

B. Integrated baseline (trend) scenario

1. Objectives and principles of the integrated baseline scenario

By nature, a baseline scenario is based on the continuation of trends and on the principle that no major changes occur in the policies applied. It is however important to consider that in certain fields, like demography, the evolution over the past decades (structural evolution of the European population, with decreasing fertility rates and mortality rates, leading to population ageing) is also valid for the coming decades, while in other fields (such as energy price), the recent evolution seems more relevant for the future than the past evolution over a longer period. In addition, a baseline scenario has also to consider a number of policy measures adopted recently (such as the Kyoto agreement), even if the impacts of such measures are not yet well known. In other words, a baseline scenario is not identical to the extrapolation into the future of long-range past evolutions.

2. Hypotheses of the integrated baseline scenario

Demography	<ul style="list-style-type: none"> - Fertility down and mortality down => population ageing - Total European population stable (+ enlargement) - Increased, but globally controlled external migration no change on constraints to internal migration
Economy	<ul style="list-style-type: none"> - slowly increasing total activity rate - slowly growing R&D expenditure, but constant technological gap to USA - decrease of public expenditure
Energy	<ul style="list-style-type: none"> - steady increase of energy prices - European consumption stable/decreasing - increase of the use of renewables
Transport	<ul style="list-style-type: none"> - continued growth of all traffic, but curbed by energy price with possible modal shift - constant increase of infrastructure endowment - constant congestion levels - application of the Kyoto Agreement
Rural development	<ul style="list-style-type: none"> - further liberalisation of international trade - increased industrialisation of agricultural production - further diversification of functions of rural areas - strong dualisation of rural areas, however attenuated by the production of biofuels - progressive reduction of CAP budget
Socio-cultural sector	<ul style="list-style-type: none"> - increasing polarisation between socio-cultural groups - growing socio-cultural (ethnic, religious, and social) tensions - heterogeneous policies related to integration
Governance	<ul style="list-style-type: none"> - increasing cooperation between cross-border regions - increase in multi-level and cross-sectoral approaches, but limited to specific programmes (rural development); - maintain of competition and incoherence between policies devoted to innovation and competitiveness and others devoted to cohesion
Climate change	<ul style="list-style-type: none"> - Moderate overall climate change until 2030 (+1°) - Increase of extreme local events - Constant emission levels - Few (too little) structural adaptation measures
Enlargement	<ul style="list-style-type: none"> - by 2008 Bulgaria & Romania - by 2020 Western Balkans (with Croatia acceding first, and relatively soon after 2008) - by 2030 Turkey - continued combination of deepening and widening - modest impact of neighbourhood policy

3. Scenario process

Demographic changes and related territorial impacts

From 2005 onwards, the demographic evolution in Europe shows a basic pattern of accelerated ageing. This pattern is however far from being homogeneous in all European countries and even more in all European regions.

The ageing process already observed in the early 2000s has been amplifying up to 2030, despite a revival of fertility rates in a number of countries¹⁵. Already by 2015 wide areas in Europe (northern half of Italy, northern Spain, Switzerland, Austria, Germany, central parts of Sweden and eastern Finland have reached a median age above 44 years. In 2030, most of European regions, with a few exceptions (western and southern France, England, Ireland, southern Norway, southern Finland and a few regions along the eastern borders of the EU) are in a similar situation. A number of regions, however have then an average median age above 50 years (north-west Spain, northern Italy and Sardinia, Corsica, East-Germany, Scotland, central Sweden). The regions with lowest median age in 2030 are metropolitan regions of Northern and Western Europe like Paris, London, Brussels, Amsterdam, Hamburg, Luxemburg, Stockholm, Helsinki, Oslo, Copenhagen, etc. More generally, population ageing is slower in north-west European regions than in eastern and southern ones.

