless governance framework.

46 "Making Europe Open and Polycentric" policy-aim summarises policy-aims first introduced on previous European policy- documents, updating some of them according to the present situation and the future prospects. It is also a translation into territorial terms of the paramount policy-aim stated on the Treaty of Rome (1956): "An Open Community of Equals with Strong Common Institutions".

First policy-aim: **Connecting Europe Globally**[47]

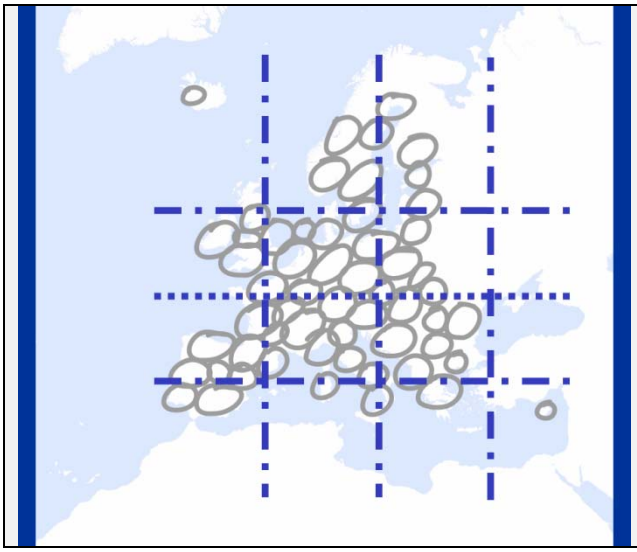


Opening up European markets to global competition and promoting global sustainability. The progressive opening of the European market to global competition, in parallel to the opening of other world markets to Europe, will create fair and sustainable development for all if the higher social and environmental European standards are gradually adopted by the rest of the world. European larger metropolis need to reinforce their role as a global cities.



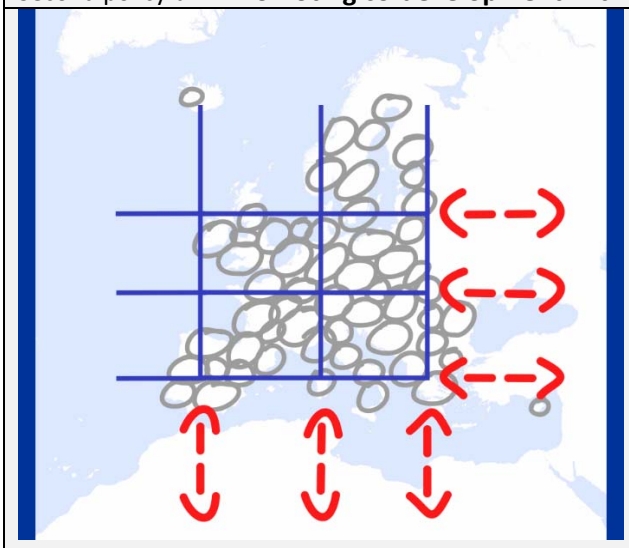
Integration of transport and telecommunication networks at all scales. The integration of information and communication technologies together with the electrification of transport systems should enhance networks interoperability. Global connectivity through maritime routes and intercontinental air services is a critical development condition, as well as local and regional connections to transnational European corridors. The decentralisation and geographic specialisation of intercontinental gateways would bring a net benefit to the European economy by reducing travel time and transport operating costs, also contributing to territorial cohesion

[47] Illustrations of policy-options are inspired by the vision for a polycentric Europe "**Bunch of grapes**" developed by Kunzmann and Wegener (1991). See annex.

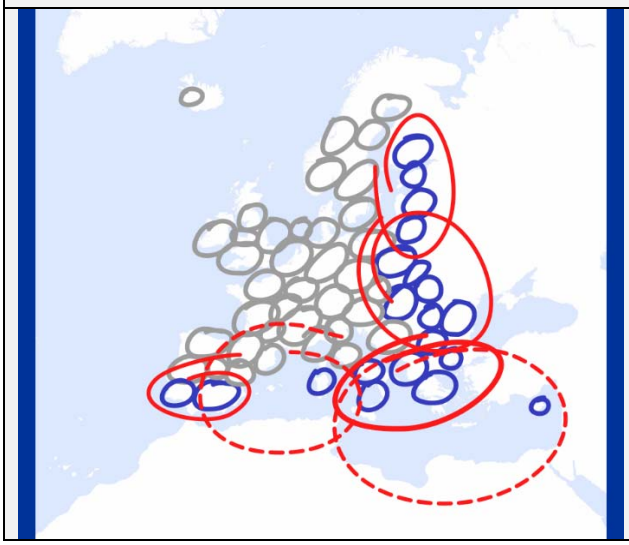


Intelligent energy networks connecting decentralised renewal energy sources. To reduce European energy dependency and increase economic efficiency, an intelligent grid covering Europe north-south, integrating renewal sources -wind in the north and solar in the south, together with other conventional sources such as hydroelectric. Intelligent energy networks will provide for more decentralised production and consumption, and be fully interconnected to facilitate more diversification of sources as well as cost reduction and price harmonisation across Europe.

Second policy-aim: **Promoting co-development with Neighbouring regions**

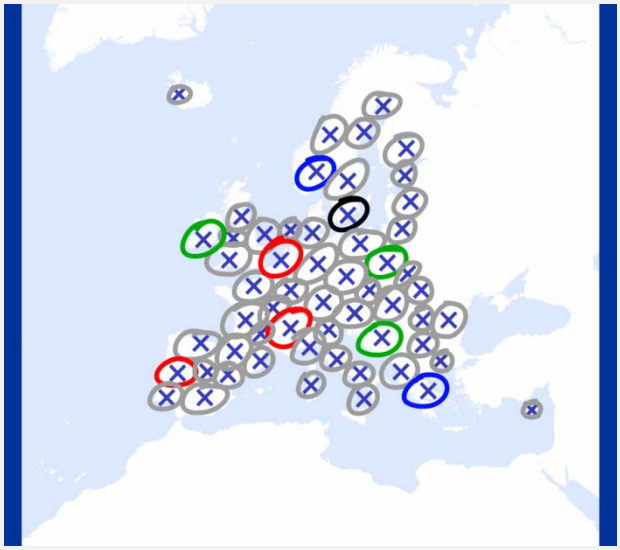


Linking transport, telecommunication and energy networks between Europe and Neighbouring regions. Links between European and Neighbouring countries transport, telecommunication and energy networks need to be further developed. Trade and traffic across de Mediterranean, Middle East and Eastern countries will continue grow and global gateways emerge in Neighbouring countries. Beyond infrastructure provision, markets for network industries should also be gradually integrated.



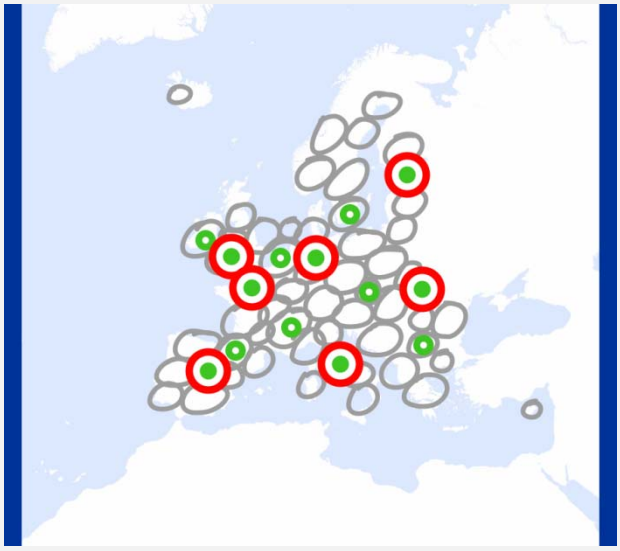
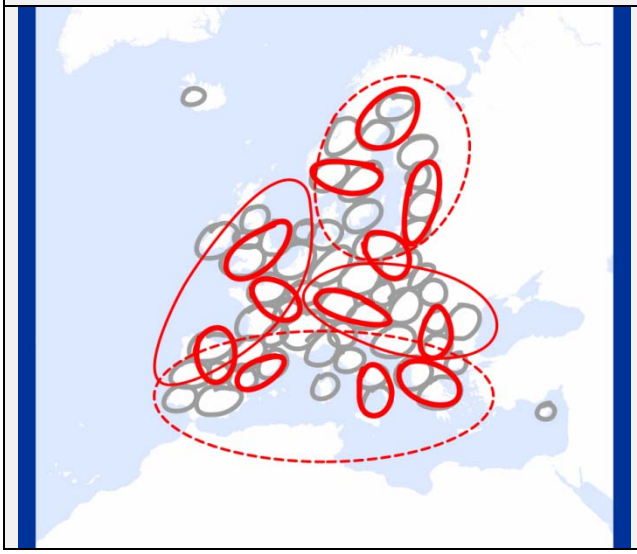
Supporting cross-border integrated development. Co-development strategies will combine the huge market dimension and R&D capabilities of Europe with the energy, qualified labour and strategic access to Sub-Saharan Africa of the South shore of the Mediterranean, as well as Eastern Neighbourhood. Cross-border areas in the West and East Mediterranean, along Eastern borders, have to become priority areas for co-development.

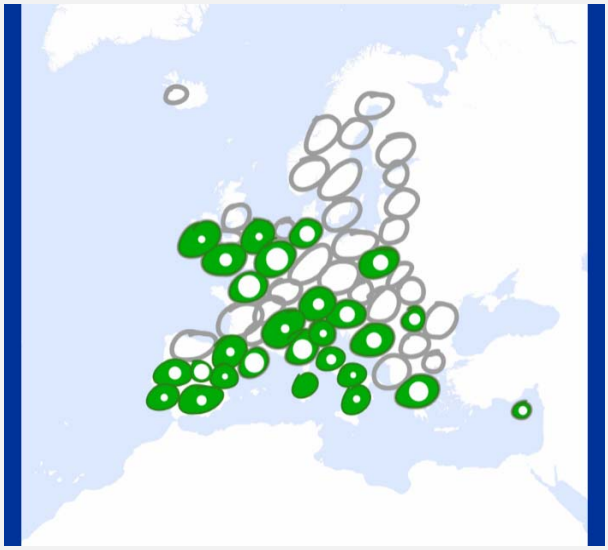
Third policy-aim: **Unleashing regional diversity and endogenous development as a mean to reduce regional disparities**



Sufficient accessibility to open up local and regional potentials. Sufficient access to transport, telecommunication and energy infrastructure is necessary not only to make a given territory attractive to exogenous investments but mostly to increase the productivity of endogenous activities. For less developed rural regions, industrial and technologic activities linked to agriculture, tourism, renewable energies, natural resources and cultural heritage, are important assets for a more diversified economic development. Empowering local and regional governments is always a necessary pre-condition.

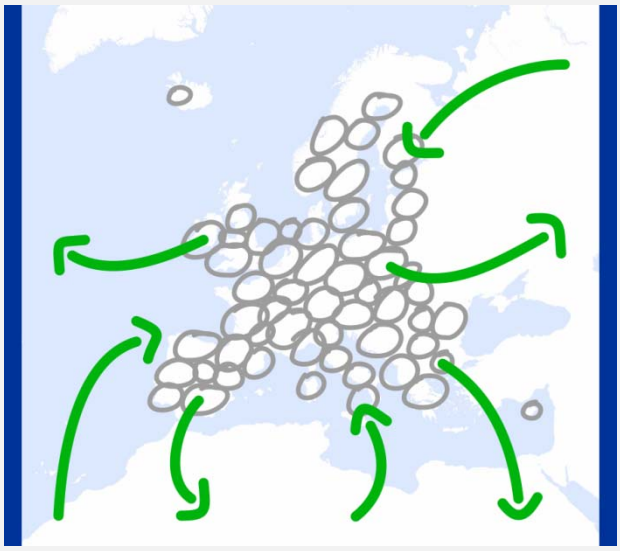
Universal access to services of general interest. The access to services of general interest is essential to improve social capital and development opportunities, as well as good enough welfare conditions for all Europeans. In sparsely populated and less developed rural regions, it is also a precondition to maintain a certain number of inhabitants. Therefore, innovative management strategies need to be adopted to make this provision financially sustainable.

Fourth policy-aim: **Supporting a balanced urban structure**	
	***Reinforcing Secondary city/regions as engines of growth.*** Europe has a relatively large number of cities and metropolitan regions enjoying a central position at global level in a variety of sectors and activities. European secondary cities must become places of attraction and engines of economic growth, with a high degree of social cohesion, platforms for democracy and cultural diversity and places of environmental regeneration. To maintain their global relevance, European global metropolises have to adopt growth strategies based on decentralisation and networking with other cities and regions.
	***Smart and inclusive revitalisation of cities.*** The quality of European cities lies in promoting inclusive neighbourhoods and mixed land-uses, avoiding spatial segregation and protecting cultural heritage. European cities are complex and have heavy historical inertias, making change and regeneration slow, and difficult. Investing in public spaces and public facilities is critical to improve the quality of European cities. The development of new information and communication technologies allow for the implementation of smart urban management technologies that may have a decisive impact improving the quality of European cities.
	***Integration of functional urban regions.*** More advanced institutional cooperation mechanisms need to be implemented to make territorial integration feasible, especially in large metropolitan areas.

Fifth policy-aim: **Sustainable management of resources**	
	***Protecting strategic land from urbanisation.*** Most European cities have to grow avoiding urban sprawl by favouring high density urban development in strategic nodes and along public transport lines. Land is a scarce resource in many parts of Europe, the most urbanised continent. There is a need both to protect land to be urbanised, for strategic and/or ecological reasons, to induce more compact urban settlements and to promote the progressive ecological restoration of low density residential areas inherited from 20th century urban sprawl.
	***Sustainable management of natural and cultural landscapes.*** The European territory is made of a diversity of places, from oceanic islands, isolated mountain areas, sparsely populated inner regions and density populates coasts, to global metropolises and small historical towns. The valorisation of the cultural heritage and the quality of the landscape, including aesthetics, are essential economic assets to make urban rural places more attractive for people to live and work, particularly for creators and entrepreneurs. Sustainable agricultural practices must be promoted throughout Europe, including both sufficient income levels and good stewardship of the land. At European scale, a green infrastructure network stimulating biodiversity and ecosystem services should be developed.

Policy options

Policy-options for Connecting Europe Globally



The Single Market for network industries to be completed needs sustained political, regulatory and anti-trust enforcement, investments and entrepreneurial effort to develop technologically advanced and interoperable infrastructure networks.

International agreements to liberalise intercontinental aviation and deep-sea, telecommunication and energy networks, are linked to the gradual implementation of social and environmental quality standards.

Opening up European markets to global competition and internalising environmental costs in planes and vessels may facilitate a more geographically balanced distribution of hubs and gateways across the European territory.

An intelligent electric grid has to be developed connecting decentralised energy renewal sources, assuring energy provision and reducing costs.

Continuous development of the Internet as the primary communications infrastructure of the Digital Age: the 'Internet of Things' and the 'Internet of Services' as the central growth engines of Europe as a knowledge-based society.

Migration flows from Neighbouring countries and the rest of the world to/from Europe are necessary giving the shrinking working population in Europe, as well as the growing world-wide demand for more skilled specialised jobs. The adequate management of in/emigration require for a much stronger European common strategy.

Policy-options to promote co-development with Neighbouring regions

Trans-European Transport, Energy and Telecommunication Networks extensions to the neighbouring countries are indispensable to promote economic integration as well as a co-development strategy targeting cross-border zones.

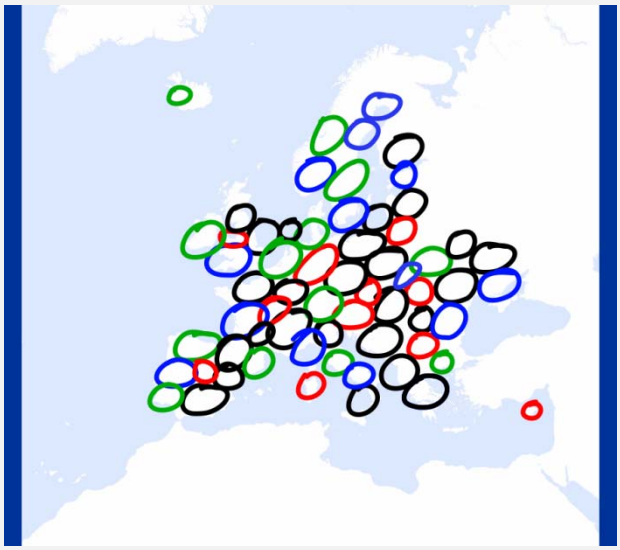
Integrated plans for strategic areas located on cross-border zones may be indispensable in areas with high potential.

Selected economic and social infrastructure investments are necessary to open up the logistic, industrial, agricultural or touristic potentials of these zones, as well as establishing sound cross-border cooperation to reduce unnecessary competition and induce more specialisation.

Beyond infrastructure, markets for network industries may be integrated. European policies have to encourage the participation of Neighbouring countries into European programs.

Establishment of free trade agreements linked to the gradual implementation of higher social and environmental standards, as well as democratic values in regions they are missing.

Policy options to unleash regional diversity and endogenous development



Economic synergies between endogenous activities, networks of SMEs, and foreign investments can become a development priority.

Economic infrastructure investments need also to rise local productivity, not just attract foreign direct investment.

Infrastructure investments need to be valorised by spatial development plans defined together with citizens and local companies, promoting community-led development.

Innovative management technologies are required to make financially sustainable the access to quality health services, education and welfare conditions for all Europeans.

More sophisticated and efficient formal cross-border cooperation mechanisms need to be implemented to make territorial integration feasible.

Good territorial governance is a necessary precondition for development. Empowering local public administrations is decisive to create sound, business-friendly development environments.

European Cohesion policies should be more sensitive to the macroeconòmic situation.

Policy options to support a balanced urban structure

Through the implementation of intelligent urban management systems, particularly in the fields of transport and energy management, European cities may become economically more efficient and will increase their environmental quality, reducing noise and pollution.

By a deconcentration of public investments from capitals and a decentralisation of responsibilities, cities can be encouraged to improve their business environments and form networks at regional scale that allow them to improve their performance in European and global scale.

By supporting strategic plans for territorial cooperation, moving from historical conflicts to jointly developing cities common assets territorial cohesion may be greatly improved.

Cities can be supported to strictly protect the blue-green infrastructure, and be more flexible in zones dedicated to economic activities and residence; irrigate residential areas with public transport and slow mobility for pedestrians and cyclists infrastructure while reducing car traffic speed and land take.

European territorial policies should avoid that European cities grow with dispersed and discontinuous urbanisation, fragmented in segregated o exclusive zones connected to specialised networks.

Instead of further concentrating population and activities, it is by networking with other European metropolises and Second Tier Cities at national level that European global metropolises have to reinforce their competitiveness at global scale.

Policy options for a sustainable management of natural and cultural resources

The acquisition of land, and other mechanisms to protect strategic land from urbanisation may be included into Structural and Cohesion Funds as a possible allocation of the investments. Agricultural Policies (Pillar II) is redefined towards rural development and natural preservation and better integrated with Structural and Cohesion Funds.

Subsidies to production can be reduced in favour of objectives such as landscape management, ecologic production, more self-sufficiency and access to local markets.

Integrated rural development plans outside the agricultural sector may promote tourism, improving commercial chains between producers and consumers, and promoting bottom-up public-private initiatives, at National and European level.

The decline of the agricultural areas in the late twentieth and early 21st century allows a restructuring of the rural areas and provides the possibility to create a green infrastructure throughout Europe, stimulating biodiversity and ecosystem services

Productive agricultural soils and high quality nature are -protected from urban development through strict planning, as well as cultural landscapes. Well-functioning ecosystems and the protection and enhancement of cultural and natural heritage must be considered as conditions for long-term sustainable development.

The valorisation of cultural landscapes and management of the attractiveness of a given place always requires reinforcing local partnership. Landscape enhancement depends on citizen's active involvement, as well as proper formalisation in planning regulations that can be encouraged and promoted by institutions at European.

Integrated Coastal Zone Management may contribute to improve maritime governance. The international governance environment may be greatly improved. The UN WEO may establish a legally binding legal framework which is included in all sea governance arrangements

Mitigation and adaption to Climate Change can be included in urban and regional development plans, particularly in relation to the resilience of existing infrastructure, together with investment programs.

Roadmap: Pathways to make Europe Open and Polycentric

Pathways towards Connecting Europe Globally

80. *The aim* is providing efficient transport, energy and telecommunication networks to European cities and regions to make possible for them to valorise their own assets at European and at global scale.

81. *The main political actions* will be focused on completing the Single Market with the further liberalisation and harmonisation of the markets for network industries, internalising the environmental costs, supporting technological and management innovation as well as planning infrastructure extensions and progressing in the cooperation and integration with Neighbourhood Countries, North-America and the rest of the world.

82. *The responsibility of the political actions* lies mostly on European institutions and in international institutions (e.g. specialised United Nations agencies) as well as in large private corporations in the sectors involved. Local and regional institutions have the responsibility to develop consistent development strategies linked to their enhanced connectivity, as well as to assure the interconnections of local and regional networks with European and global networks.

83. In the short and medium-term, policies should favour the completion of the Single European Market, giving more coherence to infrastructure planning at all scales and gradually removing the costs of non-Europe in the internal market for network industries.

84. In the longer-term, policies should open-up European markets for network industries to global competition and internalise environmental costs as effective measures to enhace efficiency.

Pathways to promote co-development with Neighbouring regions

85. *The aim* is further integrating Europe and Neighbouring countries, reducing the economic gap and valorising join development opportunities.

86. *The main political actions* will be focused on enlarging the European Union, deepening the market integration of Neighbouring countries in general, linking and further developing transport, energy and telecommunication networks and giving priority to the integrated development of strategic cross-border areas.

87. *The responsibility of the political actions* lies mostly on European institutions and in international institutions (e.g. specialised United Nations agencies) as well as European countries and regions having borders with Neighbouring countries.

88. In the short and medium-term, policies should favour the gradual market integration, economic infrastructure investments and co-development plans for strategic cross-border zones.

89. In the longer-term, policies should be addressed to deepening market integration and enlargement.

Pathways to unleashing regional diversity and endogenous development

90. *The aim* is to provide equivalent development opportunities among European regions. This entails taking appropriate positive discrimination steps towards less well-off regions.

91. *To achieve this goal, main policy steps include* the enhancement of the endogenous regional development potential, the improvement of regional infrastructure endowment, and the provision of an adequate level of services of general economic interest, especially in sparsely populated and less accessible areas. Targetted policy steps have to be successful to tackle issues faced by areas characterised by a specific permanent geographic or demographic handicap, such as islands, Arctic, remote (including ultraperipheral) or mountain areas.

92. *The responsibility for policy action* is shared between local/regional authorities and higher level authorities (i.e. member states and the EU). While mobilising all the relevant key-players in their respective region, the former have to conduct an on-going analysis of the challenges they face and their specific related needs. In line with the principles of the place-based approach, and account taken of the availability of financial means, the latter have to provide an appropriate framework to fund, supervise and adapt the local/regional development operations.

93. *In the short* and *medium-term,* Structural and Cohesion Funds have to be further reformed and better coordinated with Agricultural Funds to promote investments rising open endogenous development.

94. *In the longer term*, cities and regions will develop integrated territorial development plans as a basis for intraregional cooperation and coordination of European sectorial policies.

Pathways to towards supporting a balanced urban structure

95. *The aim* is reinforcing secondary cities, all over the continent, as well as achieving a more networked development of the system of European cities, at regional and continental level, enhancing their world-wide influence.

96. *Main political actions* have to be focused on the promotion of a model of sustainable city reconciling prosperity, social welfare and environmental friendliness for each European city. City networking between metropolises and also between these and secondary cities, geared towards a synergetic model of sustainable economic development.

97. *The responsibility for policy action* lies primarily with local and regional authorities, including groupings of such authorities in metropolitan areas. National and EU authorities also have a critical role to play in their allocation of economic infrastructure investments.

98. *In the short and medium-term,* the urban dimension of the Cohesion policy is further developed including support to smart regeneration, including the renewing of neighbourhoods.

99. *In the longer-term,* a consistent and formal system of cooperation between, and within, the European urban areas will beset up, involving metropolitan areas, cities/towns and their rural hinterland. The relevant policy steps are primarily taken at the level of functional areas, beyond administrative entities.

Pathways to sustainable management of natural and cultural resources

100. *The aim* is to protect and enhance natural assets and manage ecosystem services in a sustainable manner, both in more urbanised and less urbanised areas.

101. *Main political actions* that have to be taken are the reduction of uncontrolled urban sprawl and promotion of more compact urban development, with well-planned urban and peri-urban environments and good accessibility, minimising negative impacts of soil sealing or uncontrolled development in pristine natural areas causing habitat fragmentation, as well as the reduction of highly productive agricultural soils. Special attention should be given to the protection of land under urban stress in sensitive areas, such as on the borders of existing cities and in the coastal zones. The establishment of a network of green infrastructure with reforestation and the reclamation of agricultural land is necessary in both more and less densely settled and/or depopulating regions. Overall, land-use and territorial development measures are indispensable for mitigation and adaptation to Climate Change.

102. *The responsibility of the political actions* lies both with the European institutions and the local institutions. International collaboration in the management of ecosystem services, which include river basin management and flood control, air quality, carbon sequestration and food and bio-energy production.