Life expectancy at birth remains much higher in western than in central and Eastern Europe. The worst situations are observed in Romania and Bulgaria, the most favourable in Southern France, Northern Spain, Italy, Switzerland, Austria, Southern Sweden. Inside Western Europe, only few regions have a relatively low life expectancy (Portugal, Scotland, Wales, Denmark, Northern Greece).

The ISDD (Index of Sustainable Demographic Development) which combines the life expectancy at birth and the median age, represents the 'demographic potential' of regions. Nordic regions, Ireland, the London metropolitan area, Ile-de-France, Rhône Alpes, Nord-Pas de Calais, large part of Benelux have the more favourable situations according to this parameter while the situation in Southern and Eastern Europe is weaker and more contrasted (Cyprus, Crete and North Portugal have a rather strong demographic potential).

The ageing process has many impacts on European society. Larger and larger cohorts of people are retiring from professional life, precisely those born during the baby boom of the 1950s. This significantly influences the labour market. In a context of accelerating globalisation, of progressing knowledge economy and of related economic adjustment and restructuring, demand for highly skilled people is growing in Europe. The shortage of highly skilled people becomes therefore accentuated, despite the fact that the proportion of university graduates is higher in the new generations. Competition between the regions for attracting young skilled people is increasing, not only within the individual European countries but also in the cross-border context and, more generally, at transnational level. Pressures are exerted on governments by large companies to facilitate the immigration of young skilled people, while trade unions are fighting in the opposite direction. The large number of retirees is however only a very partial solution to unemployment problems because of the too high share of people without sufficient qualification to successfully integrate the labour market and of the large number of illegally employed low-skilled people. A positive impact of population ageing on the labour market is however the growing demand for workforce in the sectors of health care and of social and cultural services for the elderly.

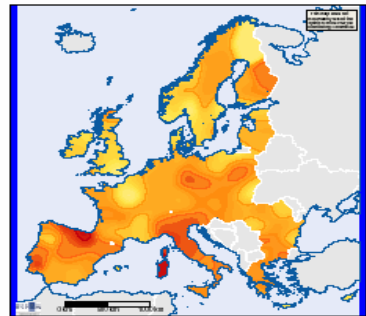
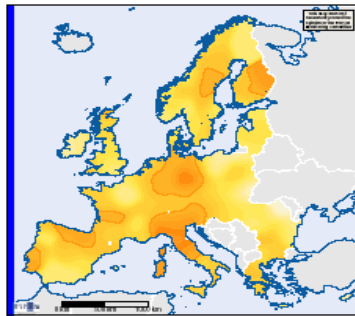
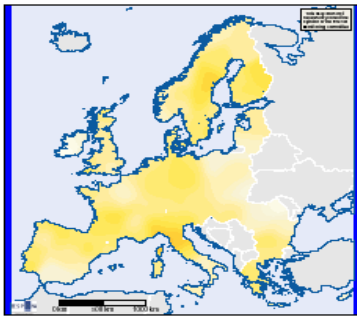
¹⁵ The method used for the calculations is described in Appendix 1

BASELINE SCENARIO

2000

2015

2030



Projections based on data from UNPP 2004, ESPON database 2005 and ULB 1991

Grasland C., Guerin M., Lambert N. (2006) - UMS BIATE - ESPON project 3.2

Median age (years)