103. *In the short and medium-term,* European Structural and Cohesion, as well as Agricultural Funds are reformed favouring landscape and ecologic planning and management, as well as promoting public investments to buy strategic land under urbanisation stress.

104. In *the longer-term,* a Green Infrastructure Network is developed linking Nature 2000 areas together with areas protected for strategic purposes. Plans for Natural Protection and Management are adopted.

A New Generation of Cohesion Policies

105. *In the short term, after 2020,* **a "New Generation" of Cohesion Policy is needed** to deal with the new challenges ahead. Structural and Cohesion Funds should be reformed following a stronger place-based approach, encouraging the development of integrated development plans in functional areas, empowering local and regional government to support more business-friendly environments and entrepreneurship. European funds have to be more sensitive to macro-economic cycles, as well as to the gradual opening of European markets to global competition. Structural and Cohesion Funds need to be better coordinated together with the Agricultural Fund for Rural Development (Pillar II, CAP). Transnational cross-border zones have to be promoted, such as the Baltic region, the Danubian region, the Black Sea, the Adriatic-Ionian region, the Alpine region, the West Mediterranean[48], as relevant geographic scales to define integrated spatial development policies.

[48] The EU has put in place two strategies, covering several policies, which are targeted at a 'macro-region': the EU Strategy for the Baltic Sea Region (2010) and for the Danube Region (2010). The European Council invited in 2012 the Commission to present an EU Strategy for the Adriatic and Ionian Region by end 2014, subject to the evaluation of the concept, and in 2013 proposed to work also on the Alpine Region aiming at having a proposal for a strategy in 2015.

Also in the short term, **Solidarity funds** need to be created to support countries and regions facing higher costs because of the application of common policies, under conditionality rules. The main purpose of the Solidarity funds in the redistribution of **equalization funds** to compensate for extra-costs of implementing EU common priorities.

106. *In the mid term,* **a Framework document**[49] applicable to the whole territory of the EU is necessary drawing up an integrated strategy which would reconcile the objectives of territorial cohesion and competitiveness, and impose a set of territorial conditions on Community aid allocated to sectoral policies, incorporating territorial considerations into every stage of planning (diagnosis, choice of priorities, methods, monitoring, evaluation of results and impact). The spatial development integrated strategy would be an opportunity to better coordinate European policies, generating synergies among sectors, in particular European funds with explicit territorial dimension (Structural and Cohesion funds, Pillar II CAP), with infrastructure and market regulatory policies in transport (e.g. TEN-Ts), energy (e.g. Electric Grid), or environmentally protected areas (e.g. Nature 2000). The macro-regional spheres of transnational cooperation constitute excellent laboratories for governance and could prefigure such a strategy: the example of the Baltic Sea region has much to teach us in this context. The aim goal is the optimal government of structural funds for energy, transport, ICT and environment, matching decision and problem spaces.

107. *In the long term***, European Territorial Development may become a common Policy**, being a major issue for territorial governance, the coordination of sectorial policies and a more efficient allocation and management of European development funds. Acknowledging the diversity of the European territory and further customising policies and fund allocations will no longer be sufficient to face global development challenges and reduce the costs of administrative and sectoral fragmentation: there is a need for a shared strategic planning of the European territory, based on an overall vision of its future development to support the better coordination of European policies with regional development with local and regional spatial development plans[50]. The aim is multi-level governance enabling territorial planning and cooperation

[49] There is no an explicit policy document framing for the Structural Funds (created in 1975), and the Cohesion Funds (created in 1992).

50 Please see "**L'Europe, aménager les territoires**", Chapter 1 by Patrick Salez, Yves Jean, Edition Armand Colin (2009)

A New Governance Approach

108. ***Increasing involvement of citizens in the European policy***, empowering local actors to a higher extent and considering territorial, environmental and socioeconomic issues altogether in an integrated approach. At the same time, an increasing mismatch between social and economic flows and administrative and political boundaries introduce rigidities in service provision, fund allocation and policy building. New planning and territorial cooperation initiatives are needed, open to networks of public and private institutions, and attached to add-hoc geographies (e.g. cross-border regions, mountain zones, coastal zones or islands, river basins, remote or sparsely populated regions …). Policies should increasingly emerge in the future by initiative of local communities putting emphasis on good governance and strategic thinking.

109. ***European governance redesigned according to subsidiarity and additionally***. As it concerns its own institutional architecture, the EU will likely continue to be built around the principle of subsidiarity enshrined in Art. 5 of the Treaty, and the EU overall architecture will likely remain also in 2050 anchored to this principle, according to which functions of higher levels of government should be as limited as possible and should be subsidiary to those of lower levels. As a result of the subsidiarity approach, the EC provides the underlying support needed for the implementation of a lean integration model, which fully benefits from the wide variety of institutions, particularly cities and regions. Subsidiarity and additionally are the key concepts in providing legitimacy to newly multi-governance approaches linking the action of the EU.

110. ***Managing policy interventions through functional territories***. Whereas the first phases of European construction focused on a process of inter-governmental integration, the future prospects necessitates different forms of governance arrangements that are more efficient in tackling specific territorial challenges and promoting territorial cohesion. Europe cannot afford to have areas that are lagging behind and decoupled from modern trends and prospects because these territories are the victims of the high levels of institutional fragmentation of Europe. Hence, creating new forms of territorial coalitions would enable areas with geographic specificities to federate their resources across a common development prospects as well as tackling more efficiently their common challenges by pooling their resources, essentially linked with the provision of services of general interests.

111. ***Enhancing Europeanization of Planning Practices.*** The sectoral programmes and incentives are negotiated collectively at the programmatic level among sectoral policies by using a strengthened Multi-Level Governance Framework and an issue-driven rather than sector-driven approach. The principles for these negotiations should be based on the identification of key development objectives (energy efficiency, fair competition, territorial inclusion, Green and Blue Growth…). This way of proceeding supports a 'governing by provision' attitude from EU policymakers that frames the capacity of local and regional to design appropriate policy interventions and thus deliver the targets agreed at inter-governmental level. Key multi-level governance mechanisms for operationalizing this 'avenue' are asymmetric co-financing and conditionality: higher EU co-financing of local/regional initiatives is dependent on the commitment to higher targets to be delivered.

112. ***A new European Multi-Level Governance Framework to deal with territorial challenges***. Given the scope of challenges, there is a need for a level of government adapted to better face all of them. Strategic planning and the delivery of public policies on economic development, the labour market, mobility and transport, housing, education, water, energy, waste, immigration, cannot be addressed at too local level. Good government and governance structures at a metropolitan level are also considered a key condition for cities' competitiveness. Governance at

the metropolitan or city-region level is not confined to national frameworks but can also cross national borders. Different territorial and governance levels have more or less relevance depending on the specific challenges and objectives they have to address. Issues such as water management may be best dealt with at sub-regional or regional level, public transport and research infrastructures may be best addressed at metropolitan or city-regional level, while equality and integration may need a more local approach at neighbourhood level. Given this quest for variety and flexibility, it is increasingly clear that different levels of fixed government structures alone are not well suited to addressing the future challenges in a sustainable way. Moreover, a formal governance system tailored to reduce discrepancies between the de facto city and the de jure city may not necessarily be relevant once operational, given the time required putting new administrative systems into practice. Indeed, adapting government structures to better respond to challenges may be a futile task: not only would the dynamic nature of challenges demand a constant re-adaptation, but their multi-dimensional nature requires responses at different scales

113. ***Coordinated approaches in a multi-level governance framework*** are needed to effectively tackle the challenges of tomorrow. Different government levels will have to play different roles in a multi-scalar governance system. In essence, what is needed is a functional and flexible approach that both respects the principles of subsidiarity and can be adapted to a functional geography and the specificities of different territorial scales. Problems solved at the level closest to the citizens who are able to deal effectively with them have to be complemented with better coordination at a higher level, to avoid transferring problems from one local level to another, or from the city centre to its periphery. What seems to be increasingly important is the capacity to shift from a *government* to a *governance* mode suitable to the scale of the challenges. Such a governance mode must be capable of integrating formal government structures with more dynamic and flexible governance procedures to cope with challenges that do not respect strict administrative boundaries. Many local authorities already cooperate to provide school buses, manage multimodal transport systems, collect and treat waste, provide water, etc. Functions shared over greater territories may include universities, major transport nodes (e.g. a regional airport), business parks, hospitals, etc… Such inter-municipal cooperation may be the basis for the creation of the new, more flexible functional urban area governance entities, but even without putting in place such new entities, cooperation may take the form of different city administrations sharing intelligence and policy learning to create human capacity-building focused on addressing common challenges.

114. ***Strengthening European territorial planning*****.** Territorial planning in Europe has become increasingly trans-national. This requires a mandate for Europe for trans-national territorial planning, subject to the principle of subsidiarity. Integrated impact assessments for all significant EU policies and programmes are developed based on and results be better integrated into the planning and management of the programs. Enhanced territorial planning capacity at European level facilitates the development of an European wide Green Infrastructure to ensure the necessary connection of natural areas to enhance ecosystem services and biodiversity, as well as the interconnection between transport and energy networks

Monitoring Territorial Cohesion

115. The monitoring and analysis at regional (NUTS2, or NUTS3) level of the policy-indicators defined at European and national level for different policies in reference documents such as Europe 2020 and European Roadmaps is necessary for a more detailed understanding of regional specificities and a more sensitive and effective policy implementation.

116. There is also a need to define territorial indicators to monitor the most fundamental territorial development and Cohesion trends. Indicators have to be policy-relevant, sound and as simple as possible to be easily understood. Four indicators for monitoring European territorial Cohesion are proposed, complementary to other existing ones (e.g. Population growth and migration, GDP growth by sectors, Transport demand by transport models, Energy demand by different sources, or CO2 emissions). For these indicators, explicit targets for 2030 and 2050 are also suggested.

117. ***Depopulation***. A number of areas in Europe will lose population, often from more or less remote rural areas towards large cities in the same region or abroad. Population decrease is not necessarily a negative trend itself, except for regions loosing a high amount of young/active population that migrates to find a job elsewhere. These regions loosing active population -their most previous asset- will be able to catch up the development level of other regions. It is suggested that no more than 5% of European NUTS3 regions should lose more than 7,5% of their population between 2010 and 2050. This simple indicator is proposed as a proxy to complex phenomena linked to population ageing, low fertility rates, migrations between rural areas and cities, and flows between European regions for labour reasons (e.g. east to west) or residential tourism (north to south).

118. ***Disparities.*** The relative distance in GDP per capita between wealthiest European regions and laggards is a possible indicator of the difference between economic development across European territory. It is proposed that the gap between the GDP per capita of 95th wealthiest NUTS3 in Europe and the 5th poorest NUTS3 in Europe should get reduced at least by 2 between 2010 and 2050. GPD is not capturing fundamental wellbeing conditions and remains contradictory from economic point of view.

119. ***Remoteness***. The 5th Cohesion Report introduced the notion of remoteness in the analysis of regional typologies in Europe. Intermediate and rural regions (as previously defined by the OECD) became remote whenever less than half of their residents could drive to the centre of a city of at least 50 000 inhabitants within 45 minutes[51]. There are currently 209 remote NUTS3 in Europe. The number of remote regions in Europe is proposed as an indicator to monitor general accessibility conditions. It is proposed that by 2050 there would be no more regions in Europe classified as remote. Minimum accessibility is regarded as a necessary condition for economic growth, having a direct impact on the attractiveness of regions for businesses and people.

120. ***Land take.*** The progress towards compact urbanisation and alleviated soil-sealing can be monitored with an indicator based on the total annual land-take in Europe. Artificial land continues to expand in Europe (in the period 2000-2006 at a rate of 920 km² per year). The Roadmap to a Resource Efficient Europe envisages by 2050 a European economy that has grown in a way that respects resource constraints and planetary boundaries, thus contributing to global economic transformation, with all resources are sustainably managed (from raw materials to energy, water, air, land and soil). In this approach, the Commission Staff Working Paper backing up the Roadmap proposes to reach a state of no net land take by 2050, which would then force a mid term target of maximum 800 km² per year in the period 2010-2020. This approach is assumed taken on board.

[51] Regional Focus 01/2008

	Topic	Indicator	Target proposed by	Indicator value in 2010	Value for target and time horizon
1	Population change	% of NUTS3 losing population	ESPON ET2050	-	95% of NUTS3 regions will not lose population beyond 7,5% by 2050
2	Regional Economic Gap	Gap in GDP per capita (percentile 95 / percentile 5)	ESPON ET2050	8,0 in 2010	To reduce the gap by 50% by 2050
3	Sufficient Accessibility	Number of remote NUTS3 regions in Europe	ESPON ET2050	209 remote NUTS3 in 2010	No remote NUTS3 by 2050
4	Minimum Land-taken	Annual land take in km2	EU Resource Efficient Roadmap 2050	920km2 sealed yearly in 2010	800km2 by 2020 0km by 2050

Illustration 13 Proposed Territorial Targets (described in points 117-120)

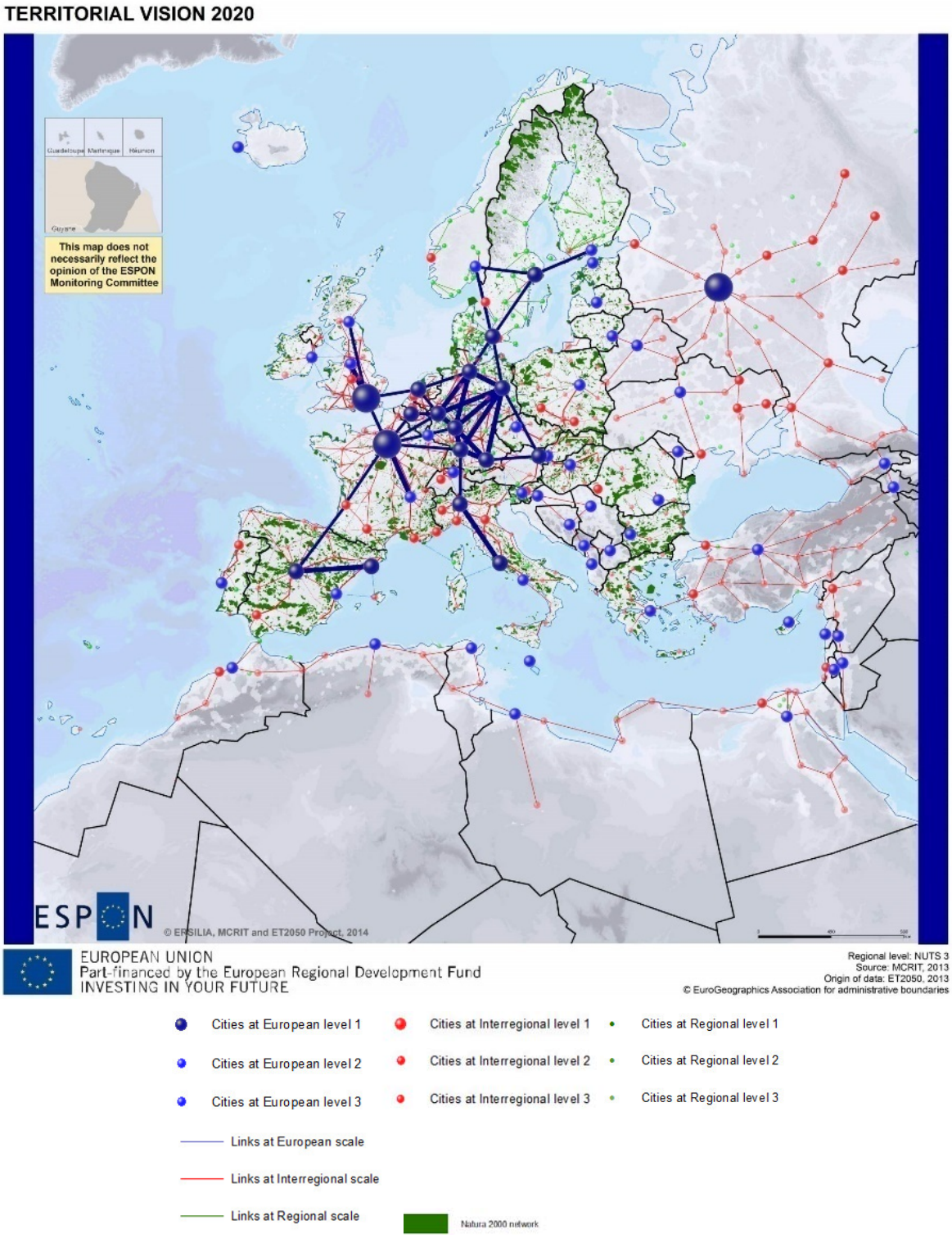


Illustration 14 "Open and Polycentric Europe" Vision towards 2020

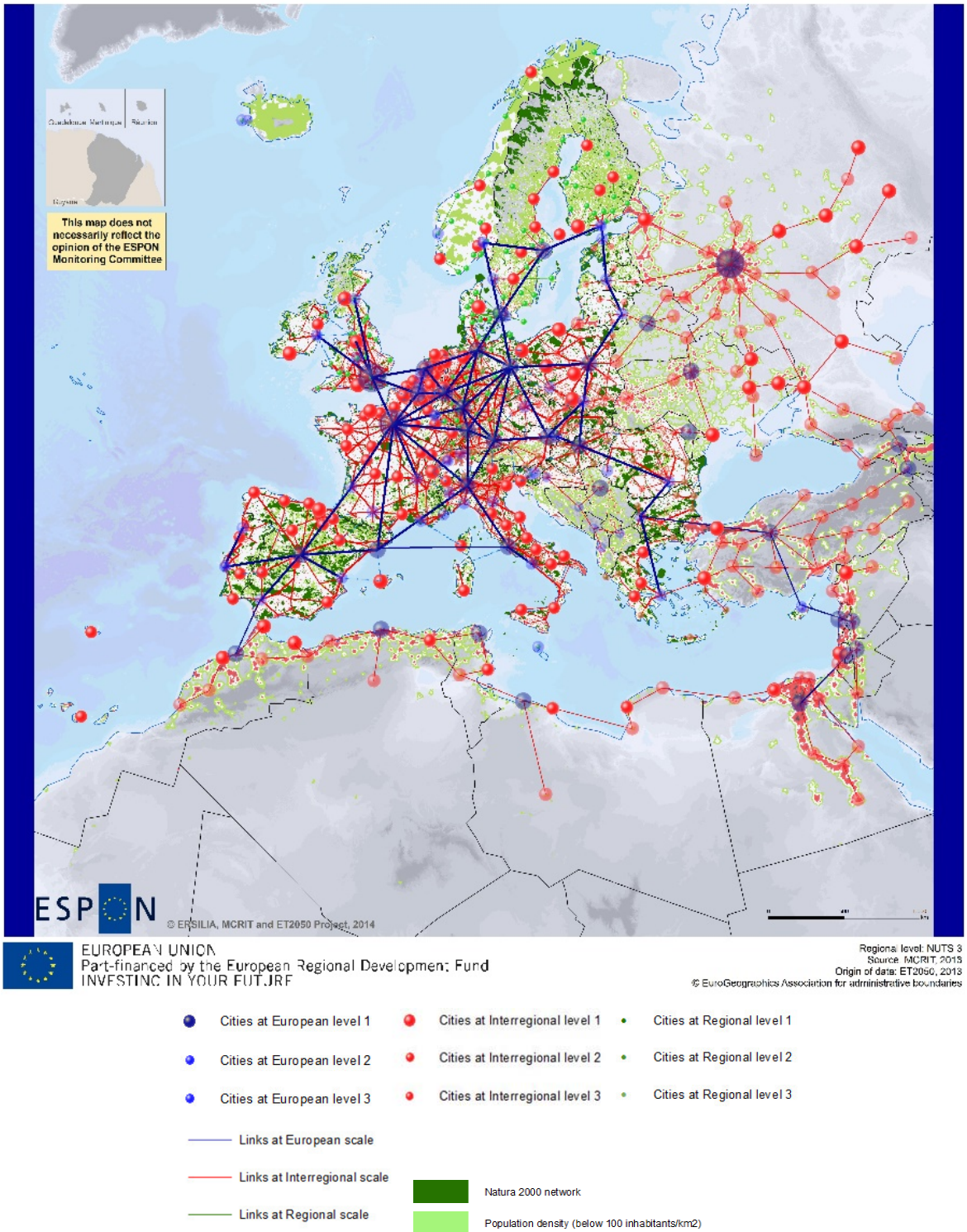


Illustration 15 "Open and Polycentric Europe" Vision towards 2030

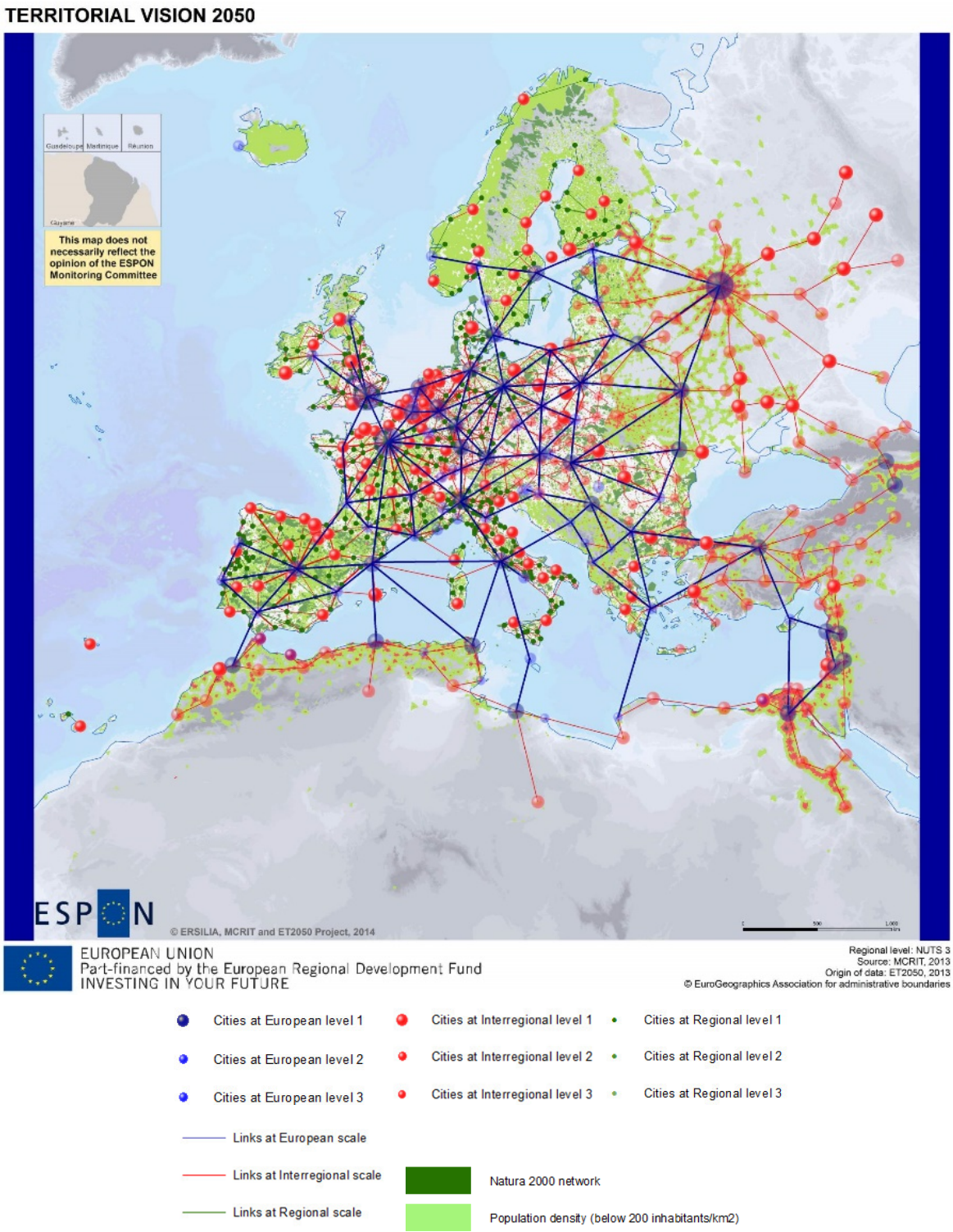


Illustration 16 "Open and Polycentric Europe" Vision towards 2050[52]

Illustration 17 Movie on Global Trends by influential thinkers (5.32'') , and movie on Vision for Europe in 2050 (2.40'')

Watch both movies at www.et2050.eu homepage

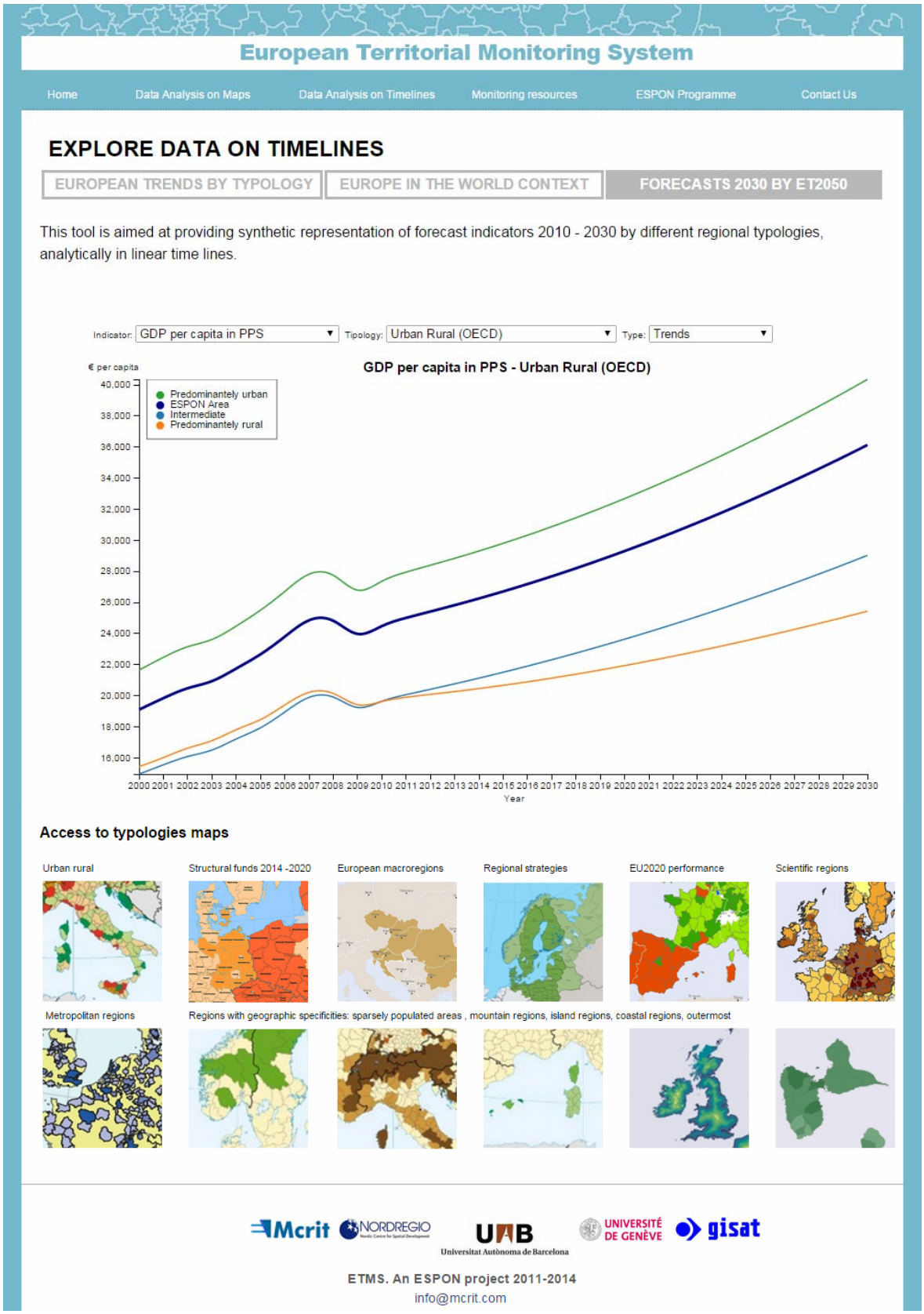


Illustration 18 ET2050 Trends and Forecasts available for consultation under the ESPON ETMS European Territorial Monitoring System, by territorially differentiated typologies

http://81.47.175.201/etms-project/index.php/this-big-city/europe-forecast-graphs/

ANNEX 1: BACKGROUND

Visions for the European Territory 1968-2014

- A number of visions for the development of the European territory have been developed over the years aiming to provide for the basis for a possible European territorial development policy framing Structural Funds (created in 1975), and then Cohesion Funds (created in 1992). It is fair to say that many of these visions, despite their value, and influence, have had a limited political relevance[53].

- The Council of Europe, a pan-European organisation created in 1949 was the driving force behind a Community concern with spatial planning: with the creation of **CEMAT** (the European Conference of Ministers responsible for Regional Planning), to organise ongoing coordination of spatial planning among Member States, in 1968; the adoption of the **European Outline Convention**, to provide a legal framework for cross-border cooperation between territorial authorities(Madrid, 1980); and above all, the adoption by ministers of the **European Spatial Planning Charter** (Torremolinos,1983). This represents a decisive step forward because it provides both for the elaboration of a European structure for territorial planning and for the specific needs of the territories (urban, rural and frontier areas, mountains, islands, etc.) and the need to organise sectoral policies on a territorial basis.

- At the Community level, it was the European Parliament that launched the initiative (based in part on the work done by la CEMAT), particularly through the so-called ***Gendebien*** **resolution on a European spatial planning policy**, adopted in 1983; the resolution concerning a **Coordinated spatial planning policy** was adopted in 1990.

- The first territorial analysis of European Development patterns and prospects were developed by the European Commission in the **Europe 2000** (1991)[54] **Europe 2000**+ (1994)[55] programs and the Compendium of Spatial Planning Systems and Policies in the European Union (1997-2000)[56]by the DGXVI, now DGREGIO, of the European Commission.

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53 In 1975 the **European Regional Development Fund** (ERDF) was established aiming to reduce regional disparities. It was only in 1985, with the arrival of the Single Market, the acceleration of European integration, and the Single European Act (1986), that the Community cohesion (or regional) policy was officially launched. **Cohesion funds** were created in the Treaty of Maastricht in 1992. In 1988, when the Structural Funds were reformed, cross-border cooperation became eligible for funding from the ERDF, and the Community cooperation initiative **INTERREG-I** was set up two years later. The first generation of INTERREG programmes was initiated during the programming period 1989-1993 of the EU structural funds. Since then, DGREGIO has been studying European spatial development patterns and publishing monitoring reports on the evolution of European Cohesion.

54 *Europe 2000: Outlook for the development of the Community's territory* (EC, 1991) which proposed structuring European spatial planning around major sectoral initiatives whose territorial impact would extend beyond national frontiers: transport, telecommunications, energy and the environment. This approach was original in that it was based on an analysis of groups of regions at the European level (urban, rural, frontier areas, etc.) and not by Member State.

55 *Europe 2000+, Cooperation for European territorial development* (EC, 1994), which defined the macro-regional areas for cooperation and presented a long-term vision and prospects for the coordinated development of the territory of the EU

56 *Compendium of spatial planning systems and policies in the European Union* (EC, 1997-2000) analysed the institutional systems for territorial development and land use. It highlighted the diversity of concepts and practice among the Member States

- The ***European*** **Spatial Development Prospective** (ESDP) was approved by the Informal Council of EU Ministers responsible for Spatial Planning in 1999. The aim of spatial development policies was to work towards a balanced and sustainable development of the territory of the European Union. In the Ministers' view, what was important was to ensure that the three fundamental goals of European policy are achieved equally in all the regions of the EU: economic and social cohesion; conservation and management of natural resources and the cultural heritage; more balanced competitiveness of the European territory. The key policy aims presented were based on achieving a polycentric and balanced territorial development of the European Union[57].

- Following the ESDP approval, the **Study Program on Spatial Planning** (SPSP) Program was launched, and then **European Spatial Planning Observatory Network** (**ESPON**) Programme was created (currently renamed as European Observation Network for Territorial Development and Cohesion).

- Since the year 2000, **ESPON** has been conducting a number of research projects that have largely contributed to a knowledge-base on territorial dynamics. ESPON has the role to support policy development in relation to EU Cohesion Policy. The programme provides pan-European evidence and knowledge about European territorial structures, trends, perspectives and policy impacts which enable comparisons amongst regions and cities. This forms a basis for finding additional opportunities for growth as well as challenges that need attention in a world where the larger territorial context is an inevitable reality. For a decade ESPON has played this key role within EU Cohesion Policy in support of policy development providing comparable pan-European evidence, analyses and scenarios on territorial dynamics that help regions, cities and larger territories in taking evidence-based decisions on their future development.

- In the ***Lisbon*** **Treaty** (2007), states Article 3 that the Union shall promote economic, social and territorial cohesion, and solidarity among Member States. It shall respect shall ensure that Europe's cultural heritage is safeguarded and enhanced. In 2007 the Commission launched a public debate on territorial cohesion by issuing the **Green Paper on Territorial Cohesion**. The debate showed that “territorial cohesion” is largely associated with an integrated approach to development, entailing the better coordination of public policies, taking better account of territorial impacts, improved multilevel governance and partnership, the promotion of European territorial cooperation as a clear EU asset, and a reinforced evidence base to

[57] Policy-Aims of the ESDP

- Polycentric and Balanced Spatial Development in the EU
- Dynamic Attractive and Competitive Cities and Urbanised Regions
- Indigenous Development
- Diverse and Productive Rural Areas
- Urban-Rural Partnership
- An Integrated Approach for Improved Transport Links and Access to Knowledge
- Polycentric Development Model: A Basis for Better Accessibility
- Efficient and Sustainable Use of the Infrastructure
- Diffusion of Innovation and Knowledge
- Natural and Cultural Heritage as a Development Asset
- Preservation and Development of the Natural Heritage
- Water Resource Management – a Special Challenge for Spatial Development
- Creative Management of Cultural Landscapes
- Creative Management of the Cultural Heritage

improve territorial knowledge58. “Territorial Cohesion” can be understood as achieving a balanced, inclusive and sustainable development of territories, making value of their specific potential, through an integrated approach based on strategic cooperation and networking between territories multi-level governance and broad partnership coordination of policies applicable to these territories.

- The European Commission asked Fabrizio Barca to prepare an independent report analysing the recent practice and achievements of EU Cohesion Policy while proposing various policy steps to redirect it in view of the 2014-2020 period. This report was published in April 2009. Among various proposals, Barca made a strong case for basing future EU regional policy programmes and operations on a “**place-based approach**”, a notion previously explored by the Organisation for Economic Cooperation and Development (OECD).

- The ‘***Europe* 2020’** strategy is the overarching European policy document for the next decade of economic growth. Its main focus is on economic development, in particular the recovery for the 2008 crisis. To monitor the progress made and quantify the objectives to be met by 2020, the Commission has proposed the following ‘Europe 2020’ headline indicators and targets: 75% of the population aged 20-64 should be employed; 3% of the EU's GDP should be invested in R&D; the "20/20/20" climate/energy targets should be met (including an increase to 30% reduction of emissions if the conditions are right); the share of early school leavers should be under 10% and at least 40% of the younger generation should have a tertiary degree. 20 million less people should be at risk of poverty[59].

- Based on the Europe 2020 Strategy (2010) and the outcomes of the debate articulated around the Green Paper on Territorial Cohesion (2008) a **Territorial Agenda 2020** was adopted (2011). The first priority was, following ESPD, “Promoting polycentric and balanced territorial development as an important precondition of territorial cohesion and a strong factor of territorial efficiency”[60]. The TA 2020, adopted by the ministers responsible for spatial planning

[58] Territorial Cohesion according to the Green Paper

- Concentration and density i.e. better exploiting regional potential and territorial capital
- Connecting territories: overcoming distance e.g. access to services of general economic interest or to energy in other words integrating the economy of places with the economy of flows;
- Cooperation: overcoming division i.e. promoting co-operation cross boundaries but also better consistency between various EU and national policies with a territorial impact, both horizontally and vertically;
- Regions with specific geographical features i.e. policy differentiation to accommodate the specific features of different territories, including regions with some geographic development challenges.

[59] Priorities of the European 2020

- Smart growth: developing an economy based on knowledge and innovation.
- Sustainable growth: promoting a more resource efficient, greener and more competitive economy.
- Inclusive growth: fostering a high-employment economy delivering social and territorial cohesion.

[60] Priorities of the TA2020

- Promoting polycentric and balanced territorial development as an important precondition of territorial cohesion and a strong factor of territorial efficiency.
- Encouraging integrated development in cities, rural and specific regions to foster synergies and better exploit local territorial assets.
- Territorial integration in cross-border and transnational functional regions as a key factor in global competition facilitating better utilization of development potentials and the protection of the natural environment.
- Ensuring global competitiveness of the regions based on strong local economies as a key factor in global competition preventing the drain of human capital and reducing vulnerability to external development shocks.

and territorial development in the EU member states, sheds further light on the notion of the place-based approach: "We consider that the place-based approach to policy making contributes to territorial cohesion. Based on the principles of horizontal coordination, evidence-informed policy making and integrated functional area development, it implements the subsidiarity principle through a multilevel governance approach. It aims to unleash territorial potential through development strategies based on local and regional knowledge of needs, and building on the specific assets and factors which contribute to the competitiveness of places. Places can utilize their territorial capital to realise optimal solutions for long-term development, and contribute in this way to the achievement of the 'Europe 2020' strategy objectives."

- In 2011, the Commission adopted Roadmaps in the environmental, energy and transport domains to support the progress towards the thematic objectives and headline targets established in the Europe 2020 Strategy with a long-term view: Roadmap to resource efficient Europe (COM(2011) 571 Final); Roadmap for moving to a competitive low carbon economy in 2050 (DG Clima, COM(2011) 112 final); Energy Roadmap 2050 (DG Energy, COM(2011) 885 Final); Roadmap to a Single European Transport Area – Transport White Paper (DG Move, COM(2011) 144 Final)

- Several territorial visions for the future have also been carried out at local, regional and macro-regional scale in Europe. All of them have the development of polycentric urban structures as the main strategic approach. The macro-regional spheres of transnational cooperation constitute excellent laboratories for spatial planning and governance such as the Baltic Sea region exemplifies.

- The Vision presented in this document was developed from 2011 until 2014, a period of crisis; the expectations and concerns of Europeans changed radically, the eurozone was under an imminent risk of fragmentation and the political cohesion of the European Union was in danger.

- Improving territorial connectivity for individuals, communities and enterprises as an important precondition of territorial cohesion (e.g. services of general interest), a strong factor for territorial competitiveness and an essential condition for sustainable development.
- Managing and connecting ecological, landscape and cultural values of regions, including joint risk management as an essential condition for long-term sustainable development.

ANNEX 2: ET2050. Synthesis of Project Activities

Aim of ET2050

The policy challenges to be taken up, as well as the method to be used, by the ET2050 project were rather clearly spelled out in the specifications[61] of the ESPON call for project proposals:

"Policymakers in the field of territorial development and cohesion are in need of a future oriented and integrated vision on the development of the European territory. (...) The ESPON Monitoring Committee, DG Regio and the ESPON Coordination Unit therefore wish to start a territorial vision-building process that involves relevant stakeholders at European, national and regional level. The vision should provide a coherent framework to formulate territorial policy actions at different policymaking levels and to assess and support policy initiatives from other sectors, all with a European perspective. The vision is expected to have a strategic character that allows giving direction to the policy debate on territorial development.

ET2050 (Territorial Scenarios and Visions for Europe) aims at supporting policy makers in formulating a long-term integrated and coherent Vision for the development of the EU territory.

Until 2008 an increasing cohesion between countries and between regions (NUTS2 and NUTS3) was observed at European level, even if inside some countries we also registered a decreasing regional cohesion. During the economic crisis, from 2008 until 2013, disparities have increased not only within countries but also between countries and between regions in the European Union[62].

A fundamental question to be answered is, therefore, to what extend the cohesion process observed before crisis was sustainable over time, and what was the actual impact of the Cohesion and Structural funds. Either the crisis is temporary and the previous catching-up dynamics will be restored sooner or later, or the crisis reveals deeper structural weaknesses hard to be solved, and increasing disparities at regional and national level are to be expected at least for the coming decade.

In their way out of the crisis national economies are becoming more competitive and open to global markets, each one trading with different regions in the world for different sectors, and the increasing trade with emerging markets is producing increasing spatial polarisation in large metropolis and main gateways. All together, in the crisis aftermath European policies will likely be reformed to be more effective, avoiding the risk and the associated costs of possible political fragmentation.

Forecasts become obsolete very fast. Europe is now changing much faster than our capacity to adapt our previous expectations. In this context, our goal is not predicting how the future will look like in ten or fifteen years, but exploring alternative possible scenarios useful to support a

[61] Applied Research Project 2013/1/19 "Territorial Scenarios and Visions for Europe"

[62] According to Eurostat data on GDP per capita PPS (index EU28=100), between 2002 and 2007 out of 13 countries with GDP above average, 5 increased their gap (i.e. Luxemburg +34%, Ireland +7%, Spain +4%, Sweden +3% and Finland +2%), and 7 converged towards average (e.g. Belgium -10%, Italy -9%, France -8%, Denmark -7%); between 2008 and 2013, 7 increased their gap (e.g. Germany +8%; Austria +5%, Belgium +3%, Sweden +3%), and 5 converged (i.e. Spain -8%, UK -8%, Netherlands -7%, Finland -7%, Italy, -6%, Ireland -5%).
Out of 15 countries with GDP below average, 13 converged 2002 and 2007 (5 countries by more than 10% and 6 by more than 5%), whereas after 2008, only 3 countries kept converging by more than 10% (i.e. Poland, Lithuania and Latvia), 2 by more than 5% (i.e. Malta and Romania), and 6 countries increased their gap (i.e. Greece -18%, Cyprus -13%, Slovenia -8%, Croatia -4%, Portugal -3%, Czech Republic -1%).

high-level policy debate on strategic European policy reforms, particularly Cohesion policies, as well as to contribute to the design of an ideal long-term vision for the European territory.

Project Methodology

The methodology applied in ET2050 was based on five successive steps:

- First, the Present Situation was studied, in relation to sectors most relevant to spatial development (e.g. demography, economy, transport, land use and environment) and considering the territorial diversity of Europe. First, eight macroregions were selected for the analysis, in pragmatic terms corresponding to the geographic areas of each of the ET2050 TPG partners (each macro-region and each area topic were object of an individual report, published at the www.et2050.eu website). In later stages of the project, the eight macroregions were condensed into four main regions (i.e. Central and Eastern Europe – CEE-, Northern Europe, Western Europe, and Southern Europe), and results of the project were analysed under this new scope; further in-depth analysis was carried out for most crisis hit regions, in particular CEE and Southern Europe, in specific volumes of the Scientific Report.

- Second, a Baseline scenario was defined by assuming no significant changes in current policies, available technologies and social behaviour. In a period of deep economic crisis, it was unavoidable that such a Baseline scenario became somehow pessimistic in terms of economic growth, given the trends of the latest five years, and the nature of current macro-economic policies. The Baseline scenario is regarded as one of most likely futures for the coming few years, but it is also one of the less likely in the long run, because policies, technologies and behaviour will change, one way or another.

- Third, three alternative prospective scenarios (A, B and C) were defined for 2030 and also 2050, in order to support the discussion of a normative scenario, or Vision, as a most desired future for 2050. Scenarios were defined combining socioeconomic and technologic framework conditions together with different territorial strategies. A strategic policy evaluation was carried out on the alternative territorial scenarios, in relation to their relative contribution to paramount territorial and societal goals (e.g. competitiveness, cohesion and sustainability).

The work of steps 1, 2 and 3 is reported extensively in the 9 first volumes of the Scientific Report.

Whereas the first volume focus on reporting the methodological approach to scenario design and the main assumptions behind the modelling work, volumes 2 until 6 are specialised thematically on short term 2030 Demographics, Economy, Transport & Environment, Land Uses, and long-term 2050 integrated spatial scenarios. Each of the thematic reports initiates the discussion on the Present State (step 1) to then expose the Baseline deployment along time (step 2) and the implications of the 3 alternative scenarios (step 3).

A synthesis of hypotheses and main outputs of the sectoral scenarios is included in this ET2050 Main Report, mostly in Annex 3.

Volume seven of the Scientific Report presents the results of the Territorial Impact Assessment . TIA assesses the impact of the four scenarios (baseline, A, B, C) on 20 single impact fields aggregated into a set of four macro development fields, and finally summed in an overall territorial impact.

Finally, volumes eight and nine examine from a closer perspective the repercussions and implications of ET2050 scenarios in most crisis-hit territories, i.e. CEE and the Mediterranean.

- Fourth, taking the scenarios as reference, a Vision for the ideal situation of the European Territory in 2050 was defined in a participatory process involving the ESPON Monitoring Committee and other relevant stakeholders, (e.g. the European Commission, the European Parliament, the Committee of Regions), already since mid 2013, but most intensively during 2014. The Three Horizons technique –space of imminent future, space of willingness to change, and space of possible futures ahead- was used for the elaboraration of the Vision (organizing how we deal with uncertainty). To facilitate this process, the three A, B and C scenarios were combined with three extreme framework conditions to define the boundaries in which the Vision for the European Territory in 2050 was discussed.

- Fifth, policy reforms needed to achieve the Vision were defined and proposed as final recommendations.

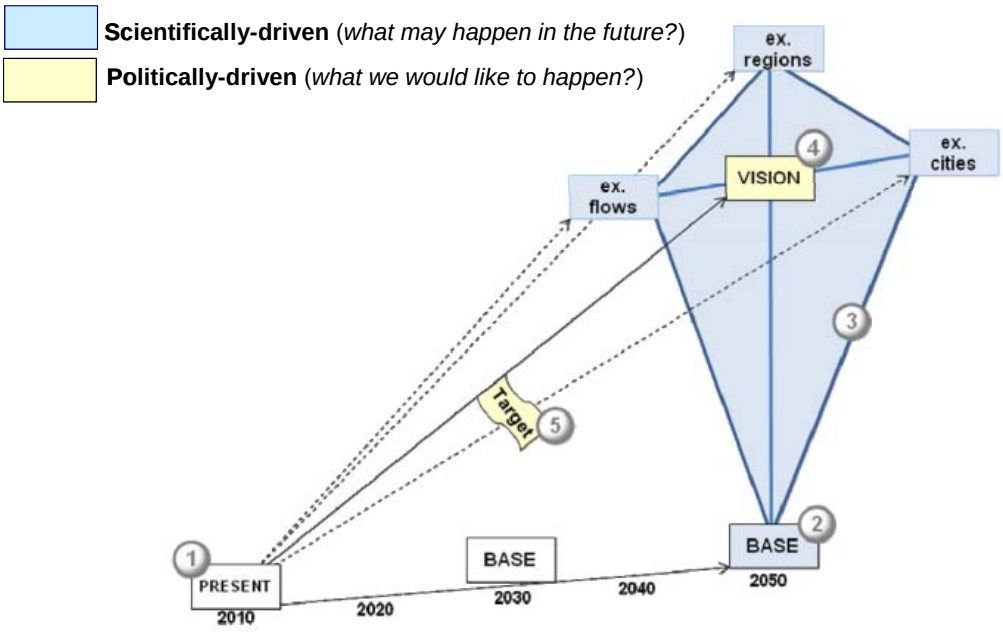


Illustration 19 Approach to construction of scenarios and the Vision (Project Specifications)

The work of steps 4 and 5 is reported in Volumes 10 to 15 of the Scientific Report.

Volume 10 contains the preparatory work for the elaboration of the ET2050 Territorial Vision. It is a detailed review of key policy topics for future development of Europe. The document was elaborated in the summer and fall of 2014, building on the synthesis of work carried out by ET2050 in combination with the analysis of ongoing policy debates at the moment, and the review of coexisting Visioning documents like the Global Europe 2050 report by DGRTD. The document, elaborated in 3 rounds, served the purpose of focussing the

open discussion with stakeholders which lead toward the ET2050 Territorial Vision "Making Europe Open and Polycentric".

However, the participatory process of ET2050 began already with the first steps of the Project in 2012 and 2013. The involvement of stakeholders took place for the project beginning, via the participation of the ESPON Community and the ESPON Monitoring Committee during the successive ESPON Seminars held twice per year on the one hand, and with interviews and meetings with key stakeholders like the DG REGIO, the REGI committee of the European Parliament, the COTER commission of the Committee of the Regions or the METREX network of metropolitan regions. Volume 15 of the scientific report aims at describing the participatory process of ET2050 in detail, whereas Volume 14 reports on the initiatives of the project to provide attractive discussion and dissemination materials to favour the implication of stakeholders in a fruitful debating atmosphere.

Volumes 11 to 13 envisage possible pathways and targets, and policy actions / reforms to be carried out to advance towards the materialisation of the ET2050 Territorial Vision.

Modelling Framework

The scenario-building process has been supported by foresight models properly adjusted to take into account the present time situation: MULTIPOLES (Demography), MASST3 (Economy), MOSAIC (Transport), METRONAMICA (Land Use), as well as SASI (Integrated Spatial Development), all disaggregated at regional and/or local scale. Other more aggregated cross-sectorial meta-models (TV+, PASH+) cover the rest of the world, by macro-regions.

The purpose of scenarios is not to guess with accuracy how indicator will be in few months or years ahead (in line with the IMF and ECOFIN forecasts for economic growth at national level), but providing useful insights for a better understanding of dominant long-term terms to support strategic political decisions, particularly in relation to alternative reforms of Cohesion policies[63]. The main focus of the modelling exercise is therefore investigating the possible evolution of Social, Economic and Territorial Cohesion under different scenarios and policy-assumptions from 2010 to 2030 and 2050.

Needless to say, a word of caution is always needed when interpreting modelling results[64]. Data at European level is often incomplete or not homogenous[65], and the indicators finally used are not the ideal ones but the ones available that can also be integrated by the formulations of state-of-the-practice models[66].

[63] The models used in ET2050 were not created (and therefore not able) to produce accurate values for specific variables in the future, on the basis of extrapolations of a system of past relations, but depict the tendencies and relative behavioural paths. In the case of the MASST model, relations are related to regional GDP growth (and regional employment growth) in each individual region under certain conditions, i.e. probable states of the system that may become real under certain conditions that are exogenously assumed. In a scenario-building of this kind, the existence of the MASST model guarantees that the results are neutral vis-à-vis the assumptions, since they are based on the structural relationships that hold together the economic system in an objective way (estimates). Used with such a purpose, it is not a short-term forecasting tool, but a long-term quantitative foresight model.