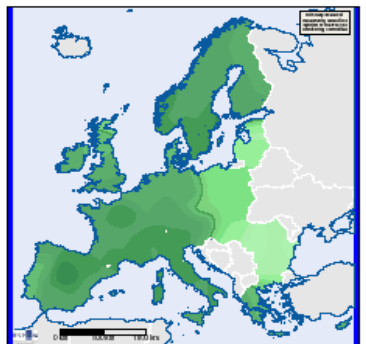
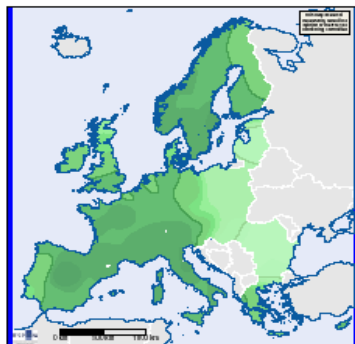
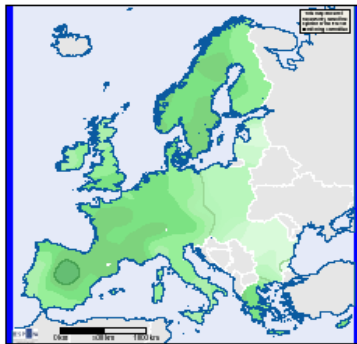


BASELINE SCENARIO

2000

2015

2030



Projections based on data from UNPP 2004, ESPON database 2005 and ULB 1991

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Life expectancy at birth (years)

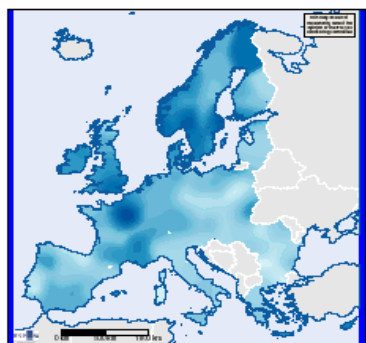
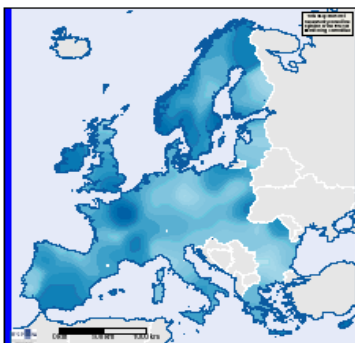
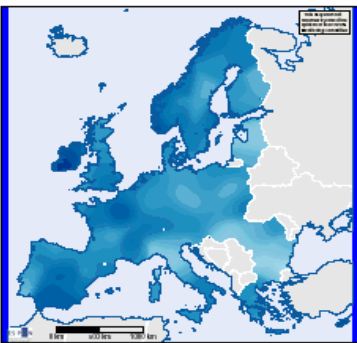


BASELINE SCENARIO

2000

2015

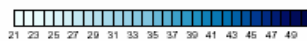
2030



Projections based on data from UNPP 2004, ESPON database 2005 and ULB 1991

Grasland C., Guerin M., Lambert N. (2006) - UMS BIATE - ESPON project 3.2

Index of Sustainable Demographic Development (years)



A closer examination of the demographic evolution at more regional and local scales reveals widely diverging situations. Population is generally growing in metropolitan areas, both in western and Eastern Europe, under the combined effect of higher fertility rates and of the attraction of migrants in relation to the development of advanced economic activities, with a number of exceptions generally in old industrial regions. The knowledge economy favours metropolitan regions, both in western and in Eastern Europe. Large cities also attract the major part of unskilled immigrants. At the opposite, a quite significant number of rural regions in the eastern and western peripheries, but also in some central parts of Europe (especially in Germany, central and northern Italy), are becoming more and more depopulated under the effects of advanced population ageing and/or of the out-migration of younger age groups. This trend is particularly significant in most parts of central and Eastern Europe and in the Western European peripheries (with some exceptions like Andalusia, Ireland, most parts of Finland and of Portugal, central Scotland). The progressive decline of public and private services in these areas accelerates the depopulation process. In between, one can find a large diversity of situations.