[64] Selected indicators are the ones most often used as reference, those that have data available, and forecast models can produce. Neighbouring countries and the rest of the world was no modelled, but reference assumptions on their possible evolutions were considered as inputs to the models.

[65] For instance data available on migration flows is not enough disaggregated by purposes (e.g. labour, retirement...) and temporary migration (e.g. for education purposes) is missing.

[66] GDP is the standard measure of the value of the production activity (goods and services) of resident producer units. Regional GDP is measured according to the definition of the System of National Accounts (SNA), and therefore "hidden

The way to present and explain model's results is never completely free from personal subjectivity, moreover, but it is precisely in order to highlight and contrast one's prejudices and expectations, away from wishful thinking, that it is indispensable to use quantitative data and apply sound forecast models[67].

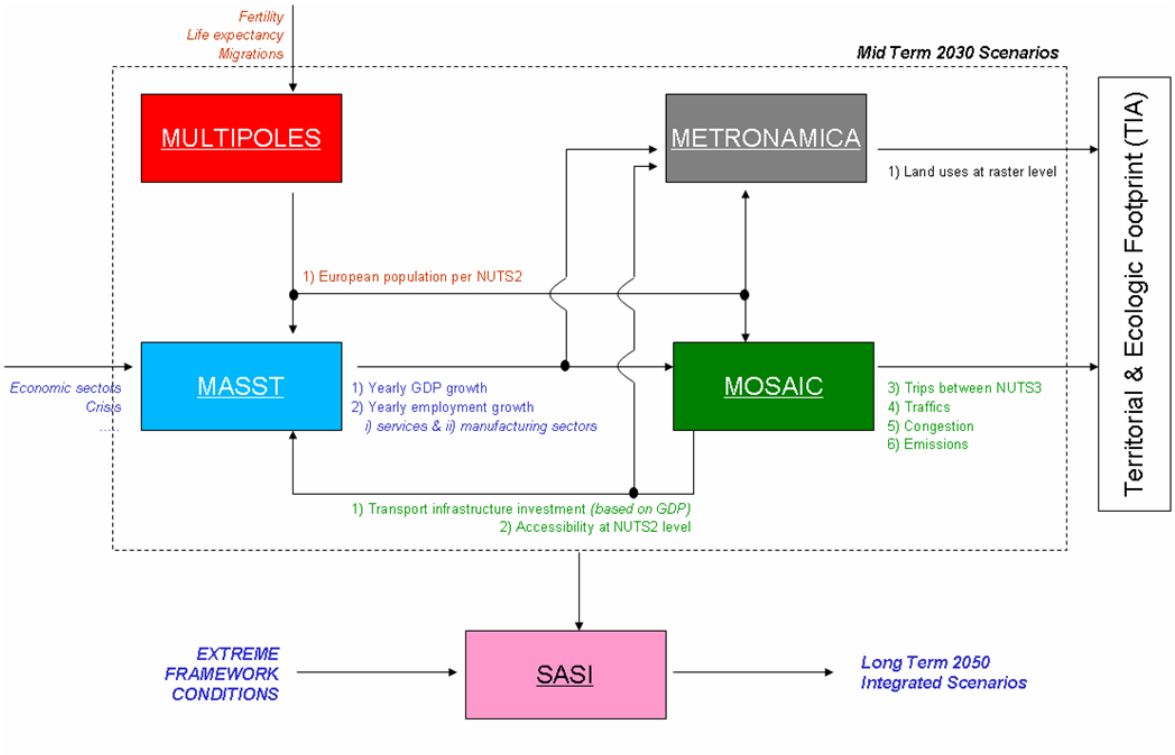


Illustration 20 ET2050 Modelling Framework

economy", that may represent up to 22% of GDP in some countries, is not considered. On the other hand, it has many inconsistencies (e.g. while investments to improve environmental conditions is counted, environmental impacts are not discounted). As the economy tends to become globalised, and further integrated, regions and national economies dependency to outside corporative decisions, GDP would need to be complemented by the GNP (Gross National Product), a measure that is hardly available. The prevalence of the use of GDP per head as a region indicator by EU policy-makers can be attributed to the availability of data at the sub-national level across the Union. Indeed, GDP per head has become so widely used as a basic indicator that little attention has been paid to its shortcomings as a measure of equality. Many of these arise from the problems associated with measuring GDP at the regional level. A basic point is that there are practical difficulties involved in deciding how to assign output where activities span regional boundaries and national statistical offices differ in their approaches to this. The extent to which regional GDP expresses the prosperity of a region is also modified by the transfers that result from government taxation, spending and social security systems. Excluded from GDP estimates are the goods that people produce for their own consumption, as important as the black or hidden economy already mentioned

[67] The HERMIN model framework can illustrate this fact. HERMIN was applied to assess regional disparities and Structural and Cohesion funds impacts has been continuously improved in late 1980s. According to John Bradley, it was developed in Ireland the late 1980s to evaluate the macro impacts of SFs, and drew on many aspects of the above revision and renewal of macro economic modelling. HERMIN was initially designed to take account of the very limited data availability in the poorer, less-developed EU member states and regions on the Western and Southern periphery (i.e., Ireland, Northern Ireland, Portugal, Spain, the Italian Mezzogiorno, and Greece). A consequence of the lack of detailed macro-sectoral data and of sufficiently long time-series that had no structural breaks was that the HERMIN modelling framework needed to be based on a fairly simple theoretical framework that permitted intercountry and inter-region comparisons and that facilitated the selection of key behavioural parameters in situations where sophisticated econometric analysis was impossible. The HERMIN model was designed in order to analyse medium-term policy impacts involving large-scale public investments in physical infrastructure and in human resources.

Full reference of the models can be reviewed in the sectoral reports Volumes 1-6, whereas concise SPQR normalised model fact sheets are published in the www.et2050.eu website. SPQR forms document model aims, theoretic basis, needed inputs and provided outputs.

A modellers' workshop was organised by ESPON in September 2014 to discuss the usefulness and the shortcomings of current day models to support territorial policy making in Europe, with the participation of ET2050, DG REGIO, DG ECFIN, JRC, OECD.

Scenario Definitions[68]

Starting Point: Flows, Cities and Regions Scenarios from Project Specifications

The point of departure in ET2050 was the three Exploratory Scenarios proposed in the Project Specification. Their descriptions were textually:

- *Europe of the Flows*. This scenario provides an image of the European territory in which economic and population growth as well as public investments are mainly stimulated to take place within main corridors that structure the European territory. Europe of the Flows is characterised by strong connections between cities and transport nodes. Political focus lies on issues such as enhancing connections and long distance networks and global integration.

- *Europe of the Cities.* This scenario provides an image of the European territory in which economic and population growth as well as public investments are mainly stimulated to take place within existing cities that structure the European territory; cities that have a role as driving forces in the global, national and/or regional level. Europe of the Cities is characterised by economically strong and compact cities. Political focus lies on issues such as intensified use of urban space, strong preservation of open space, reduction of long-distance traffic.

- *Europe of the Regions.* This scenario provides an image of the European territory in which economic and population growth as well as public investments are mainly stimulated to take place on the basis of specific regional identities and strengths. Europe of the Regions is characterised by strong urban and rural territories that form a mosaic of different regions and types of territories with strong identities. Political focus lies on issues such as regional self-reliance, small-scale development and landscape protection.

Being the purpose of the Exploratory Scenarios investigating Territorial Cohesion issues, in terms of how different spatial structures and patterns could influence the social and economic future evolution of Europe, and vice versa, the initial scenarios were then reformulated to focus explicitly on emphasising polycentricity as a key dimension. Polycentricism was defined at three different geographic scales by the Exploratory Scenarios, renamed to A, B and C Scenarios. Based on the polycentricity concept, the type of regions to be promoted under each scenario was defined: Metropolitan Global Areas in the A Scenario, second-tier Cities in the B Scenario and Regions in the C Scenario

Scenario A (Territorial Strategy: Promotion of Metropolitan Global Areas)

The A Scenario provided an image of Europe in which the territory was flexible and adaptable to technological, social and economic change; it was inspired on the FLOWS scenario from the Project Specifications. The scenario considered Polycentricity at global scale. To ensure European

[68] Full documentation of the Scenario Definition process in Volume 1 of the Scientific Report

economic performance, the size and agglomeration advantages of European larger metropolis are promoted by National and European policies. Focus is set on largest metropolis and transport nodes and corridors and on removing constrains to their spontaneous growth. More integrated trans-national zones emerge by the networking of cities in cross-border areas, and transport and energy corridors link major European centres of production and consumption with neighbouring countries and the rest of the World. This scenario follows the Europe 2020 strategy of promoting global competitiveness by promoting economic development of the largest metropolitan areas of global importance in Europe, i.e. of the 76 Metropolitan European Growth Areas (MEGAs) defined in ESPON 1.1.1. The policies applied are mainly investments in MEGAs supporting of high-level R&D as well as European transport infrastructure, such as high-speed rail, and enhancing connections and long distance networks, favouring more efficient technologies and management strategies.

Scenario B (Territorial Strategy: Promotion of Cities)

The B Scenario focused on the promotion of large and medium size cities; it was inspired on the Europe of Cities presented in the Project Specifications. Congestion costs in large and densest European metropolises would grow more rapidly than in other continents, and the promotion of urban regions and second rank cities well connected to global metropolises, as well as to smaller cities and more rural areas, with relatively diversified economic activities, and social inclusiveness, would be a preferable political option in Europe. This scenario provided an image of the European territory in which economic and population growth, as well as most private and public investments, took place within existing cities that give structure to the European territory: national capitals and major regional capitals as driving forces. This scenario is characterised by economically strong and compact cities as centres of excellence. It is a place-based scenario that follows the priority of the European Spatial Development Perspective (1999) and the two Territorial Agenda (2007; 2011) for balanced polycentric urban systems at the macro-regional or national scale for the 261 cities of European or national significance defined in ESPON 1.1.1. Policies applied are mainly in the fields of Cohesion funds being mostly targeted to cities, including urban renewal and reurbanisation, and R&D investments distributed among cities, and promotion of regional and national transport networks.

Scenario C (Territorial Strategy: Promotion of Regions)

The C Scenario focused on the promotion of small and medium size cities, especially in less developed regions; it was inspired on the Europe of Regions scenario presented in the Project Specifications. Local and regional scales are promoted by public policies to support endogenous development and increase economic resilience. Local production and local markets gain much importance, migration of skilled people from large cities to rural areas accelerates localism, large cities become further decentralized into more productive, slow neighbourhoods. Strengthening the social and economic balance of Europe at the regional level, promoting endogenous development and empowering regional institutions may lead to more efficient provision of public services. European Cohesion policies should be targeted to small and medium-size towns and rural regions, especially in less developed countries, favouring changes in people and corporative behaviour. This scenario responds to the challenges of energy scarcity and climate change expressed in the Territorial Agenda 2020 (2011) by promoting small and medium-sized cities as centres of self-contained and economically resilient regions with more sustainable mobility patterns yet taking account of the necessary economies of scale of services of general interest and the prospects of an ageing society. Policies applied are mainly from the fields of cohesion funds targeting mostly rural less developed areas, and transport investments focused on local and regional networks.

Scenario Study	Scenario Orientations			
ET2050	A	B	C	VISION
ESPON Project Specifications	Europe of Flows	Europe of Cities	Europe of Regions	VISION
ESPON 3.2	Pro-Competitivess		Pro-Cohesion	
Netherlands 2040	Talent Towns	Metropolitan markets & Cosmopolitan Centers	Egalitarian Ecologies	
France 2020	Archipelago exploded	Centralism renovated	Local differentiated	Networked polycentrism
Territoires 2040	Postpolisation	Hyperpolisation	Depolisation	Regiopolisation
PLUREL 2025	Fragmentation and High-tech		Self-reliance and Sustainability	

Illustration 21 Comparison between ET2050 Exploratory Scenarios and existing references

Methodological approach to temporal horizons in Scenarios

Scenarios are in general a combination of two kinds of assumptions: assumptions about the framework conditions that cannot be influenced by European or national policies and assumptions about European and national policies that can be influenced by political decisions.

Framework conditions may include:

- *Economic recession: Globalisation and growth of emerging economies lead to significant slowing down of the growth of the European economy.*
- *Technology advance: New innovations in labour productivity and transport technology result in significant increases in labour and transport system productivity.*
- *Energy/climate: Rising energy costs and/or greenhouse gas emission taxes lead to strong increases of production and transport costs.*

Relevant European and national policies include:

- *Migration: maximum volume and conditions of international migration*
- *Cohesion: expenditures of EFRE, ESF and the Cohesion Fund*
- *Agriculture: expenditures of CAP*
- *Transport: implementation of the TEN-T*
- *Research: expenditures for R&D promotion*
- *EU enlargement: accession of new member states*

The question was how the two components, the assumptions about framework conditions and the assumptions about policies, are to be combined.

- One possibility is to create holistic scenarios changing both types of assumptions together in order to achieve internally consistent scenarios. That means that for each of the three Exploratory Scenarios, assumptions about framework conditions and policies are made in line with those that best promote the objectives of each scenario.

- Another possibility is to keep the assumptions about the framework conditions fixed while varying those about policies and, conversely, keeping the assumptions about policies fixed while varying those about the framework conditions in order to isolate the impacts of framework conditions and policies, respectively.

The first approach was used in Scenarios between 2010 and 2030. The approach helped creating realistic mid-term scenarios providing insides on the territorial implications of applying polycentricity at different scales through the several sectorial policies, discussing for each scenario the unknown impacts of these predefined sets of policies. This stage will applied a standard forecast methodology based on the definition of consistent policies from 2010 on to obtain an image of all scenarios by 2030. It was performed by the Multipoles model in relation to demography, MASST3 model for economy, Mosaic model for transport and environment and Metronamica model for land-use.

In the second approach, ET2050 Scenarios A, B and C are combined with alternative framework conditions between 2010 and 2050, not necessarily the most favourable ones, in order to study the long-term performance of the three scenarios under a range of alternative framework conditions. The object of this exercise is to extend the room for designing the 2050 Territorial Vision and assessing to what extent scenario orientations are resilient to varying framework conditions or perturbations along the temporal timeline. It was performed in an integrated way by the SASI model, in relation to demographics, economics, transport and environment. Based on SASI results, Metronamica elaborated a 2050 land-use projection for a number of scenarios and scenario variants.

Because the object of 2030 and 2050 scenarios is different in orientation and operative objectives, the two temporal horizons are neither linear nor successive. This means that for 2030 (where the 2 approaches meet together), results from the second approach do not need to be always coincident with results form the first approach. Results in the 2 time horizons are intended for different purposes, and need to be understood in this way.

Scenario Results and Assessment

Present State of Europe in the World Trends

From 1990s the World has experienced accelerated changes in terms of demographic growth (+12% between 2000 and 2010), information and communication technologies and information flows, integration of global financial systems, exponential increase of global trade (50% increase between 2000 and 2010), emergency of Asian economies (27% global GDP increase between 2000 and 2010), increasing oil prices and growing environmental concerns.

While economic disparities at world level have been reduced (GINI index 0’66 in 2000 to 0,63 in 2008), internal social disparities within developed and emerging countries have increased.

The economic gap between European countries and the rest of the World has been reduced since mid seventies (from 37% of Global GDP in 1970 to 28% in 2010), because of the lower economic growth in Europe, and the outsourcing of American and European industrial corporations mostly to export-oriented Asian economies still with very low salaries. This diminishing share of the world economy by European countries does not imply any absolute reduction but even

exponential growth in many indicators, such as trade, tourism or intercontinental freight and passenger traffic.

The European countries economies, in their way out of the crisis, are increasingly focused to increase exports with the rest of the world. In this sense, European economies may follow increasingly different globalisation patterns (e.g. UK closely linked to Commonwealth countries and USA, Spain to Latino America, Germany to China…). Extra-European trade may grow faster than intra-European trade, and catching-up development processes (e.g. Southern European countries in late 1980s and early 1990s, Eastern European countries in 200s…) may dramatically change.

Demographic Trends by MULTIPOLES[69]

European population growth will continue to grow in the Baseline scenario towards long-term stabilisation. No shrinking envisaged. Total population of 31 European countries will grow from 514 million in 2010 to 530 million in 2030 (less than predicted by EUROPOP 2010) and 539 million in 2050 (in line with EUROPOP).

Future life expectancy has been underestimated in previous forecasts. Life expectancy observed in Europe in 2010 (77 for men and 83 for women; Eurostat data) were higher than forecasted in the EUROPOP 2010 Eurostat's projection and in DEMIFER's scenarios. Ageing is universal across Europe. Percentage of population 65+ over population on working age increases in Europe from 26% in 2010 to 40% in 2030. This will require complete rethinking of the spatial planning to adapt it to a large number of people with partial or full disability.

Total cumulated migration between NUTS2 in Europe (internal and external) up to 20 million migrants between 2010 and 2030. High migration scenario A considers up to 21.4 million migrants, while low migration scenario C considers 18.1 million.

Rural-urban migration and depopulation of many rural areas is expected. Despite an overall small increase in population, many regions are declining, especially in Eastern countries and some remote peripheral areas, mainly as a result of the intra-Europe emigration.

Population growth is likely to happen in Western Europe and in regions with large urban agglomerations. Population growth is generated by immigration coupled with relatively high fertility.

The re-population of rural areas with high life quality standards can be important in attractive areas like the Mediterranean coast or touristy areas of France and Italy, or Spain.

Even on pro-family and pro-natalist policy scenarios like Scenario C, the number of births in the ESPON area is predicted to decrease. This is related to population ageing and the related decrease in the number of women in the fertile age.

The decreasing number of births, combined with an increasing number of deaths results in decreasing natural change in most scenarios. Only pro-fertility scenario C is able to postpone negative natural increases (more deaths than births) until 2020.

[69] Full outcomes of the Demographic Scenarios in Volume 2 of the Scientific Report

With a negative natural change, the growing extra-European migration will constitute a key balancing factor of population dynamics. Low fertility scenarios assumed high migrations (A and B) while the high fertility scenario C is a low migration scenario, providing all scenarios similar demographic figures by 2030 (528 million in Scenario A, 530 million in Scenario B, 532 million in Scenario C, 530 million in Baseline)

The differences in the speed of ageing (expressed as the percentage change of ODR in the 2010-2030 period) between the exploratory scenarios and the Baseline generally follow the migration pattern assumed in the exploratory scenarios. High migration assumptions tend to slow down the speed of ODR increases.

The result of substantially higher fertility assumed in Scenario C is hardly visible in ageing dynamics, as in 2030 too little time will have passed for most of children born between 2010 and 2030 to join the labour force. The impact of high fertility can be more important towards 2050.

Economic Trends up to 2030 by MASST3[70]

The average GDP growth rate up to 2030 in the Baseline is of 1.89% (1.88 in Western Countries, 1.93 in Eastern Countries) which is slightly lower than the long run trend for Europe, because of the slow coming out of the crisis.

GDP growth is positive in all European regions, with the exception of a very limited number of regions in Southern Europe, where the recovery after the crisis is not able to overcome the negative effects of the crisis in the first years of the period 2011-2030.

GDP per capita growth for the largest macro-regions in Europe will continue to grow, but disparities will increase. For the 2010-2030 period, according to MULTIPOLES and MASST forecasts, out of the 132 regions below GDP per capita average in 2010, 84 are expected to experience further regression and only 54 are expected to progress positively.

Total employment growth rate increases across Europe by 1.58% yearly between 2010 and 2030 (1.53 in Western Countries, 1.93 in Eastern Countries). Employment grows at a sustained rate in Europe meaning that large part of the recovery from the crisis comes from job creation. Part of the recovery, however, also comes from productivity gains, as signalled by the larger increase of GDP with respect to employment (1.89% for GDP against 1.58% for employment). Employment led growth noticed in some peripheral regions (Poland, Southern Italy, Spain) where employment growth rate are high even in the presence of reduced GDP growth rates, meaning lower salaries. Productivity led growth is particularly present in Western and Northern countries which show a low employment growth rate, even in the presence of high GDP growth rates.

In Eastern Countries, despite the negative population growth rates labour force is made available from active population leaving the agricultural sector (if Eastern countries' contribution of agriculture to total GDP decreased from 11% in the 1990 to 6% in the 2008, it is still higher than western countries', which is around 2,4% in 2008) as well as from unemployed people returning to work.

An equilibrated increase of both manufacturing and service activities characterises Western countries. This suggests that a process of reindustrialization will take place in these countries.

[70] Full outcomes of the Economic Scenarios by 2030 in Volume 3 of the Scientific Report

Decrease in off-shoring processes, especially towards Eastern countries which will increasingly suffer from the constant erosion of their relative advantage in low labour cost

Productivity gains are limited in New 12 countries mainly for two main reasons: i) traditional reconversion from agriculture to manufacturing activities is more contained than during the 1990s (the share of agriculture reached 6% of total GDP, and therefore the more contained shifts to industrial activities generate more limited productivity gains than before); ii) New 12 countries are characterised by a shift of employment from manufacturing to services, evidencing a clear new stage of development from industry to services; however, this industrial reconversion does not bring with it gains in productivity, being the new services low-value added services, like commerce.

The higher expansion of growth in the B scenario (2.31% yearly GDP growth, respect to 1.89% in Baseline) can be explained by the higher and more efficient exploitation in this scenario of territorial capital elements, of local specificities, present in both large and second rank cities that allows local economies to achieve higher competitiveness. The weak presence of equilibrated and efficient urban systems in the Eastern countries may explain why these area registers very similar growth rates between the A and the B scenarios, being both the result of growth based on efficient first rank cities.

The low-growth Scenario C shows the advantage of Eastern European countries with respect to the Baseline, confirming that when cohesion policies are reinforced, their effect is visible. However, this scenario performs worse than all others, a result that underlines the importance of a "competitiveness" driven attitude, and at the same time reminds the relatively lower effect of cohesion policies when they are not accompanied by an endogenous effort in moving towards competitiveness. The two combined aspects, cohesion policies from one side, and local competitiveness from the other, can probably be the best recipe for growth.

Transport Trends up 2030 by Mosaic[71]

High accessibility to intercontinental flights will mostly be available around core airports in Europe (London, Paris, Amsterdam and Frankfurt, or Madrid) as a global hubs. Several European capitals (Rome, Warsaw, Praha, Wien, Copenhagen, Stockholm, or Berlin), and large metropolitan areas (Milano, Nice/Marseille, Barcelona) will play a complementary role, while small regional airports will grow because of specific purposes (e.g. low-cost carriers, tourism, corporative flights…).

Freight accessibility to extra-EU markets will be dominated, still as today, by Northern European ports, mostly by Rotterdam, Hamburg, Antwerp and Bremen, with the significant contribution of Felixtowe, the Hague and Zeebrugge. Limited growth of Mediterranean ports, especially Barcelona, Valencia and Genoa, not much other ports like Algeciras, Gioia-Tauro, Marsaxlock (Malta), Athens.

The connexion between Second-Tier Cities and regions to main global hubs become a critical development condition. While more networked-like structures may emerge at European scale, increase hub-spoke hierarchical configurations emerge at global scale.

Accessibility measured as the accessible population weighted by the time of reaching this population always improves when new infrastructure is built, excepts in regions where population declines. When considering the cost of using infrastructure, accessibility measured as accessible population within a limited travel budget does not increase everywhere. When higher travel costs

[71] Full outcomes of the Transport Scenarios in Volume 4 of the Scientific Report

associated to new transport infrastructure are not compensated by travel time savings, this may lower the accessibility in certain regions.

The number of trips between NUTS3 in Europe increases in all scenarios between 2010 and 2030, between 61% in Scenario C and 86% in Scenario A. The largest body of inter-NUTS3 trips remains the trips due to personal affairs (private trips), followed by trips for holydays.

Long distance mobility in Europe is expected to grow from 2010 to 2030 in all scenarios, between 32% (Scenario C) and 39% (Baseline 2030). All scenarios result in less overall passenger·kilometres than the Baseline in 2030. The fact that the total number of trips inter NUTS3 increase much faster than the total passenger•kilometres indicates that trips tend to be shorter for all scenarios in 2030 than in 2010.

Road will remain the main mode for passenger transport in Europe (between 62% and 70% in 2030 compared to 67% in 2010), but some degree of modal shift can be achieved depending on the policies applied. Rail has the highest growth potential in the Scenario C "Regions", up to 12% in 2030 compared to 6% in 2010, but also the Scenario B "Cities" provides for moderate rail modal share increases, whereas Scenario A causes rail share to decrease by one half.

Total travel time increases in Baseline 2030 by 41.7% against Baseline 2010, about +7% more than the increase of total trip kilometres (39.0%). This implies that the overall transport system is slower in 2030 than in 2010, for the Baseline. Scenarios B and C maintain approximately the same speeds as Baseline 2010, meaning that the total number of hours spent in travelling in Europe increases just at the same rhythm as the number of passenger•kilometres travelled (0.7% speed increase in Scenario B, and 1.8% speed decrease in Scenario C). Only Scenario A shows a 32% average speed increase.