A quite large number of attractive rural or medium-density areas, especially in Western Europe are subject to population increase, as a result of the migration of retired people and of free-lance workers from large cities towards areas with a better environment. In this respect, coastal areas are particularly favoured as well as the piedmonts of mountain regions. Movements of retired population mainly to sunnier, Mediterranean and Atlantic coastal areas can be observed, especially in France, Belgium and the UK. Daily commuters from the large cities also contribute to the densification of attractive rural areas surrounding the agglomerations. The regular influx of newcomers counterbalances natural population decline in a number of these attractive areas. Even in a context of general ageing, they can thus achieve demographic stabilisation in the long term. There are however also numerous areas with low or intermediate density where the stabilisation process cannot cope, after 2010/2015, with the natural decline of the population and where, accordingly, population is lastingly declining. In a number of these regions, the situation is not tragic, but the number of empty houses and dwellings increases. In others, demographic decline is stronger and has detrimental impacts on the vitality and attractiveness of the whole region, because the quality of public and private services is declining and new investments are barely made, a process which accelerates the ageing of buildings and infrastructures. The number and size of derelict areas increases. This type of evolution can be observed in central and Eastern Europe, outside of large cities, but also in a number of West-European intermediate regions.

Immigration from outside Europe is contained by public policies, but not really stopped. The process of illegal immigration continues, bringing into Europe mainly people with low education and skill level who are facing tremendous difficulties to become integrated into the society and the labour market because of their legal status. The European Mediterranean regions, especially in Spain, Italy, Greece, France and Cyprus are subject to strong immigration pressure. Luxemburg is also observing increasing immigration, in particular from Portugal. In the countries of central and Eastern Europe, immigration from countries farther in the east (Asia, Caucasus, Middle East) intensifies. Legal immigration of skilled people is being organised by a number of countries where the shortage of skilled labour is stronger, such as Germany, the UK or France. Immigrants generally locate in large cities, not only because of better employment opportunities, but also because of the presence of ethnic and cultural communities which alleviate the constraints of integration. After 2010/2015, a larger number of immigrants also locate in intermediate and rural regions, because of better housing opportunities and of the possibility of self-sufficient economies. The development of ethnic communities progresses in these regions also.

The socio-economic integration of specific population groups (in many cases young generations of non-European origin) progressively becomes a serious issue in numerous European countries and generates socio-cultural manifestations. Youth unemployment is the main cause and it favours the development of ethnic/religious communities. Although the failure in socio-economic (and sometimes socio-cultural) integration is not strictly related to the share of population of foreign, non-European origin, it can however be observed in numerous European metropolitan areas that the importance of population groups of foreign origin is growing. A Europe-wide awareness of this issue develops after the riots in French suburbs in the fall of 2005. Measures are being taken at local level, but incoherently and with insufficient resources to really alleviate and solve the

problems. Periodically, violent manifestations and riots take place in the metropolitan areas. Reactions to this take various shapes, from political radicalism and increasing xenophobia up to the development of protective measures, including population moves towards the rural areas surrounding cities or the development of gated communities near large cities and in high-level tourist and retirement areas. The counterpart of this evolution is the development of derelict sites with multiple deprivation in cities and suburbs. Socio-economic dualisation and socio-spatial segregation is progressing in numerous European cities.

The EU enlargements to Bulgaria, Romania and Croatia do not change significantly the general trends observed in the rest of the EU. These three countries are also facing a trend of population ageing similar to that of most other European countries. Out-migration from these countries towards Western Europe is however stronger after 2010, because of diverging income levels and employment opportunities.

Economy and technology

Globalization is an ongoing process stretching over the period until 2030, driven by declining transaction costs and a growing openness of the markets for capital, goods and services. Not only trade flows are growing between Europe and non-European countries, but intercontinental interactions in the ownership of businesses are also significantly developing. While a number of European enterprises become world leaders in their specific sector and stretch their activities on other continents, large parts of the European economy are owned or controlled by non-European multinational enterprises. The international division of labour undergoes further progress and the competition among regions becomes stronger. Specialization benefits regions which show relative advantages in terms of factor endowment. For capital-intensive industries, the regions inside the pentagon show locational advantages, whereas the regions outside the pentagon – with few exceptions in the form of some metropolitan areas – show locational disadvantages. Under the influence of globalisation, adjustment and restructuring of the European economy is progressing, but Europe does not draw optimal advantages from the process because of insufficient competitiveness compared with other advanced economies at world scale. The relocation and closing down of certain types of businesses goes on and remains for a long time a source of concern, in particular because of the territorial imbalances generated.