All Scenarios to 2030 show a relative decline of transport emissions and fuel consumption in relation to 2010. This is mostly due to the increase in vehicle efficiency (reduced emission factors in 2030 in relation to 2010), and larger shares of non-conventionally fuelled vehicles in the future. Scenario C shows the largest gains in environment, and the fact that the scenario is successful in increasing the rail share translates onto a relative factor decline of the CO2 emissions in relation to the total fuel consumption.

Land-use Trends by Metronamica[72]

The combined impact of economic crisis with reduced GDP growth, and decarbonisation (e.g. the use of more environmentally friendly energy sources, savings and efficiency gains) leads to a net reduction of CO2 emissions specially in more industrialised and populated regions, even if there is a reindustrialisation process.

New residential land use will mostly be allocated on areas that were agricultural land before. Moreover, urban land use classes show a stronger dependency with other urban land uses in their allocation then agriculture, forest and natural vegetation

South-Eastern Europe and Western Europe, inland water bodies will remain attractive for new residential development; in Mediterranean and Western Europe, marine water bodies will remain attractive for the allocation of new residential land uses.

[72] Full outcomes of the Land-use Scenarios in Volume 6 of the Scientific Report

Agriculture shows the largest decline in surface area, especially in Western Europe, followed by the Mediterranean region. Conversion from agriculture to all other land uses is expected throughout Europe, while new agricultural locations can mainly be found on land previously occupied by forest and natural vegetation.

Forested areas are expected to increase in the first years of the baseline scenario, mainly due to the growth of existing forests. The increasing demand for land slows-down in the future due to increased land use competition with further urbanization, an increasing demand for meat and dairy products and the need to maintain a sufficient agricultural production, together with an increasing demand for bio-energy crops, all while meeting ambitious environmental goals, such as the GAEC standards for permanent pastures, the nitrate and water framework directive and the biodiversity action plan BAP).

Territorial Impact Assessment of 2030 Scenarios[73]

Impact on ECONOMY: the impact on economy of scenarios is overall positive, and particularly strong in EU12, Baltic western countries, western and southern France. In the baseline scenario, a huge homogeneity appears inside countries, but also strong national effects which keep southern European countries, and Greece in particular, much less affected by positive changes. The C Scenario is equally homogeneous, but more cohesive as far as southern European countries are concerned: many regions in Portugal, in southern Spain, central and southern Italy and Greece benefit from some more relevant growth impacts. The A and B Scenarios show wider regional differentiations inside the general macro-territorial development shown by the Baseline scenario; the former is of course more selective, the latter more diffused, with many more regional growth cases of with respect to the average performance of their countries.

Impact on SOCIETY: differently with respect to the previous aggregate effect, impacts on society show both positive and negative signs. Positive signs are more widespread, and show up in all EU12, in southern Sweden and southern Finland (including Helsinki), most of France, Denmark and Spain (including capital regions), southern Portugal including Lisboa, many regions in England, Scotland and Wales, the entire Greece and Ireland. Negative scores show up in a large north-south belt running from Holland and Germany to Italy, touching also Belgium and Austria. These negative scores in some cases depend on the good present situation, which will not be totally maintained in the long term, while in other cases, like the Italian one, to persistent difficulties of the country. Some improvements in the condition of some southern Italian, Belgian and Dutch regions show up only in the B Scenario, where negative signs are turning towards light positive ones.

Impact on ENVIRONMENT: impacts on environment are overall negative, but in general not too intense. The highest negative values are reported in Romania, Bulgaria and Hungary (this last country probably over-estimated), in northern Italy and Southern France, in Andalucia and Norte region, in Holland, Denmark and the entire southern Baltic coast. In the A Scenario the impacts are overall lower, but some concentrations of negative conditions emerge in large Dutch cities, in Paris, London, Munich, in Rhone-Alpes and the entire southern French coast, in Copenhagen and southern Denmark, the North Sea coast in Germany and in Lithuania. In the B Scenario, impacts are less severe, while some novel effects emerge in the C Scenario: EU12 experience a generalized higher negative impact while some relevant cases of positive environmental impacts are visible in a wide east-west belt in France, running south of Paris, in south eastern England with the exception of London, in Madrid and Extremadura in Spain, in the Warsaw region.

[73] Full outcomes of the Territorial Impact Assessment, including maps, in Volume 7 of the Scientific Report

Impact on Territorial IDENTITY: impacts on territorial identities show generalized positive signs. The highest values are shown by most southern countries (Portugal, Spain, southern France, Italy, Greece and also Romania and Bulgaria), many western and southern Polish regions, the Baltic Republics, some regions in Wales, central Sweden, southern Finland and Slovakia. A much more selective picture emerges in the A Scenario, where only some specific regions present high values: Bavaria, Andalucia, Norte, the Krakow and Stockholm regions, Estonia, Latvia, southern Finland and most of Italian regions. In the B and C Scenario in particular this last picture increasingly widens in the direction of medium-city regions and beyond.

SUMMATIVE IMPACTS. If we believe that positive and negative impacts may be compensated – and this is something that could be accepted, given the fact that impacts are not determined, in our case, by specific actions of projects, but by composite scenarios – then summative impacts may be calculated, one for each scenario. In the baseline scenario, we understand that positive impacts overcome the negative ones in all European regions. The picture indicates that the intensity of positive impacts will be inversely proportional to the present level of economic development, by and large, underlining a convergence in territorial cohesion that will take place in a comprehensive sense, in terms of living and working conditions and not just in economic terms. The highest scores are reached by EU12, eastern regions in Germany, Portugal, Spain (particularly central and southern), France (particularly western), southern Belgium and also, to a lesser extent, Finland, Denmark, central and southern Italy and Greece. On the other hand, lower improvements will be experienced in Holland, western Germany, Austria and northern Italy. The B and C Scenarios would not bring in any substantial differences with respect to the Baseline scenario, but the situation would slightly change in the A Scenario, in favour of some 'core' areas: in south-east and central England, in northern Italy, in northern Germany, but the same diffusion of wellbeing and socio-environmental sustainability will be still apparent.

IMPACTS BY TYPOLOGY OF REGIONS. An analysis in terms of impacts on different types of regions looks particularly interesting (see next table). Selecting the most interesting geographical typology, namely the megas-agglomerated-urban-rural typology (and reading first the table by columns), it appears that:

- according to the baseline scenario and summing up all impacts and all regions, the European future looks particularly favourable to medium-size cities (urban) and megas regions. In the first case -medium cities regions– this result is mainly due to favourable impacts on the economic sphere (GDP, innovation, accessibility, ..) and on territorial identity elements; in the second case, to favourable impacts on societal aspects. But also rural areas will not be left aside in terms of increasing wellbeing, as economic, societal and environmental effects will be highly beneficial; only identitarian effects could be less favourable, especially due to faster cultural (and multi-cultural) transformation;
- confronting impacts on the different types of regions by the three exploratory scenarios, the expected results are found with regards to impacts on the economy: most favoured regions are the big-cities regions (megas + agglom) in A Scenario, medium cities regions in B Scenario and rural regions in C Scenario. What was less expected is the good result of rural regions in economic impacts (all scenarios but the B one), in societal impacts (all scenarios) and in environmental impacts (all scenarios but the C one, where development is explicitly enhanced in cohesion regions).

Reading by rows and comparing overall, summative effects among the three exploratory scenarios (first, 'summative impact' block), scenarios C and B look as the most desirable for the entire European space ('all regions' together). In a territorial perspective, in all the 3+1 scenarios

the positive overall effects forecasted in the 2030 horizon are the highest on 'urban' regions. Going down to the other blocks in next table, scenarios A and B lead the scene in terms of their effects on the economic and territorial identity sphere while scenario C leads in terms of societal and environmental effects.

SCENARIOS →	BASELINE	A	B	C
Regional typologies		**SUMMATIVE IMPACT**		
All regions	12.850	13.555	**14.065**	**14.380**
Megas	***13.287***	14.001	***14.474***	***14.566***
Agglomerated	11.630	12.656	13.006	12.834
Urban	***14.241***	***14.170***	***15.436***	***16.003***
Rural	12.235	***14.449***	13.003	14.044
		SUMMATIVE - ECONOMY		
All regions	43.308	**52.345**	**50.209**	40.701
Megas	43.512	***55.152***	50.556	39.835
Agglomerated	41.148	***54.385***	48.110	37.010
Urban	***45.005***	51.578	***52.065***	***42.764***
Rural	***44.798***	48.437	***50.992***	***45.867***
		SUMMATIVE - SOCIETY		
All regions	4.561	3.621	3.784	**5.285**
Megas	***6.525***	***5.657***	***5.850***	***6.517***
Agglomerated	3.618	1.989	3.418	3.873
Urban	4.863	4.086	3.613	6.136
Rural	***6.623***	***7.354***	***5.532***	***7.051***
		SUMMATIVE - ENVIRONMENT		
All regions	-23.568	-27.163	-26.857	**-12.098**
Megas	-26.040	-32.279	-29.242	-12.578
Agglomerated	***-21.905***	-32.678	***-25.583***	***-8.539***
Urban	-25.807	***-25.160***	-30.028	-13.023
Rural	***-21.659***	***-16.079***	***-20.641***	-20.435
		SUMMATIVE - TERRITORIAL IDENTITY		
All regions	26.873	**31.046**	**28.367**	22.722
Megas	***29.222***	***33.497***	***30.098***	23.856
Agglomerated	22.929	***33.420***	24.863	17.538
Urban	***33.977***	32.431	***36.983***	***28.038***
Rural	16.304	18.873	11.431	21.826

In bold: most favorable impacts on all regions, first rows.
In italics: most favorable impacts, reading by columns.
Impacts refer to a 0/100 (or 0/-100) interval.

Illustration 22 Table on Aggregate impact values on all regions by scenario and regional typology

Long-term integrated scenarios by SASI, up to 2050[74]

The simulated economic development over time in the long-term supports the hypothesis that the forces moving towards economic convergence are robust and will remain in effect after the economic crisis under a wide range of framework conditions. However, they will not be strong enough to remove the gap in income between the prosperous old member states in western and northern Europe and the economically lagging new member states in eastern and southern

[74] Full outcomes of the Economic Scenarios by 2050 in Volume 6 of the Scientific Report

Europe. In this respect the A scenarios (MEGAs) performs worst and the C scenarios (Regions) best, with the B scenarios (Cities) in between.

The same holds for polycentricity at the national level, with remarkable differences between the old and new member states. In the old member states in western and northern Europe the impacts are modest, but in the new member states in eastern Europe they are large because of the growing centralisation of economic activities in their capital cities. As expected, the A scenarios and B scenarios lead to more spatial polarisation, except the energy/ climate variants A3 and B3, whereas all C scenarios lead to more polycentricity

In terms of sustainability all scenarios reflect the positive effects of rising energy efficiency and rising shares of renewable energy. But the most important message is that the political targets of the European Union and national governments to reduce CO2 emission of transport can only be achieved if transport, in particular road transport, becomes more expensive, be it by rising energy prices, user fees or taxation. Under all framework conditions the B scenarios are more successful in reducing energy consumption and CO2 emission of transport than the A and C scenarios.

The scenario simulations point to the great importance of the framework conditions and policy scenarios in which the spatial scenarios are embedded. But within those contexts they confirm the importance of which regions are promoted with priority:

- - Promotion of large metropolitan areas will maximise economic growth but increase spatial disparities and environmental damage.
- - Promotion of rural *and* peripheral regions will increase spatial cohesion but reduce economic growth and sustainability.
- - Promotion of large *and* medium-sized cities is a rational trade-off between competitiveness and cohesion and will be most successful in terms of sustainability.

This is one of the first studies confirming the claim of the European Spatial Development Perspective (ESDP) and the Territorial Agenda of 2007 and the Territorial Agenda 2020 that a polycentric spatial system of Europe would comply in a balanced way with the three major goals of the European Union, competitiveness, cohesion and sustainability. These results strongly support the promotion of a balanced polycentric spatial organisation as proposed by the European Spatial Development Perspective and the two Territorial Agendas and suggest to take the B scenarios (Cities) as point of departure for the Territorial Vision

From Scenarios to the Territorial Vision

The ET2050 project was expected on the one hand “to support and deliver input to the territorial vision-building process by updating, extending and refining the scenario work of ESPON”, and “to deliver expert and procedural support to the vision-building process”. On the other hand, owing to these specific features of its agenda, and in contrast to other ESPON applied research projects, the ET2050 project was also characterised by specific methodological requirements, expressed as follows in the specifications:

“A vision is a dream of a future ideal situation. In relation to supporting the vision development the project should make use of a proactive (roll-backwards) methodology having a point of departure in a future situation (2050) defined by political orientations. (...) The proactive scenario to be developed by this project will be called a Territorial Vision. (...) The building process of the

scenarios and the Territorial Vision should be cyclical and dynamic, allowing the Monitoring Committee to take active part in the development and testing of the vision and scenarios."

It was therefore anticipated that the Vision elaboration process would be characterised by a strong emphasis on the participatory approach:

"In contrast to other Applied Research Projects, which follow mostly an expert-driven approach, this project will be a mix of policy-driven and expert-driven approach. This means that policy makers have an important say on the choices to be made within the project. Because the policy makers are not part of the TPG, the project should follow a participatory approach in which it is very important to involve the relevant stakeholders at the relevant moment during all … steps of the project ...
(...)
Due to the policy-maker involvement, mobilisation of the stakeholders with their values, views, knowledge and ideas is of key importance for this project. Participatory tools could support the engagement of stakeholders and in turn this could support an extended reflection upon the different steps of the project resulting in shared framing of the territorial vision and pathway to it. In the end of the project the stakeholders should ideally have become the co-owners of the Territorial Vision."

The ET2050 Vision of the future of the European territory departed from the outcomes of the modelling and scenario building exercises, and initiated a broad consultation and participatory process involving a wide range of key stakeholders. The purpose of this process was to produce an ideal picture of the European territory in 2050 based on policy choices; in principle, the exercise had to take into account, but without feeling constrained by, the room for manoeuvre defined by the contrasted exploratory scenarios; this ET2050 Vision was thus clearly value-based and policy-driven.

The scenarios building and the Vision elaboration were linked by an iterative cross-fertilising process. Put otherwise, the policy driven input was kept in mind when carrying out the scientific 'expert driven work' (i.e. scenarios assumptions, modelling tasks and TIA); conversely, account was taken of the science-informed work to elaborate the successive drafts of the TeVi and to test its feasibility. This proved challenging but was necessary to secure both the scientific credibility and the political relevance of the project.

The Territorial Vision building process consisted in cross-fertilising

- - a value-based, inductive, and policy-driven process
- - and a fact-based, deductive, and science-informed approach,

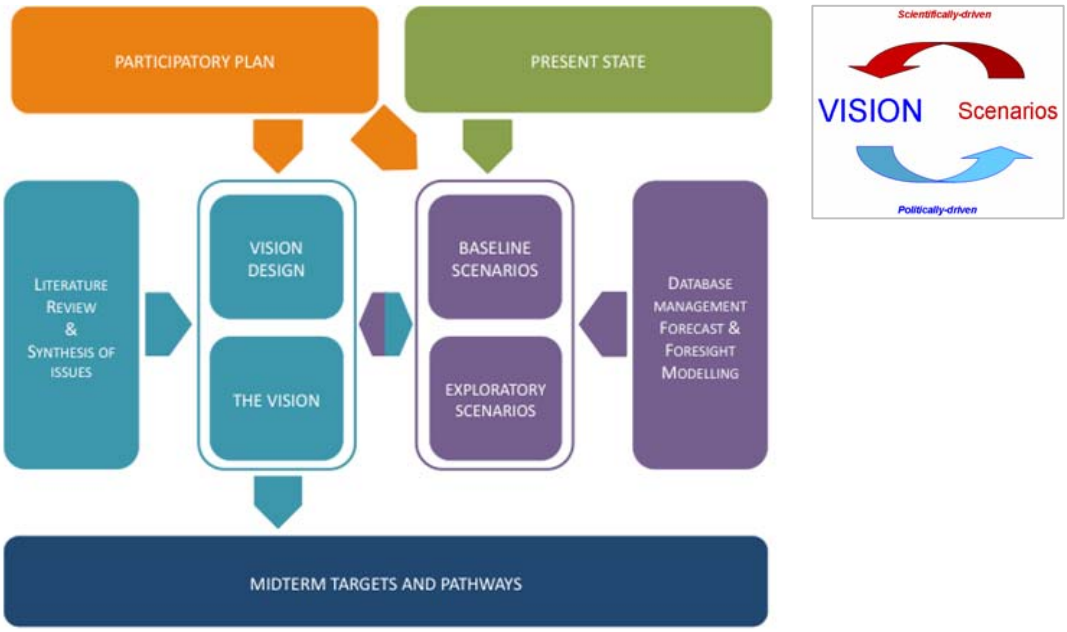


Illustration 23 The building process of Scenarios and the VISION as a cyclical and dynamic (no linear neither sequential) process

In particular, the following participatory activities were carried out:

Date	Place	Objectives / Contribution to the project	Actors involved	Activity
Nov 2011	Krakow	Input to adjust territorial scenarios	ESPON Scientific Communitty, Coordination Unit and DG REGIO	ESPON seminar
May 2012	Brussels	Input to / hypotheses for baseline scenarios, exploratory scenarios and Territorial Vision	Group 2 (policy makers) and Group 4 (experts)	Small group & individual consultations (round 1)
June 2012	Aalborg	Baseline scenario 2030 , first discussion	ESPON Scientific Communitty, Coordination Unit and DG REGIO	ESPON seminar
Sept 2012	Brussels	Involvement of main EU institutions,	EU Parliament, REGI chair	Policy maker face-to-face consultation 1
Sept 2012	Brussels	Input on the policy- aims and criteria to elaborate the Territorial Vision, and influence elaboration of exploratory scenarios	ESPON MC, DG REGIO, ESPON CU	Policy workshop.
Oct 2012	Brussels	/nput to the fine tuning of the baseline scenario 2050 storyline	Key EU actors, including EC DGs (MOVE, AGRI, REGIO, ENVI, …), EESC, non-public stakeholders	Small group and individual consultations
Dec 2012	Cyprus (Paphos)	Input to the exploratory scenarios (consistency, likelihood, desirability, criteria for TIA).	MC, DG REGIO, ESPON CU	Policy workshop 4. Dedicated half day session of the MC meeting
Feb 2013	Brussels	Involving main Eu institutions. Presentation of Baseline scenario and related maps development	EU Parliament, REGI chair	Policy maker face to face consultation 2
March 2013	Luxembourg	Dissemination of baseline scenario results & discussion of hypotheses and storyline	ESPON MC, CU	Policy workshop 5 Mc meeting
June 2013	Dublin	Presentation of draft exploratory scenarios, testing first elements	ESPON Scientific Communitty, Coordination Unit and DG REGIO	ESPON seminar

Date	Place	Objectives / Contribution to the project	Actors involved	Activity
		for territorial Vision,		
June 2013	Brussels	Involving main EU institutions. Presentation of scenarios and related maps development	DG REGIO	Policy workshop 7.
June 2013	Brussels	Involving main EU institutions. Presentation of scenarios and related maps development	EU Parliament/ REGI members	Policy maker face to face consultation 3:
Sep 2013	Brussels	Involving main EU institutions in Vision design process. Awareness raising of TEVi building process and Dissemination and discussion of territorial scenarios	DG REGIO	Policy workshop 8.
Sep 2013	Brussels	Involving main EU institutions in scenarios results and Vision design process	EU Parliament REGI Committee	Large audience conference
Oct 2013	Brussels	Involving main EU institutions in Vision design process. Awareness raising of TEVi building process and Dissemination and discussion of territorial scenarios	CoR, COTER chair	Individual consultation
Oct 2013	Brussels	Involving main EU institutions in Vision design process. Awareness raising of TEVi building process and Dissemination and discussion of territorial scenarios	DG REGIO	Individual consultation
Oct 2013	Brussels	Workshop on first draft territorial Vision	Large audience conference	ESPON Vision policy workshop
Dec 2013	Vilnius	Discussion on exploratory scenarios, Territorial vision, midterm target and pathways,	ESPON Scientific Communitty, Coordination Unit and DG REGIO	ESPON seminar
Feb 2014	Brussels	Involving main EU institutions in territorial scenarios and Consensus building around the Vision	EU Parliament, REGI chair	Policy workshop
April 2014	Brussels	Communication and consensus building around the Vision	Large audience conference	Conference “Making the European Territory Open and Polycentric"
May 2014	Leipzig	Debating the Territorial Vision	METREX	Participation in Conference
June 2014	Paphos	Debating the Territorial Vision	ESPON Scientific Communitty, Coordination Unit and DG REGIO	ESPON seminar
Sept 2014	Brussels	Debating suitability and accuracy of models to support territorial policy making	ESPON CU, DG REGIO, DG ECFIN, JRC	Workshop
Sept 2014	Dresden	Debating the Territorial Vision	City Regions Conference	Workshop
Dec 2014	Rome	Debating the Territorial Vision	ESPON Scientific Communitty, Coordination Unit and DG REGIO	ESPON seminar

Illustration 24 Participatory activities along the ET2050 process towards a Territorial Vision

Further Research Needs

The ET2050 project has presented scientific model-based results about likely future development of the European territory and alternative scenarios. The project has also developed a Vision in a consensus-aimed participatory process with stakeholders, linked to strategies and pathways to shape a wishful future.

Some points will deserve follow-up activities and debate to explore the implications of the Vision and to further develop on new policies needed and reform of current policies:

- Deepening of the ET2050 debate after the publication of the ET2050 Vision. There are many future-oriented territorial scenarios and visions at other levels in Europe (such as national, transnational (INTERREG B, macro regions, e.g. VASAB) as well as for other world regions (India, China, …) which also see themselves as embedded into global development perspectives. A deeper communication regarding themes, assumptions, models and methods, reasoning, and results would be of great interest and indispensable to bring different perspectives and actors in a common framework. Such activities could be part of actual dissemination strategies and/or of the future ESPON 2020 programme.

- Influencing the policy agenda towards the Vision 2050. The proposed strategy in ET2050 fits into current policies and gives new impetus. However, from here to more specific policy formulation and recommendation is still some way to go. The chapters on policy goals, policy aims and policy options followed by pathways describing a roadmap for policy development presents interesting although quite general ideas and arguments for future territorial policies. Based on this it will now need more discussion, in particular at European, trans-national and national level, but also including cities and regions, stakeholders and scientists, to fully comprehend and implement adequate policy measures to support the visions and pathways that are sketched here.

- Promotion of ET2050 Territorial Targets. ET2050 put light that there are very seldom policy targets currently in force in Europe with a direct territorial focus. As a consequence, a set of 10 targets linked to the development of the Vision 2050 was proposed, including a number of EU2020 headline indicators but also proposing new indicators related to territorial issues dealt within ET2050. In particular, Shrinking Regions (linked to regions losing most population); Regional Economic Gap (linked to the convergence of per capita income across ESPON NUTS), Territorial Openness (linked to regional accessibility), Compact Settlements (linked to the increasing arterialisation of natural land). Given that the ET2050 project and the development of the European Territorial Monitoring System by ESPON run in parallel, these indicators could only be considered very partially by the ETMS. ESPON should validate the interest of ET2050 indicators and targets, and eventually include them in the next versions of the ETMS, and if relevant, promote them to a higher policy level.

- The Vision vis-à-vis with the neighbourhood and the rest of the World. ET2050 discussed the crucial role of global development for the future development of Europe, and also within Europe. Of particular interest – besides neighbouring East-European and Maghreb countries - is the future development of Africa, but also of India, South America, Russia and the ASEAN Economic Community (AEC) which shall be implemented as a next step of regional economic integration in South-East Asia by 2015. It seems worthwhile, in the next ESPON 2020 Programme, to analyze the recent and prospective role of these important world regions for European development and put national and EU urban and territorial policies in a world-wide perspective. In other words, to explore the geo-policial dimension of the Vision, linked to its « Open » dimension. It would also be relevant to explore the implications for the EU Territorial Vision of

possible geopolitical tensions and conflicts in the use and control of limiting resources. Cooperation with such countries should be made possible in the ESPON framework for this reason.

- Potential impacts of evolving societal development in relation to the Vision. They could be further developed and deepened in the next future-oriented ESPON studies. Changing societal dynamics are considered by ET2050, but are not a central part of its work. Societal changes (a potential game changers and wild cards) could be object of add-hoc analysis (e.g. new social behaviour, new mind sets, increasingly important collaborative and green consumption, consolidation of the sharing economy, future energy paradigms) with a prominent role in the analysis of their spatial and material condensation. This could be part of future ESPON work lines, providing a deeper understanding of evolving societal trends and their implications of the future territorial development of Europe.

- Deepening into the concept of Territorial Resilience. The idea of territorial resilience (see Rob Hopkins, 2008) could be investigated in the future in relation with the 3 exploratory scenarios proposed by ET2050: How can territorial communities recover a development capacity against external shocks as particularly the shortage of energy resources? relocalisation of activities and decrease in geographic mobility, territorial governance changes towards more decentralisation of powers are key issues in this field.