The global European policy tries to cope with the challenge of both widening the EU and deepening the integration process. Bulgaria and Romania enter the EU by 2008 and later on Croatia (the entry negotiations started in autumn 2005). The adoption of the 'acquis communautaire' in the new member countries allows to reduce transaction costs, with a positive impact on trade and on FDI. Europe as a whole benefits from the new enlargements. For capital mobility, the enlargement of May 2004 created favourable conditions while labour mobility is hampered longer as primarily intended by interim arrangements. Although restrictions of labour mobility are progressively given up by various EU-15 countries, re-location of firms towards the new member states continues. Losses of jobs with medium and low-skill requirements concern a number of EU-15 regions. As the new member states (May 2004 and later) absorb large parts of the EU-structural funds, in a medium-term perspective (after 2013) the funding for objective-1 regions in the EU-15 becomes very limited. The 'battle' for scarce EU funding which already came up after 2000 leads to a situation where neither a sufficient progress regarding Europe global competitiveness nor a sufficient degree of territorial cohesion can be reached until 2030.

Technology is progressing in a variety of fields. ICT use in production is rapidly changing the work organization in the business sector. Not only intra-firm procedures are being re-organized with related productivity gains, but the re-organization of inter-firm relationships with customers and suppliers is of even greater importance. Stocks are reduced. Production and logistics become more effectively connected. Large firms are more capable to reap fully the benefits from ICT than small firms which often suffer from limited managerial and financial capacities¹⁶. Since large firms often have a preference to locate in densely populated areas, whereas small firm often are located in

¹⁶ The CIS3 survey delivers some indication for these size related differences (European Commission; Eurostat 2004, p. 42).

areas outside the agglomerated areas, the benefits from ICT use in terms of growing competitiveness and productivity are not evenly distributed among the regions. Significant added value is generated by the networking of efforts, especially in the R&D sector. ICT play also a major part in the internationalisation of services, as well as in public and domestic activities.

Biotechnologies are producing a true breakthrough with a wide diversity of applications. Concerning the green biotechnology, the production and cultivation of plants as raw materials for industrial use and industrial production plants are spatially combined in order to reduce transportation costs. Localization and scale economies are being fostered. The expansion of gene-modified products calls for a variety of new activities, including control and certification, R&D as well as separate distribution and logistic channels for gene-modified and traditional products for agriculture and food industries. The cultivation and transformation of energy crops are rapidly developing, leading to mass production of new biofuels. Numerous applications of biotechnologies are also emerging in the field of environmental protection techniques and pharma-industries. Research, development, and production in the field of red biotechnology in regions with public and university research infrastructure is further developing. Agglomeration economies have a positive impact. Employment effects, leading to regional economic growth, increase over time in such privileged regions, especially in highly industrialized regions, where skilled labour force exists as an essential precondition. Grey biotechnologies find new applications, in particular in the new member countries, especially in relation with water purification and supply.