- Deepening into the territorial implications of Regional and Cohesion Policy across European regions. ET2050 has suggested that cohesion policy should be reformed to promote more resilient regions (especially in the periphery) to economic and social contractions like the 2007-2015 crisis. This topic could be object of future add-hoc investigation within the ESPON Programme. The place of a few future sectoral policies at EU, national and regional level could be analysed further in their relation with the Territorial Vision. Within the « new generation of cohesion policies » and the « new governance approach » suggested by ET2050, the importance of macro-regional strategies for territorial cooperation is also stated, put in evidence a new model of territorial governance. This model of governance could be investigated further as a suitable model to promote territorial cohesion and place-based approach in all their dimensions.

- Use of Forecast Models and Tools by ESPON. The ET2050 project has brought together and ran 6 forecast models and 2 foresight meta-models to produce in a co-ordinate way different sectoral figures and storylines across Europe at regional level. Model developers have fine-tuned and improved the strengths and weaknesses of their models within the scope of the project. This exercise has an interest on itself, in relation to the development of an increasing number of modelling tools well fit to analyse territorial phenomena in Europe and assess policies linked to territory and spatial development. The interest of this activity was confirmed by the success of the European Modellers Workshop organised by ESPON in September 2014. ESPON should encourage further use of such tools to promote further refinement and capitalise these assets for an increasing understanding of territorial cohesion in Europe.

- The implementation of Complex Systems algorithms would provide for a complementary modelling paradigm. Complex Systems can be modelled either by micro-simulation (considering the behaviour/ schemata of the different actors/stakeholders, e.g. following the Game Theory) or at aggregated macro-level focusing on main patterns (by non-linear differential equations including stochastic parameters, e.g. such as the so-called Polya model). Complex modelling maybe a complementary paradigm to main-stream modelling formulations providing for a better understanding of systems being modelled, even if results are often not robust enough to be included into decision-making processes formalised as CBA. In the development of the ET2050

foresight meta-model, the Polya model was considered to disaggregate European values regionally, but was finally not used.

- Non-conventional data sources have to be used (e.g. Big Data). In the nearby future we will move from data scarcity to excess of data for many questions, and data filtering processes with become more important than today. Today, instead of relaying in (few) public institutions providing official data, more dispersed data sources with unclear reliability are emerging. In the ET2050 project, the use of these unconventional data sources has been limited to complementing maps with missing information from Neighbouring countries.

- Models need interactive interfaces and clear visualisation / mapping of results. In order to make models useful, knowledge-based tools in decision-making processes, interested stakeholders, citizens and institutions have to get access to them. Web interfaces facilitating to retrieve and visualise results (in graphics, in maps) or even to introduce new inputs and parameters will gain relevance. In ET2050 no specific resources were allocated to carry on this work, but in cooperation with ESPON ETMS, forecast results for the different scenarios have been introduced in a web application allowing retrieving and representing them graphically according to different geographic criteria.

ANNEX 3: TABLES, FIGURES AND MAPS

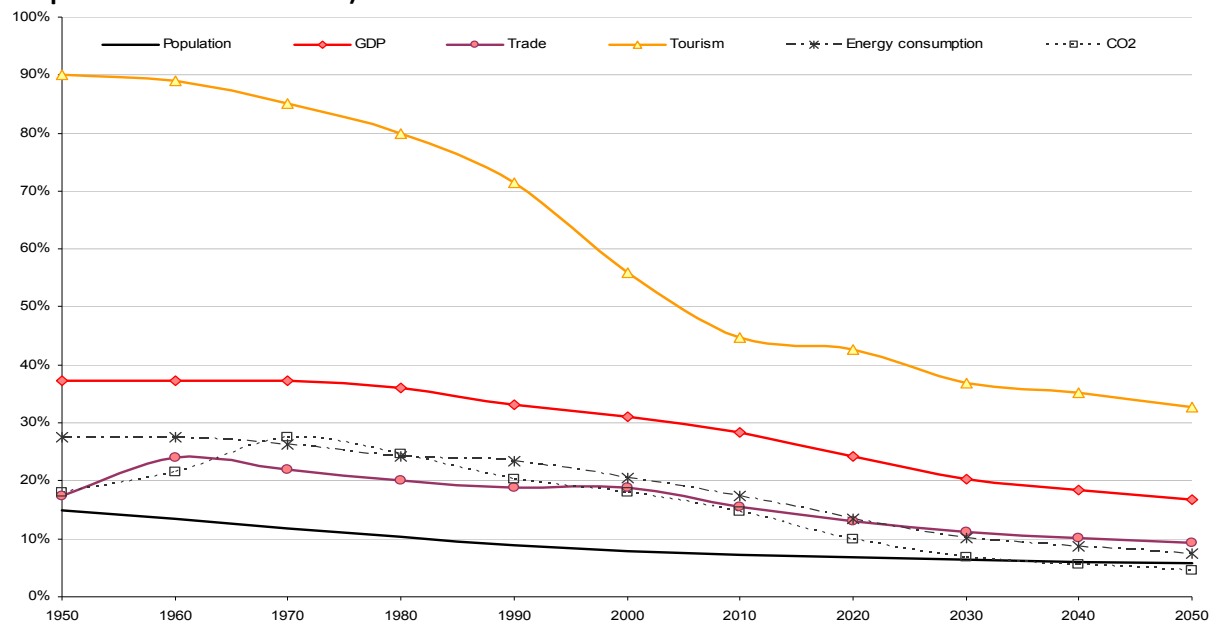
Europe in the World 1950-2050

Table 1. World Framework 1950-2010 and projections 2010-2050 – Table of exogenous variables

Indicator	1950	1960	1970	1980	1990	2000	2010	2020	2030	2040	2050
World Population (millions of people)	2.531	3.039	3.708	4.473	5.308	6.125	6.910	7.670	8.323	8.889	9.214
World Urban Population (% over total population)	29%	33%	36%	39%	43%	46%	50%	55%	59%	64%	69%
World illiteracy rate (% of population 15+)	44%	41%	37%	30%	24%	18%	17%	14%	11%	9%	7%
World Gini Coefficient (Income Disparities)	0,63	0,64	0,65	0,66	0,66	0,66	0,64	0,63	0,63	0,62	0,60
World GDP (1000 millions of 2010 €)	4.501	7.422	13.535	19.367	26.411	34.214	43.338	60.565	84.638	106.888	134.986
World total trade (goods& services in 1000 million €)	125	178	479	2.250	5.625	13.027	19.947	36.060	65.189	100.272	154.236
Global seaborne traffic (billion tone·km)	4.862	7.197	10.654	16.777	16.440	22.927	32.746	48.472	69.707	100.246	144.163
Global air traffic (billion RPKs)	226	368	600	1.100	2.100	3.381	4.621	7.491	12.145	19.688	31.918
World Tourism (million overnight visitors per year)	25	64	109	170	319	560	940	1.281	1.746	2.379	3.241
World energy consumption (MTOE)	2.900	3.754	4.884	6.469	7.192	8.441	10.182	13.442	17.747	20.758	24.280
World CO2 emissions (million tones)	10.000	11.802	14.908	18.990	21.977	24.224	29.905	38.875	50.537	56.757	63.741
Real crude oil price (€2010 per barrel)	13	12	9	82	33	30	67	108	121	130	138

Source: PASH+ foresight model based on various sources (UNDESA, UNESCO, World Bank, UNCTAD, DRAWRY, AIRBUS, BOEING, WTO, IEA, BP).

Figure 1. European evolution in relation to the rest of the World 1950-205075 (European share at World level)



Source: Multipoles, MASST, SASI, MOSAIC, METRONAMICA and PASH+

[75] Europe is associated to the ESPON area

European Baseline 2010-2030

Table 2. Key Baseline Trends at European Level

Baseline Trend	Temporal Evolution	Territorial Implications
More Stable Population. Depopulation of Eastern rural regions	From 514 million inhabitants in 2010 to 530 in 2030 and 539 in 2050. Fertility rate increases from 1,61 to 1,66 in 2030.	Many Eastern rural regions suffer population decline while large and capital cities grow because of internal migration, taking advantage of agglomeration economies.
Aging across Europe	Old-age Dependency Ratio (ODR) grows from 26% on average in 2010, to 39% in 2030 (219 millions of elderly).	Ageing European population is general in Europe, except in large cosmopolitan cities and regions attracting young skilled people. Increases in retiring age are likely (e.g. up to 70 years old)
Increasing Migrations. Labour migrations East-West (and probably South-North).	1,21 million immigrants per year arriving from outside Europe by 2030. Total cumulated migration in Europe (internal and external) up to 38 million between 2010-2030.	More mobility because of temporary labour migration and personal visits. More diversified migration purposes, from labour to leisure and tourism, health care and education. Increasing attraction of large cities in front of rural regions.
Average economic growth at a moderate, not marginal, level	1,89% annual growth up to 2030. Economic growth at different speeds. 45 regions grow at less than 1% yearly.	Increasingly different paths to economic recovery across regions. Marginal economic growth is not related to productivity gains in Southern and Eastern regions, while higher growth related to productivity in central regions.
Divergent economies, with higher productivity gaps between the core and peripheral regions	From coefficient of variation 0,50 in 2008 to 0,60 in 2030	Increasing disparities between core regions of Europe and several peripheries (Southern, Eastern).
More jobs being created everywhere, with lower salaries in less developed regions.	Employment annual growth of 1,58%. It grows at a sustained rate in Europe, meaning that large parts of the recovery for the crisis come from job creation and lower salaries, instead of productivity gains.	Labour markets are reformed in Southern European countries and more jobs are generated even with low economic growth. Increase in social disparities also because the likely reduction of social public expenditures, that may hit specific zones and neighbourhoods.
Reindustrialisation of the economy, with balanced employment growth in manufacture and services.	Jobs in manufacture grow at slightly under rates of service employment (1,63% services, and 1,38% industry).	Technological innovation concentrated only in some sectors and regions. Increasing dependency of more expensive energy
Growth in long-distance and intercontinental traffic.	Polarisation of global accessibility in regions having intercontinental transport services in airports and ports.	Continuous growth of long-distance and intercontinental traffics, and increasing share of road in inland transport. Polarised development attached to global transport nodes (e.g. intercontinental airports and ports).
Accessibility changes influenced by other factors than new infrastructure.	Population and economic changes, as well as increasing transport costs heavily influence accessibility within Europe. Road and air becoming the dominant modes. Rail modal share maintained at 6% in 2030 for passengers, and below 7% for freight (12,6% in 1995, 10% in 2009).	Limited territorial integration, with few passenger and freight cross-border flows. Polarised development in transportation nodes well connected globally, in general located near larger metropolis
Expansive land consumption, producing more hybrid urban-rural geographies	More specialised and segregated uses in large metropolitan areas, especially in Southern and Eastern regions with weakest planning traditions.	Increasing low-dense urbanisation, with different development patterns across territories. Relaxed planning regulations in Southern European countries in coastal and touristic zones.
Reduction on Green-House Emissions in more advanced industrial economies	Transport emissions related emissions reduced 17,2% by 2030 because of a combination of lower economic growth and the use of more environmentally friendly vehicles and energy sources.	Decreasing CO2 emissions but targets are not met. Environmental regulations are relaxed in less developed regions.

Source: Multipoles, MASST, SASI, MOSAIC, METRONAMICA and PASH+

Exploratory Scenarios 2030

Table 3. Scenarios facing the Critical Bifurcations

	Scenario A	Scenario B	Scenario C	Baseline
Will European national economies be able to adjust to structural transformations?	Reduction of Public Administrations. Further opening and deregulation of markets. Private-Public Partnerships. Public support to R&D	Policy reforms based on reinforcing social welfare. Public investments that allow for economic recovery	Policy reforms towards post growth societies limiting both large corporations and central public administrations.	No, partially
Will migrations continue to be necessary in Europe to shirking labour market?	Strong migrations bound to most performing economic corridors and MEGAs	Moderate migrations mostly bound to large urban centres from inner regions and other EU countries	Limited external migration. Residential mobility from large cities to medium and small towns	Migrations growing slowly mostly bound to largest metropolitan regions
Will European countries be able to sustain their welfare system?	Welfare system fully privatised	Reinforced to allow its maintenance and sustained through increased taxation	Reformed to facilitate Third Sector (ONG's, social communities…) interventions.	Welfare system reduced and further privatised.
Will Europe (and its single countries) be able to find ways to finance its public debt?	Financial debt fully repaid by 2030. Surplus	Financial debt reduced, but not fully repaid by 2030	Financial debt repaid in 2050	Financial debt remains high and public administrations are substantially reduced
Will Europe be able to compete with emerging countries in high-value sectors?	Increased overall competitiveness (manufacturing, biotech, medicine)	Competitive limited to sectors like transport, design, nutrition, green energies	Limited competitiveness to sectors like tourism and welfare services	European technological advantages reduced overtime
Will Europe be decarbonised and decentralized energetically, reducing GHG emissions?	Increased efficiency of fossil fuels, some RES, emergence of CCS. Targets partially met.	High development of centralised RES and nuclear. Targets partially met.	Decentralised RES. Lower energy consumption. Targets met.	Fossil fuels remain important. Emissions reduced but targets are not met.
Will Europe will be able to tap the untapped potential of its regional diversity richness?	Continuous de-territorialisation of the economy.	Yes at National level, while regions in each country will play a secondary role.	Local differences emphasised as a major European asset.	Partially.
Will spatial development and settlement structures be more polarised?	Development focussed on global cities (MEGAs), and on corridors linking them	Development mostly focussed on large and medium cities (FUAs)	Development focussed on medium and small cities with high quality of life	Increased polarisation
Will be Europe politically more integrated?	Europe of multiple speeds. Increased cross border integration motivated by economic interests. Increased relations with neighbouring space.	Continuation of existing trends..	Limited Federalism. No new EU Members.	No significant progress in EU political integration. Limited cross-border relationships. Croatia enters EU.
Will decision and management processes of EU key policies be more decentralised?	Corporate and business dominated top-down governance	Increased role of Nations (mixed top-down and bottom-up approaches)	Strengthened principle of subsidiarity. Bottom-up governance enforced.	Top-down governance with limited decentralisation

Table 4. Policy Assumptions

Policies	BASELINE	A Scenario	B Scenario	C Scenario
Demographic policies	Continuation of actual trends	Lowered support to natality and families	Continuation of actual trends, as in Baseline	Public support to natality and families.
Migration policies	Continuation of actual trends	Openness to migrants from outside Europe	Relative openness	More strict immigration policies
Monetary policies	In Western European countries, stability of interest rates, ULC, exchange rates, inflation; Progressive convergence of Eastern EU towards Western European Countries values Decrease of interest on bonds: end of speculation periods			
Fiscal policies	Increase of tax rates in the Western and Eastern Countries. Debt/GDP remains constant	Slow tendency towards stability pact: 60% of Debt/GDP. Decrease of public expenditure growth rate especially in vicious countries.	Debt/GDP remains constant	Slow divergence from stability pact. Slight increase of public expenditure growth rate
Transport Policies	0,8% of European GDP invested in transport infrastructure by 2030 [76], mostly in long distance infrastructure (€1.970Bn 2013-2030). Slightly reduced modal allocation of investments to rail, and slightly increased to airports and ports. Single European Transport area fully developed for intra-Europe transport	0,6% of European GDP invested in transport infrastructure by 2030, mostly in long-distance infrastructure (€1.630Bn 2013-2030) Modal allocation increasing in air and maritime, and decreasing in rail European transport area opened to global competition. ITS deployment in road mode reduces costs by 5%. Reduced subsidies to rail.	1,0% of European GDP invested in transport infrastructure by 2030, mostly in medium distance infrastructure (€2.320Bn 2013-2030) Modal allocation increasingly rail based Single European Transport area fully developed for intra-Europe transport Pricing and taxation as in baseline	0,7% of European GDP invested in transport infrastructure by 2030, mostly in short distance infrastructure (€1.980Bn 2013-2030). Modal allocation focussed on collective modes and urban public transport Slow liberalisation and integration of the European transport market Road and air taxation causes 5% cost increases Rail and public transport subsidies
Energy policies	Fossil fuels remain important. Emissions reduced but targets are not met.	Increased efficiency of fossil fuels, some RES, emergence of CCS. Targets partially met.	High development of centralised RES and nuclear. Targets partially met.	Decentralised RES. Lower energy consumption. Targets met.
Environmental policies	Continuation of existing environmental management trends Euro-standards [77] regulation drops vehicle emissions to 100gr/km by 2030, (140gr/km in 2009)	Environmental protection focussed on keeping standards of environmental quality for air and water. Technologic optimism. Euro-standards drop vehicle emissions a 10% respect to baseline	Protection and management of rural areas as open spaces for leisure and environmental safety. Strong mitigation. Strict public regulations. Euro-standards drop vehicle emissions by 5% respect to baseline	Limits in both use intensity and quality standards and land occupation. Mixed Focus on adaptation. Euro-standards drop vehicle emissions by 20% respect to baseline
Cohesion policies	Budget kept constant. Allocation among regions in 2007-2013 as 2000-2007 Limited and gradual reforms favouring efficiency with no major political change.	Half of the present budget. Allocation among regions in 2007-2013 as 2000-2007 Territorial cross-border cooperation reinforced as well as with Neighbouring countries and the rest of the World. Productive investments in neighbouring countries.	Budget kept constant. Allocation among regions in 2007-2013 as 2000-2007 Thematic objectives redefined favouring urban-oriented policies and innovative urban actions. Strict-land use instruments in vulnerable areas	Budget doubled. Regions type C get 2/3 of the budget, Type B 1/3 Integrated territorial investments and community-led local development reinforced. Place-based focus promoting endogenous development.
Agricultural policy	Limited reform of the CAP	Budget reduced and focussed on subsidies to increase the sector productivity	Limited reform of the CAP. Higher emphasis on landscape management	Full integration of agricultural and environmental policies in their territorial dimension through cohesion policy, particularly pillar II.

[76] General assumption for all scenarios on European transport investment: 0,9% in 1995; 1,2% in 2007; 0,6% in 2015

[77] Regulation on transport vehicles environmental performance

Table 5. Territorial strategies associated to the Exploratory Scenarios

	BASELINE	A Scenario	B Scenario	C Scenario
Spatial distribution of population and economic growth, (and territorial governance)	No relevant modification on actual spatial patterns	Relative accessibility and connectivity to international transport networks and agglomeration economies attract growth, following spontaneous market tendencies. Global cities, mostly MEGAS grow bigger	Large cities attract both more people and activities because effective public policies promoting them at National scale. Internal migrations from sparsely populated areas to urban centres	Medium-size cities and towns attract people based on their cultural and environmental quality, and strong public policies and incentives. Change in consumer behaviour favouring proximity and self-sufficiency. Intense decentralisation at local and regional level. Limited external migrations

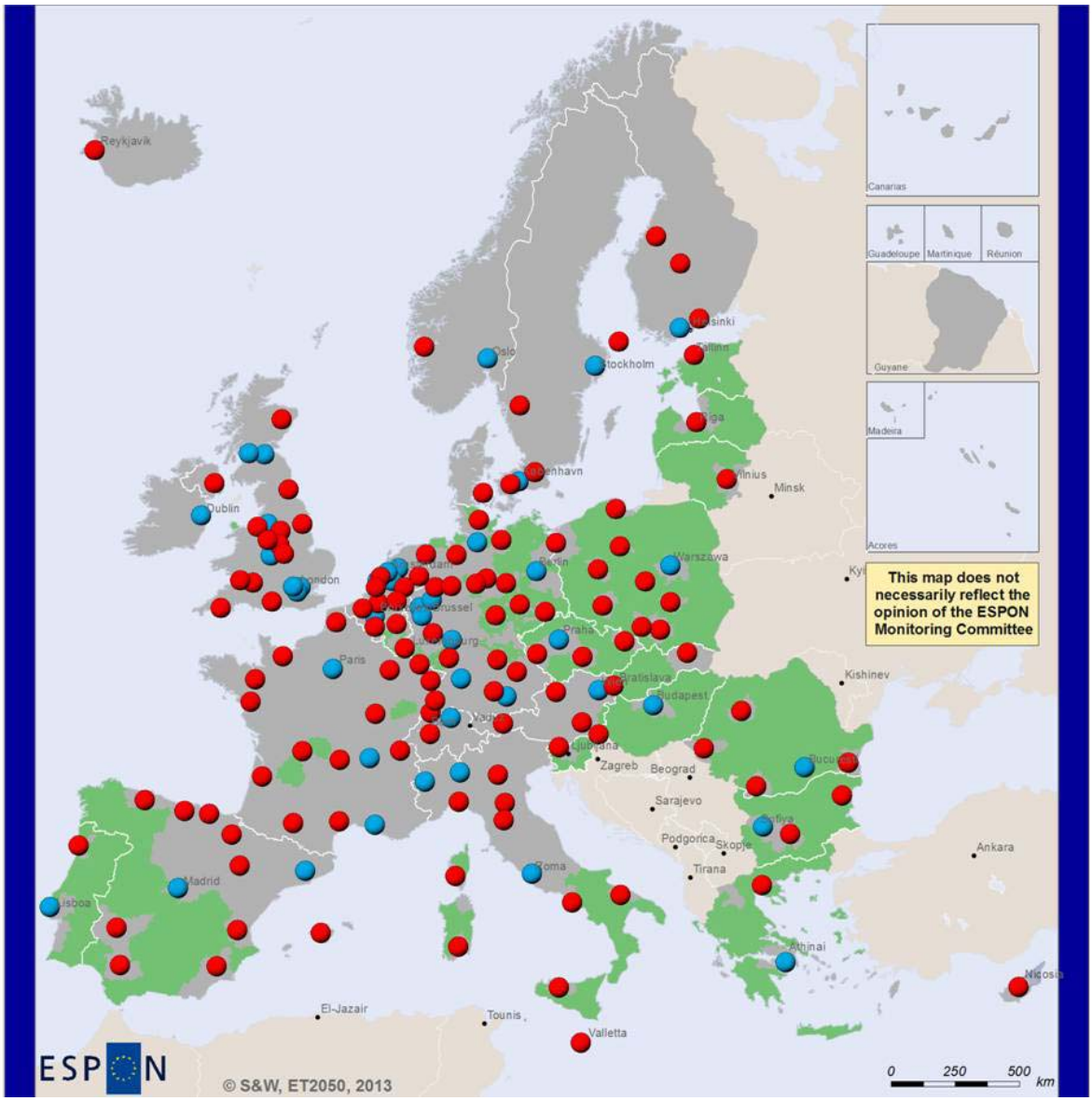


Illustration 25 Areas promoted in the A (blue), B (red) and C (green) Scenarios for 2030 and 2050

Table 6 Main Results at European level for 2030 (ESPON Space)

		2030			
Indicator	**2010**	**Scenario A**	**Scenario B**	**Scenario C**	**Baseline 2030**
Total Fertility Rate (TFR) (births per woman)	1,61	1,50	1,66	1,80	1,66
Life Expectancy at birth (years, average male-female)	80,0	83,5	83,5	83,5	83,5
Extra-EU yearly migratory flows (million immigrants arriving yearly)	0,73	1,35	1,75	1,00	1,21
Total cumulated migrants (including intra and extra EU migrants)	-	39,6	38,8	37,2	37,9
Total population (millions of inhabitants)	514,1	527,7	530,8	531,6	530,2
Old-age dependency ratio (ODR) (>64 / 16-64; weighted average of ODR by NUTS2 population)	26%	38,8%	38,9%	39,1%	38,9%
GDP growth (% annual average growth)	-	2,22%	2,31%	1,82%	1,89%
GDP per capita (€2010 per inhabitant)	23.335	34.104	34.121	31.049	31.845
Regional divergence (coefficient of variation of per capita GDP)	0,503	0,598	0,595	0,592	0,601
Total employment (% annual average growth)	-	1,92%	1,96%	1,55%	1,58%
Manufacturing employment (% annual average growth)	-	2,12%	1,66%	1,08%	1,38%
Services employment (% annual average growth)	-	1,86%	2,04%	1,67%	1,63%
Transport demand (increase in pax·km)	-	34,3%	34,8%	31,6%	39,0%
Time spent in travelling (increase in hours)	-	23,3%	34,5%	32,1%	41,7%
Cost of transport (increase in euros)	-	29,7%	34,9%	29,0%	39,3%
Land-take (average yearly km2 of new artificial land)	1208	898	879	728	1080
CO2 due to transport (increase in tonnes)	-	-14,8%	-20,6%	-48,6%	-17,2%
Total CO2 (increase in tonnes)	-	N/A	N/A	N/A	-28,9%

Source: Multipoles, MASST3, MOSAIC, METRONAMICA.

Territorial Scenarios and Variants 2050

Table 7 Territorial Scenario variants: spatial orientations and extreme framework conditions

Spatial orientation of Scenarios	Framework conditions			
	Baseline	1 Economic decline	2 Technical advance	3 Energy / Climate impacts
Promotion of metropolitan areas	A	A1	A2	A3
Promotion of large European cities	B	B1	B2	B3
Promotion of peripheral regions and medium cities	C	C1	C2	C3

Table 8 Main Assumptions for trends and policies

		2050			
	2010	Scenarios A1, B1, C1	Scenarios A2, B2, C2	Scenarios A3, B3, C3	Reference Scenario
Extra-EU yearly net migration (million immigrants-outmigrants per year)	0,18	0,20	0,20	0,20	0,20
Total population (millions of inhabitants)	514,0	542,0	542,0	542,0	542,0
GDP growth, without generative effects (% annual average growth)	-	0,62%	1,50%	1,50%	1,50%
GDP per worker, without generative effects (€2010 per worker)	69.700	99.400	145.500	99.400	99.400
Fuel Price (€2010 per litre)	1,70	3,00	3,00	10,20	3,00
Structural Funds (% of GDP)	0,4%	0,4%	0,4%	0,4%	0,4%

Source: SASI

Table 9 Results for main indicators

	2050												
	Reference Scenario	A	B	C	A1	B1	C1	A2	B2	C2	A3	B3	C3
GDP per capita 2050	42.897	43.988	43.463	43.078	31.636	31.254	30.978	53.546	52.922	52.436	41.190	40.810	40.571
GDP growth (% annual change in GDP per capita)	1,43	1,50	1,47	1,45	0,63	0,59	0,57	2,03	2,00	1,97	1,33	1,30	1,29
regional divergence (coefficient of variation of per capita GDP)	50,3	54,4	50,7	50,1	54,6	50,8	50,2	50,7	47,2	46,5	56,5	52,5	51,8
national polycentricity (polycentricity index ESPON 1.1.1)	65,1	62,1	65,2	65,7	62,1	65,2	65,7	62,1	65,3	65,8	63,2	65,6	65,8
Energy Use of transport (MJ/capita/year)	32,2	36,0	333,9	35,3	33,2	31,6	32,8	20,6	28,7	29,9	22,1	22,1	23,1
CO2 emissions from transport (tones/capita/year)	1,31	1,46	1,38	1,44	1,35	1,28	1,34	1,24	1,16	1,22	0,86	0,85	0,89

Source: SASI

Monitoring Indicators and Policy Targets

Table 10 Proposed Main Territorial Targets

	Topic	Indicator	Target proposed by	Indicator value in 2010	Value for target and time horizon
1	Population change	% of NUTS3 losing population	ESPON ET2050	-	95% of NUTS3 regions will not lose population beyond 7,5% by 2050
2	Regional Economic Gap	Gap in GDP per capita (percentile 95 / percentile 5)	ESPON ET2050	8,0 in 2010	To reduce the gap by 50% by 2050
3	Sufficient Accessibility	Number of remote NUTS3 regions in Europe	ESPON ET2050	209 remote NUTS3 in 2010	No remote NUTS3 by 2050
4	Minimum Land-taken	Annual land take in km2	EU Resource Efficient Roadmap 2050	920km2 sealed yearly in 2010	800km2 by 2020 0km by 2050

Table 11 Targets adopted by European Roadmaps (in yellow new values according to the Vision)

					2010 - 2050 path to target				
Topic	Source	Target	Unit	Target Year	2010	2015	2020	2030	2050
SOCIAL TARGETS									
Health	European Innovation Partner-ship on Active and Healthy Ageing	Increase healthy life for everyone in Europe by an average of two years	Healthy life years	2020	62	63	64	66	70
Education	EU2020	Reducing school drop-out rates below 10% by 2020	% of population aged 18-24	2020	14,1%	12,5%	10,0%	8%	7%
Education	EU2020	At least 40% of 30-34 year old completed tertiary education	% of population aged 30-34	2020	33,5%	35%	40,0%	45%	50%
Education	Education and training benchmarks to 2020	At least 95% of children between 4 and the age for starting compulsory primary education should participate in early childhood education	% of population aged 4-6	2020	92,3%	93,0%	95,0%	97%	100%
Education	Education and training benchmarks to 2020	The share of 15-years olds with insufficient abilities in reading, mathematics and science should be less than 15%	% of population aged 15	2020	20%	17,5%	15,0%	10%	0%
Education	Education and training benchmarks to 2020	an average of at least 15% of adults (age group 25-64) should participate in lifelong learning	% of population aged 25-64	2020	9,3%	12%	15,0%	20%	30%
Poverty / Social exclusion	EU2020	At least 20 million fewer people in or at risk of poverty and social exclusion by 2020	Thousands of people	2020	115.716	110.000	95.000	80.000	70.000
Social disparities	ESPON ET2050	To achieve an EU28 GINI coefficient by 2050 bellow to the lowest national GINI coefficient of an EU MS before the crisis (23.5, Denmark 2006)	GINI coefficient for EU	2050	30,5	30,5	27	25	20
ECONOMIC TARGETS									
Employment	EU2020	75% of the 20-64 year-olds to be employed	% of population aged 20-64	2020	68.6%	70%	75,0%	78%	80%
R&D / innovation	EU2020	From 1,8% in 2005 to 3% of the EU's GDP (public and private combined) to be invested in R&D	% of GDP	2020	2,0%	2,4%	3,0%	3,5%	4,0%
Eurozone members	Maastricht Treaty	All Member States except from UK and Denmark are obliged to join the Eurozone as they fulfil convergence criteria. Latvia will join in Jan 1st 2014 and Lithuania in Jan 1st 2015.	Number of States integrating the Eurozone	All times	17	19	24	28	28
Inflation (Eurozone)	ECB	Maximum 2%	Number of Eurozone members fulfilling	All times	11	11	22	28	28
Inflation (Eurozone)	Maastricht Treaty	Not more than 1,5 percentage points above the rate of the three best performing Member States	Number of Eurozone members fulfilling	All times	16	19	24	28	28
Government deficit (Eurozone)	Maastricht Treaty	Maximum 3.0% of GDP	Number of Eurozone members fulfilling	All times	5	10	20	28	28
Government debt (Eurozone)	Maastricht Treaty	Maximum 60% of GDP	Number of Eurozone members fulfilling	All times	14	16	18	23	28
TERRITORIAL TARGETS									
Accessibility	ESPON ET2050	At least 50% population in all European NUTS3 can access a 50.000 inh city within 45 minutes drive by 2050. No NUTS3 regions in Europe classified as remote by 2050 *(Dijkstra&Poelman definition)*	Number of NUTS3 regions classified as remote	2050	165	145	110	50	0
Regional Disparities	ESPON ET2050	To achieve a GINI coefficient by 2050 equal to 20	GINI index applied to average GDP per capita at regional level	2050	28	27	25	23	20
Regional GAP	ESPON ET2050	Difference between largest and lowest performing EU country in RGA Disposable Income in PPS lowered to 1/3	Max/Min Real gross adjusted disposable household income per head	2050	3,13	2,95	2,67	2,10	1,04

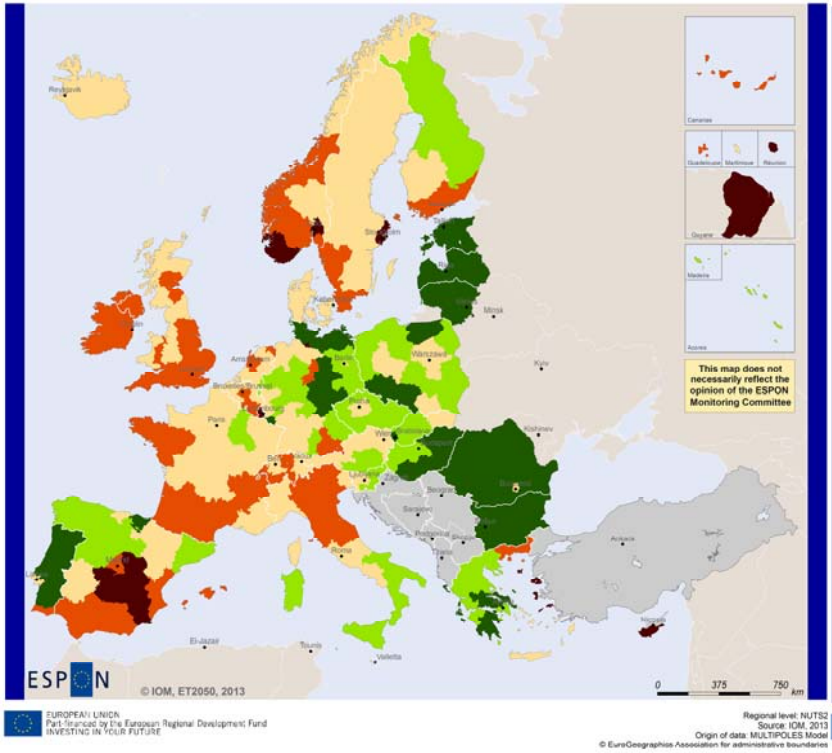
					2010 - 2050 path to target				
Topic	Source	Target	Unit	Target Year	2010	2015	2020	2030	2050
Land use	The Roadmap to a Resource Efficient Europe - "The Roadmap" *(Proposed, yet not adopted target)*	Average annual land take, from additional 920 km2 per year in 2000-2006, to 800km2 in 2020 and 0km2 by 2050	New artificial land in km2	2020 - 2050	920	850	800	550	0
Land use	The Roadmap to a Resource Efficient Europe - "The Roadmap" *(Proposed, yet not adopted target)*	At least 10% of the marine EU area is covered by a coherent network of (Marine Protected Areas) MPAs	% of protected marine area	2020	2%	5%	10%	20%	25%
ENERGY TARGETS									
Total GHG emissions	EU2020 Roadmap for moving to a competitive low carbon economy in 2050 (Low-Carbon RM 2050)	GHG emissions 20% lower in 2020 than in 1990 (or 30% if a agreement can be achieved to follow Kyoto) (EU2020). GHG 80% lower in 2050 than in 1990 (40% in 2030, 60% in 2040) (Roadmap)	Index 1990=100	2020 2050	85	80	75	60	20
GHG by sectors: Power generation	Low-Carbon RM 2050	GHG 95% lower in 2050 than in 1990	Index 1990=100	2050	93	80	65	40	5
GHG by sectors: industry	Low-Carbon RM 2050	GHG 85% lower in 2050 than in 1990	Index 1990=100	2050	80	78	76	67	15
GHG by sectors: Transport	Transport White Paper 2011 (WP2011) & RM2050	Transport emissions (including CO2 aviation, excl. maritime) 60% lower in 2050 in relation 1990's *(Stabilisation of air emissions by 2020 (carbon neutral growth) and 50% reduction in 2050 compared to 2005 (IATA); CO2 emissions from maritime transport should be cut by 40% (if feasible 50%) by 2050, compared to 2005 levels)*	Index 1990=100	2050	130	125	120	105	40
GHG by sectors: Residencial	Low-Carbon RM 2050	GHG 90% lower in 2050 than in 1990	Index 1990=100	2050	88	80	72	55	10
GHG by sectors: Agriculture	Low-Carbon RM 2050	GHG 45% lower in 2050 than in 1990	Index 1990=100	2050	80	75	70	63	55
GHG by sectors: other	Low-Carbon RM 2050	GHG 75% lower in 2050 than in 1990	Index 1990=100	2050	70	50	38	28	25
Primary energy consumption	EU2020 Low-Carbon RM 2050	20% increase in energy efficiency by 2020, i.e. 20% decrease in primary energy consumption by 2020 (EU2020) 30% decrease in primary energy consumption by 2050 respect to 2005 (Roadmap)	1000 tones of oil equivalent (kTOE)	2020 2050	1.646.839	1550000	1.474.000	1290000	884.400
Renewable Energy sources	EU2020	20% of total gross energy consumption from renewables in 2020	% of RES	2020	12,5%	15%	20,0%	36,1%	75,0%
Renewable Energy sources in transport	Renewable Energy Roadmap Communication by the EC, 2007	10% of transport energy from renewables in 2020	% of RES	2020	4,7%	7%	10%	17%	35%
Renewable Energy sources in transport	Regulation 443/2009 h	New vehicle car emissions: 95 g CO2/km target for 2020	gr CO2 / km	2020	140	130	95	60	30
Renewable Energy sources in transport	Transport White Paper 2011	40% use of sustainable fuel used in aviation *(IATA thinks a 6% share of sustainable 2nd generation biofuels is achievable by 2020; Boeing supports a target of 1% of global aviation fuels by 2015)*	% of sustainable fuel	2050	0%	1%	6%	20%	40%
Renewable Energy sources in transport	Transport White Paper 2011	40% cut in fuel emissions of the shipping industry	% of sustainable fuel	2050	5%	10%	17,5%	30%	40%
TRANSPORT TARGETS									
Passenger transport modal	Transport White Paper 2011	50% medium distance passenger transport shift to rail by 2050.	% rail in passenger·km	2050	8,30%	9,40%	12%	20%	50%
Freight transport modal shift	Transport White Paper 2011	30% freight transport >300km shift to rail or waterborne. 50% by 2050	% (rail + waterborne) in tonne·kilometre	2030 2050	15%	18%	21%	30%	50%
Trans European Networks TEN-T	Transport White Paper 2011	Multi-modal TEN-T core network by 2030	Km of motorways in core network	2030	29.950	31.000	33.000	35.899	35.899
Trans European Networks TEN-T	Transport White Paper 2011	To triple the length of high-speed rail network by 2030. To complete a European high-speed rail network by 2050	Km of HSR	2030 2050	6.602	7.343	9.743	18.000	22.000
Trans European Networks TEN-T	Transport White Paper 2011	All core network airports connected to rail network by 2050, preferably by high-speed rail	Core airports connected to rail	2050	15	17	20	25	37
Trans European Networks TEN-T	Transport White Paper 2011	All core seaports sufficiently connected to the rail freight and, where possible, inland waterway system.	Core port connected to rail with adequate standards	2050	25	27	35	65	83
Clean urban transport	Transport White Paper 2011	Lower 50% the use of "conventionally-fueled" cars in urban transport by 2030 and 0% use of "conventionally-fueled" cars in urban transport by 2050	% Share of unconventionally fuelled cars	2030 2050	5%	10%	20%	50%	100%
Clean urban transport	Transport White Paper 2011	CO2 free logistics in cities by 2030	% Share of unconventionally fuelled delivery vehicles	2050	0%	5%	15%	50%	100%

					2010 - 2050 path to target				
Topic	Source	Target	Unit	Target Year	2010	2015	2020	2030	2050
Road fatalities	Transport White Paper 2011	By 2020, 50% fatalities in road transport compared to 2010. Close to zero fatalities in road transport by 2050.	Fatalities per million people	2030 2050	62	45	31	15	0
ENVIRONMENTAL TARGETS									
Air pollution	Roadmap to a Resource Efficient Europe (EC, 2011)	Concentrations of Particulate Matter (PM10) in ambient air, not exceeding 50µg/m3 per 24 hours more than 35 times a year	Number of PM10 events with concentration > 50µg/m3 per 24 hours, per year	2020	45	40	35	20	0
Air pollution	Thematic Strategy on Air Pollution	47% reduction in loss of life expectancy as a result of exposure to particulate matter	% reduction respect to 2005	2020	10%	25%	47%	75%	100%
Air pollution	Thematic Strategy on Air Pollution	10 % reduction in acute mortalities from exposure to ozone	% reduction respect to 2005	2020	5%	7,5%	10%	20%	60%
Air pollution	Thematic Strategy on Air Pollution	Reduction in excess acid deposition of 74% in forest areas	% reduction respect to 2005	2020	35%	55%	74%	95%	100%
Air pollution	Thematic Strategy on Air Pollution	Reduction in excess acid deposition of 39% in surface freshwater areas	% reduction respect to 2005	2020	10%	25%	39%	70%	100%
Air pollution	Thematic Strategy on Air Pollution	43% reduction in areas or ecosystems exposed to eutrophication	% reduction respect to 2005	2020	10%	25%	43%	70%	100%
Air pollution	Thematic Strategy on Air Pollution	Reduction of air emissions: SO2 by 82%, NOx by 60%, volatile organic compounds by 51%, ammonia by 27%, and primary PM2.5 (particles emitted directly into the air) by 59%	Level of achievement of target	2020	0%	50%	100%	150%	200%
Water	Water Framework Directive	Restore degraded inland surface and ground waters to “good status”	% of good status water	2015	80%	100%	100%	100%	100%
Water	Roadmap to a Resource Efficient Europe (EC, 2011)	By 2020, good environmental status of all EU marine waters is achieved	% of good status water	2020	70%	85%	100%	100%	100%
Biodiversity	EU Biodiversity to 2020	100% more habitat assessments and 50% more species assessments under the Habitats Directive show an improved conservation status; and 50% more species assessments under the Birds Directive show a secure or improved status.	Level of achievement of target	2020	0%	50%	100%	150%	200%
Biodiversity	EU Biodiversity to 2020	ecosystems and their services are maintained and enhanced by establishing green infrastructure and restoring at least 15 % of degraded ecosystems	Level of achievement of target	2020	0%	50%	100%	150%	200%
Biodiversity	EU Biodiversity to 2020	maximise areas under agriculture across grasslands, arable land and permanent crops that are covered by biodiversity-related measures under the CAP	Level of achievement of target	2020	0%	50%	100%	150%	200%
Biodiversity	EU Biodiversity to 2020	Forest Management Plans are in place for all forests that are publicly owned and for forest above a certain size	Level of achievement of target	2020	0%	50%	100%	150%	200%
Biodiversity	EU Biodiversity to 2020	Invasive Alien Species and their pathways are identified and prioritised, priority species are controlled or eradicated, and pathways are managed to prevent the introduction of ne ones.	Level of achievement of target	2020	0%	50%	100%	150%	200%
Biodiversity	EU Biodiversity to 2020	the EU has stepped up its contribution to averting global biodiversity loss	Level of achievement of target	2020	0%	50%	100%	150%	200%
Recycling	The Roadmap to a Resource Efficient Europe - "The Roadmap"	50% of reuse/recycling of municipal waste	% of municipal waste	2020			50%	75%	100%
Recycling	The Roadmap to a Resource Efficient Europe - "The Roadmap"	70% of reuse/recycling/recovery of construction and demolition waste	% of construction waste	2020			70%	90%	100%

Maps

Illustration 26 Evolution of macro magnitudes 2010 – 2030: population and gross domestic product

Population change 2010 – 2030 (MULTIPOLES, Baseline)



Annual population change (Units: %)

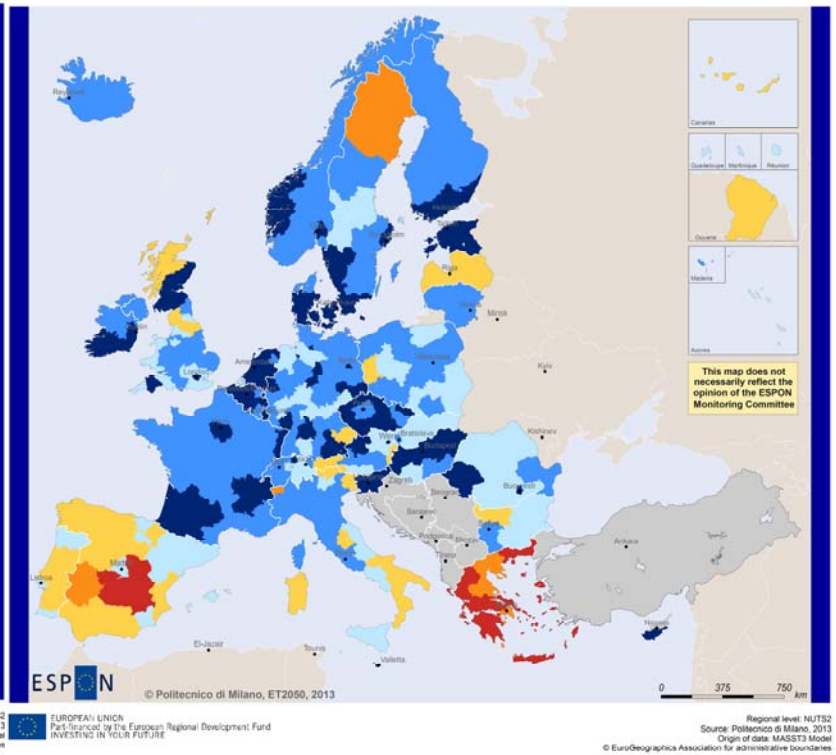
Results obtained by MULTIPOLES forecast model

- < -0,5%
- -0,5% - 0%
- 0% - 0,5%
- 0,5% - 1%
- > 1%
- No data

European population growth will tend towards stabilisation. Total population (ESPON Space) will grow from 514 million in 2010 to 530 million in 2030.

MULTIPOLES is a cohort-component population dynamics model. It is used for the simulations of complex hierarchical multiregional, multi-country population systems; for analysing impact of various scenarios concerning migration, fertility, and mortality.

GDP growth 2010 – 2030 (MASST3, Baseline)



GDP Growth annual average rate (Units: %)

Results obtained by MASST3 forecast model

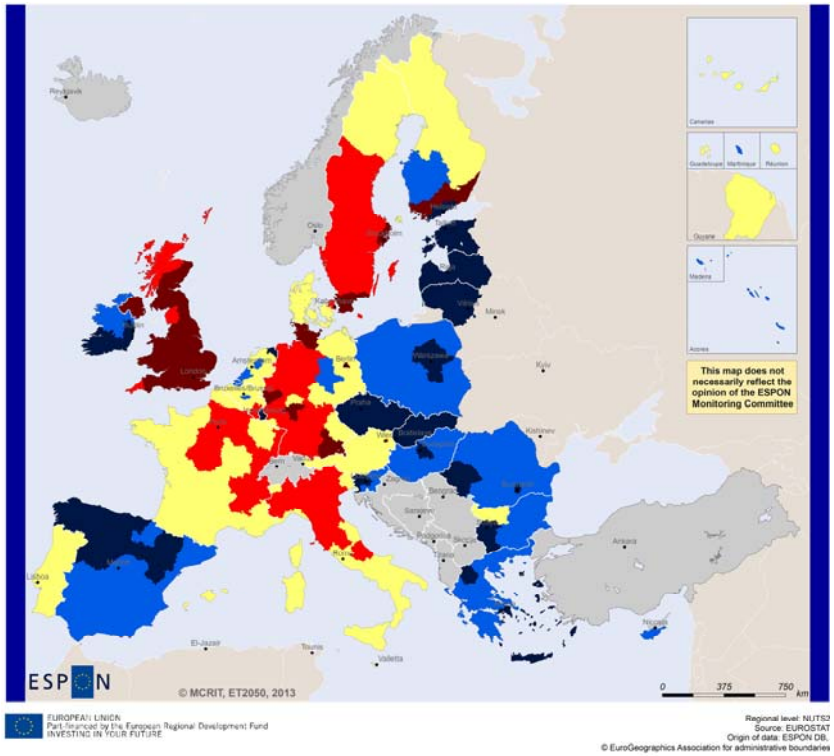
- < 0%
- 0% - 0,5%
- 0,5% - 1%
- 1% - 1,5%
- 1,5% - 2%
- > 2%
- No data

Economic growth at very different speeds, leading to an increase in inter-regional economic disparities. Number of regions below to 1% of GDP growth: 45 (16%). ESPON Space annual average GDP growth rate:1.89%

MASST3 is an econometric, macroeconomic, sectoral, social and territorial model. It has been upgraded to explicitly take into account the impact of the current economic crisis.

Illustration 27 Impact on GDP per capita: from regional convergence to increasing disparities after the crisis

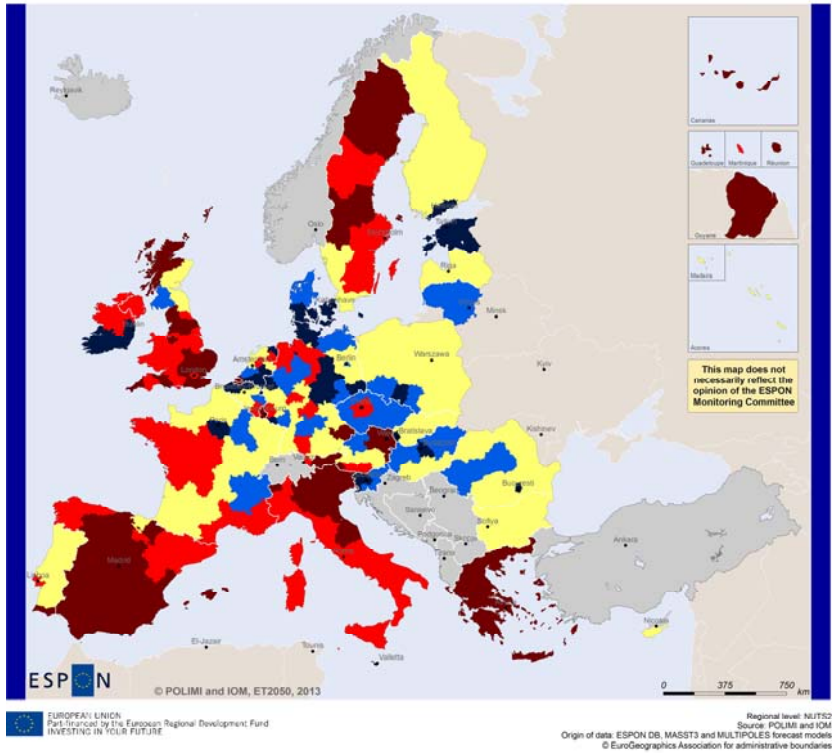
GDP per capita change 2000 – 2008 (EUROSTAT)



Relative change in GDP per capita growth in relation to EU27 average

- < -15%
- -15% - -5%
- -5% - 5%
- 5% - 15%
- > 15%
- No data

GDP per capita change 2008 – 2030 (Baseline) (MULTIPOLES and MASST3)

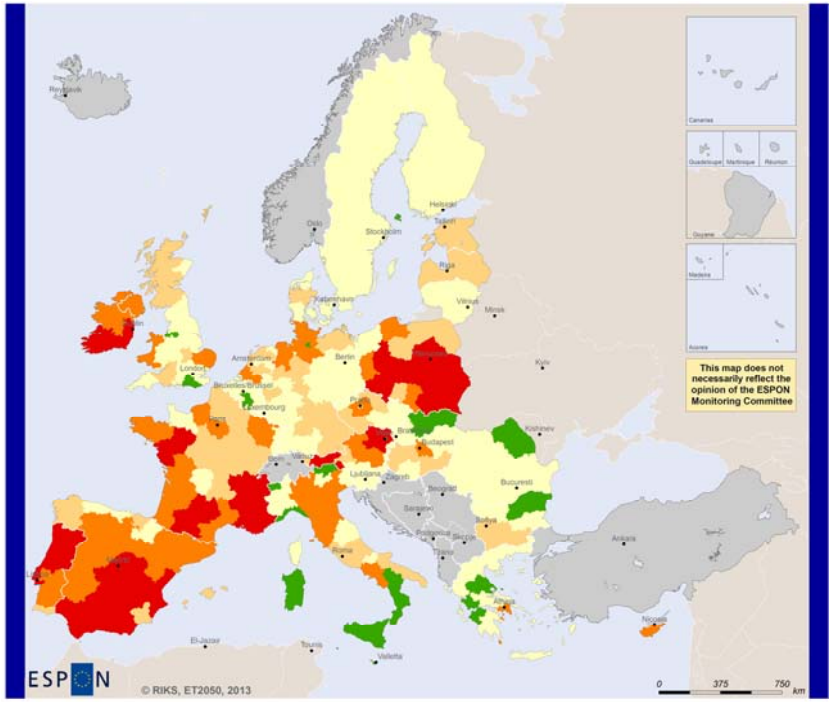


Relative change in GDP per capita growth in relation to EU27 average
Results obtained by MASST3 (Economy) and MULTIPOLES (Demography) forecast models

- < -15%
- -15% - -5%
- -5% - 5%
- 5% - 15%
- > 15%
- No data

Illustration 28 Annual land take (Residential tourism not included).

Annual land take 2000 – 2006 (CORINE Land cover)

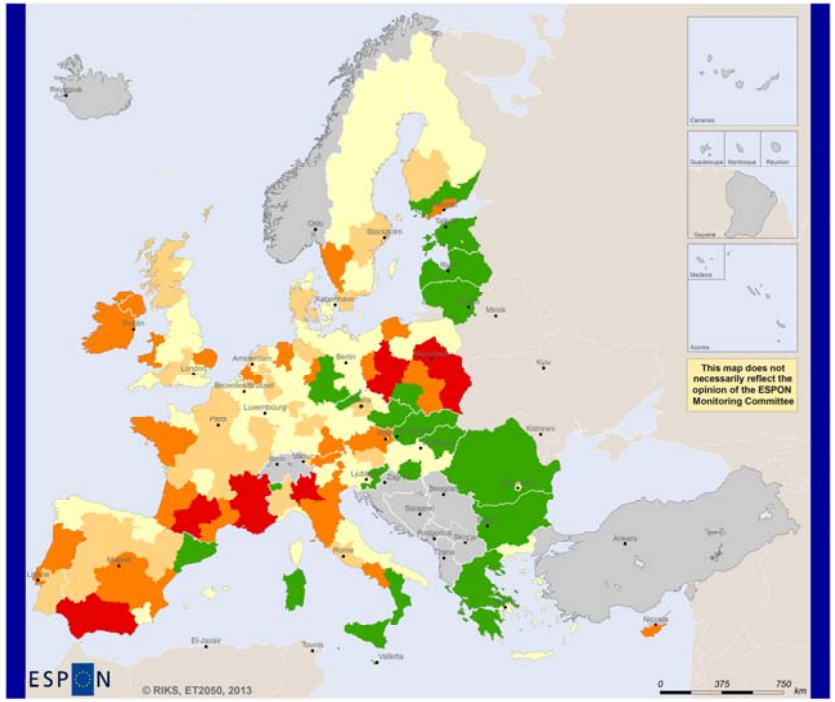


Annual land take 2000 - 2006 (Units: km2/ year)

Results obtained by METRONAMICA forecast model

- -8 - 0
- 1 - 4
- 5 - 8
- 9 - 16
- 17 - 50
- No data

Annual land take 2010 – 2030 (Baseline) (METRONAMICA)



Annual land take 2010 - 2030 (Units: km2/ year)

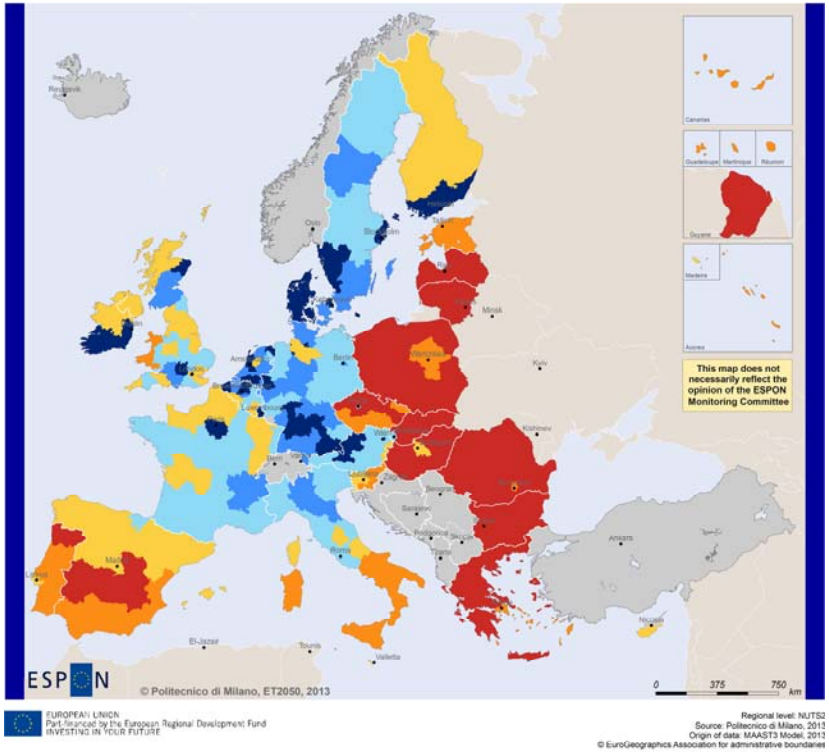
Results obtained by METRONAMICA forecast model

- -30 - 0
- 1 - 4
- 5 - 8
- 9 - 16
- 17 - 32
- No data

(*) Note: Negative land take values are to be seen as a potential based on expected economic and demographic trends (low GDP growth, diminishing population). The materialisation of such reductions depends as much on the materialisation of these forecasts as on the application of policies in relation to empty buildings (e.g. abandonment, demolishment, conservation…)

Illustration 29 Regional Economic Gap in scenario B for 2030 (according to MASST3) and scenario C2 for 2050 (according to SASI).

Regional Economic Gap 2030 (Scenario B) (MASST3)

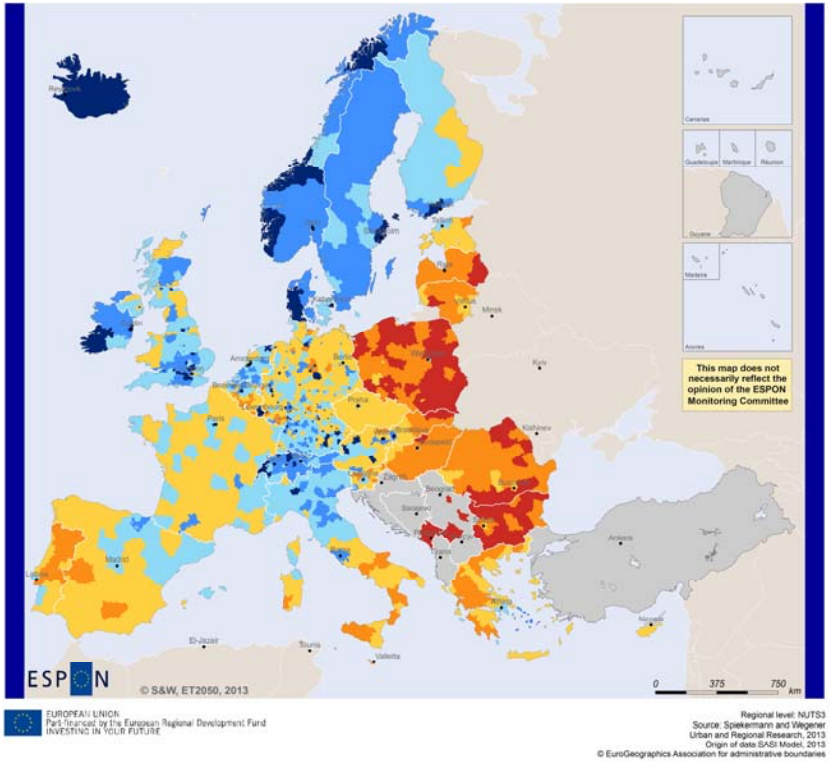


Dispersion from EU GDP per capita average 2030 (Units: %)

Results obtained by MASST3 forecast model

- < 50%
- 51% - 75%
- 76% - 100%
- 101% - 125%
- 126% - 150%
- > 150%
- No data

Regional Economic Gap 2050 (Scenario C2) (SASI)



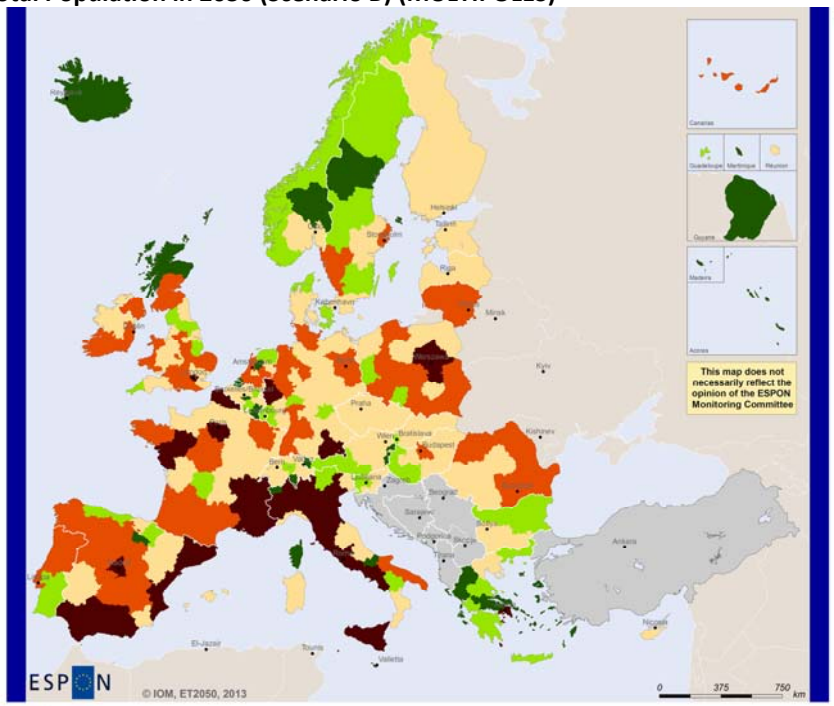
Dispersion from EU GDP per capita average 2050 (Units: %)

Results obtained by SASI forecast model

- < 50%
- 51% - 75%
- 76% - 100%
- 101% - 125%
- 126% - 150%
- > 150%
- No data

Illustration 30 Population change in scenario B for 2030 and scenario C2 for 2050.

Total Population in 2030 (Scenario B) (MULTIPOLES)

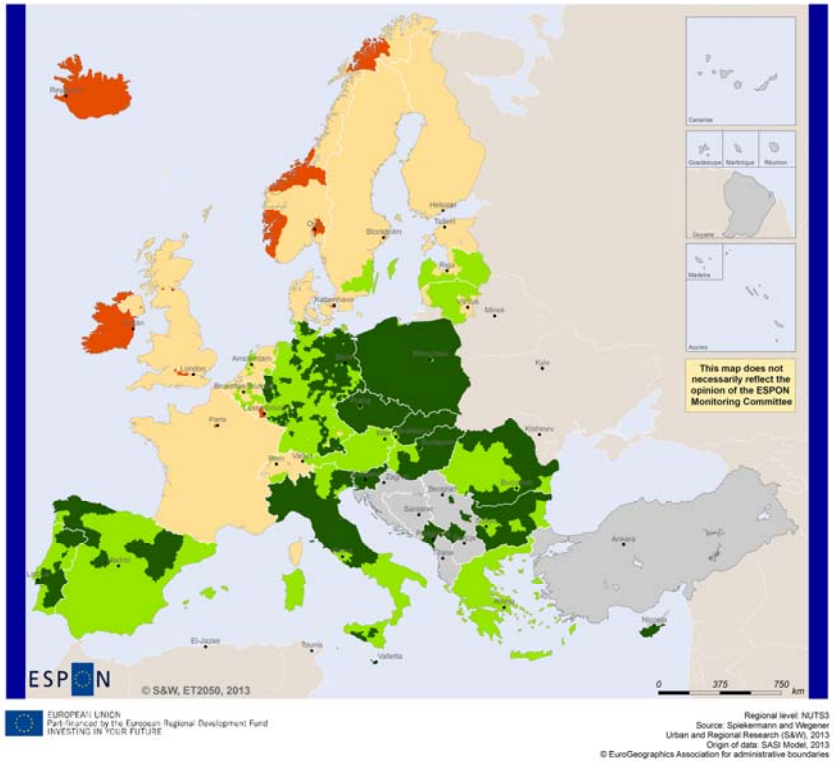


Population at regional level 2030 (Units: Million inhabitants)

Results obtained by MULTIPOLES forecast model

- < 0.5
- 0.5 - 1
- 1 - 2
- 2 - 4
- > 4
- No data

Population Change by 2050 (Scenario C2) (SASI)



Total population change (Units: %)

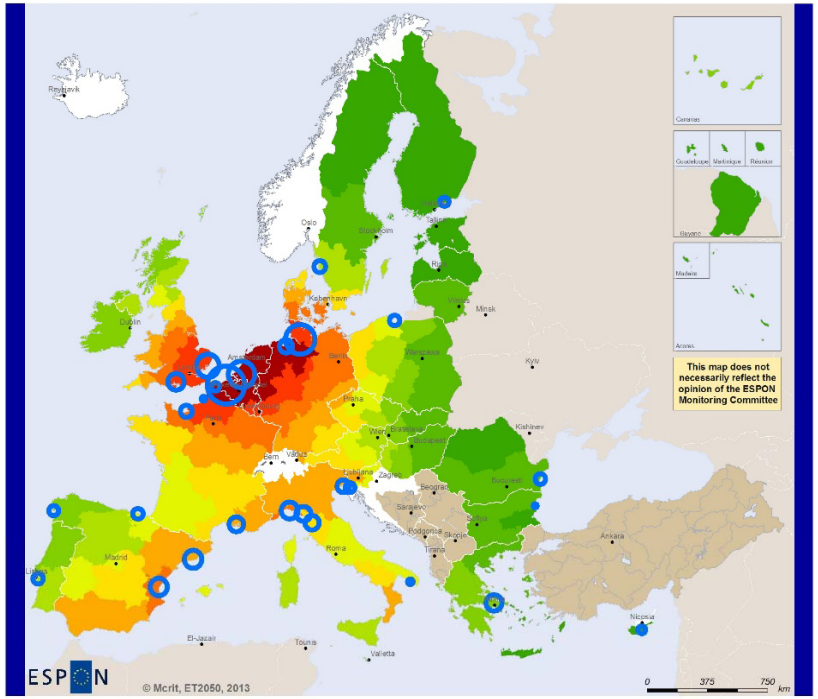
Results obtained by SASI forecast model

- < -7,5%
- -7,4% - 0%
- 0,1% - 7,5%
- > 7,5%
- No data

Illustration 31 Global accessibility 2030 - 2050

Global freight accessibility 2030 (Scenario B) (MOSAIC)

Potential accessibility to large commercial ports



Global freight accessibility (Units: weighted TEUs)

- 656 - 160.000
- 160.001 - 400.000
- 400.001 - 700.000
- 700.001 - 1.100.000
- 1.100.001 - 1.500.000
- 1.500.001 - 2.000.000
- 2.000.001 - 3.000.000
- 3.000.001 - 5.000.000
- 5.000.001 - 8.000.000
- 8.000.001 - 14.700.902
- No data

Port extraEU27 container traffic Mtor

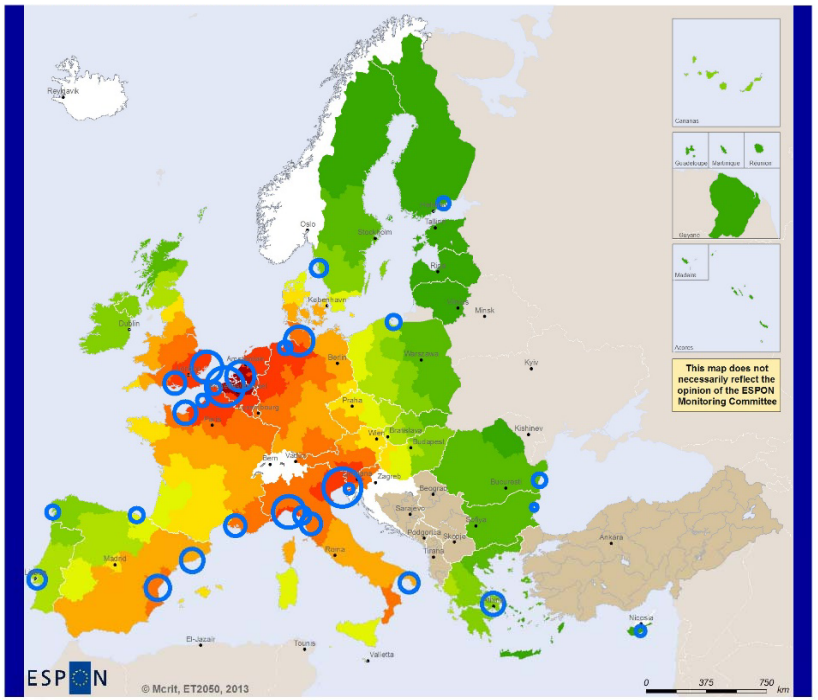
- 1
- 10
- 100

Potential accessibility to standarised containers receptioned or sent outside the EU27 in European ports (unit: weighted TEUs).

Potential formulation as $A_i = \sum W_j \cdot \exp(-8 \cdot c_{ij})$, with W_j TEUs handled at ports contained in destination NUTS2 j; c_{ij} travel time to reach j from i in minutes

Global freight accessibility 2050 (Scenario C2) (MOSAIC)

Potential accessibility to large commercial ports. North/ South traffics to/ from Asia rebalanced



Global freight accessibility (Units: weighted TEUs)

- 658 - 160.000
- 160.001 - 400.000
- 400.001 - 700.000
- 700.001 - 1.100.000
- 1.100.001 - 1.500.000
- 1.500.001 - 2.000.000
- 2.000.001 - 3.000.000
- 3.000.001 - 5.000.000
- 5.000.001 - 8.000.000
- 8.000.001 - 10.320.070
- No data

Port extraEU27 container traffic Mtons

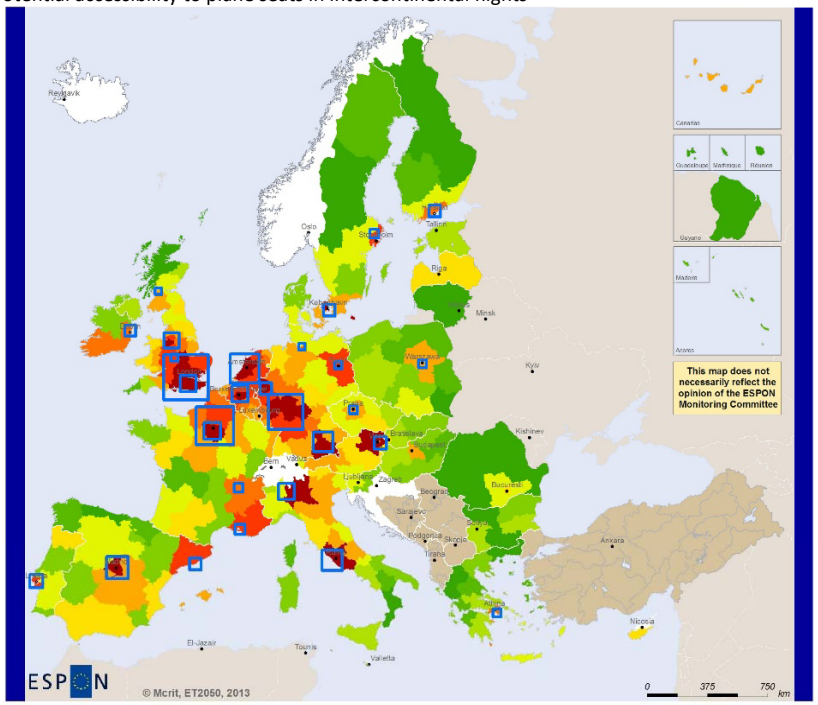
- 1
- 5
- 10

Potential accessibility to standarised containers receptioned or sent outside the EU27 in European ports (unit: weighted TEUs).

Potential formulation as $A_i = \sum W_j \cdot \exp(-8 \cdot c_{ij})$, with W_j TEUs handled at ports contained in destination NUTS2 j; c_{ij} travel time to reach j from i in minutes

Global passenger accessibility 2030 (Scenario B) (MOSAIC)

Potential accessibility to plane seats in intercontinental flights



Global passenger accessibility (Units: weighted seats)

- 311 - 50.000
- 50.001 - 100.000
- 100.001 - 200.000
- 200.001 - 400.000
- 400.001 - 700.000
- 700.001 - 1.000.000
- 1.000.001 - 2.000.000
- 2.000.001 - 3.000.000
- 3.000.001 - 5.000.000
- 5.000.001 - 43.042.574
- No data

Intercontinental passengers

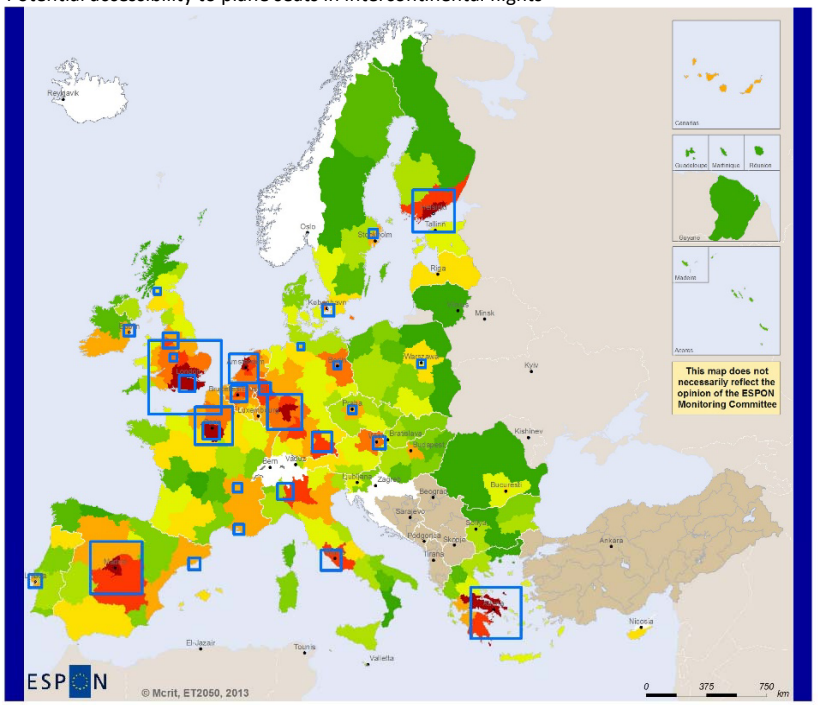
- 1.000.000
- 5.000.000
- 10.000.000

Potential accessibility to seats offered in intercontinental flights departing from and arriving to European airports (unit: weighted seats).

Potential formulation as $A_i = \sum W_j \cdot \exp(-0{,}02 c_{ij})$, with W_j seats in intercontinental flights offered at destination NUTS2 j; c_{ij} travel time to reach j from i in minutes; intercontiental flight seats available at destination are considered proportional to intercontinental passenger demand in airports contained in NUTS2.

Global passenger accessibility 2050 (Scenario C2) (MOSAIC)

Potential accessibility to plane seats in intercontinental flights



Global passenger accessibility (Units: weighted seats)

- 311 - 50.000
- 50.001 - 100.000
- 100.001 - 200.000
- 200.001 - 400.000
- 400.001 - 700.000
- 700.001 - 1.000.000
- 1.000.001 - 2.000.000
- 2.000.001 - 3.000.000
- 3.000.001 - 5.000.000
- 5.000.001 - 49.213.871
- No data

Intercontinental passengers

- 100.000
- 1.000.000
- 10.000.000

Potential accessibility to seats offered in intercontinental flights departing from and arriving to European airports (unit: weighted seats).

Potential formulation as $A_i = \sum W_j \cdot \exp(-0{,}02 c_{ij})$, with W_j seats in intercontinental flights offered at destination NUTS2 j; c_{ij} travel time to reach j from i in minutes; intercontiental flight seats available at destination are considered proportional to intercontinental passenger demand in airports contained in NUTS2.

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