Similarly, nanotechnologies become more widely applied, especially in the field of environment and health protection. High-speed analytical techniques for measuring water quality, nano-based filtration and purification techniques contribute to a less water-intensive production, which in turn reduces internal costs (economies of scale). In order to obtain data on the speed and levels of environmental pollution, self-calibrating, cheap air and water pollution sensors are used to detect various organic and inorganic chemical species. New types of catalysators extract harmful chemicals produced by combustion in cars, aircrafts and power stations. New measurements of physico-chemical properties contribute both to hazard assessment and environmental modeling. A relevant impact of environment-related nanotechnology is that air pollution sensors can manage daily traffic generation and prevent traffic congestion. Waste reduction (especially of food) saves energy and resources (water) by producing less wasteful, and more recyclable, antibacterial 'smart' packaging. Packaging systems are able to monitor and identify contents by controlling appearance/touch of food and provide data on energy to produce and transport (with signaling its location at any time/ logistics of food). Thus, quality of food can be assured and just-in-time logistic systems reinforced. New technologies applied in the energy sector ease mobility and decrease transport costs. The development of power cables, superconductors, quantum conductors of new nano-materials rewire electricity grid and enable long-distance, continental and even international electrical energy transport. The reduction of weight and volume also reduces transport costs. Firms continue to equip their storage because smaller spaces for storages are needed under the effect of miniaturisation.

Although new technologies are further invading Europe, only a modest part of them are generated in Europe which remains dependent upon discoveries, patents and licensing from other continents. The technological gap with the USA, Japan and, increasingly, other Asian countries, remains.

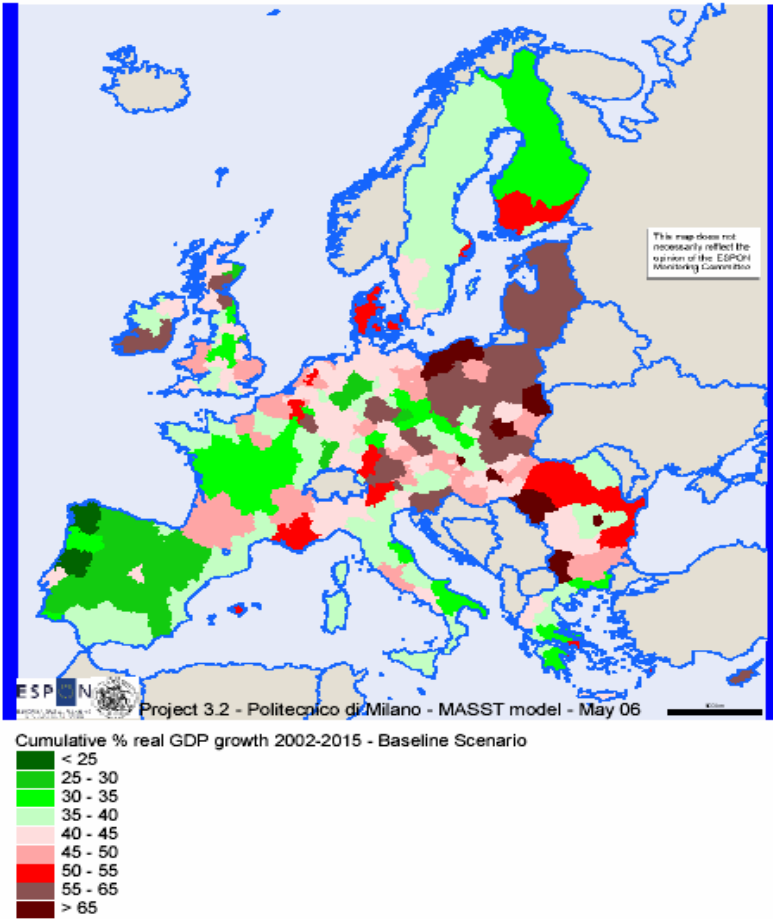
Regional patterns of economic evolution

Simulations carried out with the MASST model¹⁷ provide an insight into the regional pattern of economic development up to 2015. Although the model does not integrate all factors and variables considered in the scenarios, its outputs show the global directions of territorial development and enable the differentiation between winner and loser regions in the development process.

- Considering the cumulative growth of GDP between 2002 and 2015 (Map...), the catching up process of the East-European economies is obvious with regional growth rates largely higher than in West-European regions (clear eastwards shift of the European barycentre of growth). Only a few

¹⁷ A detailed description of the characteristics and limitations of the MASST model is provided in Appendix 2.

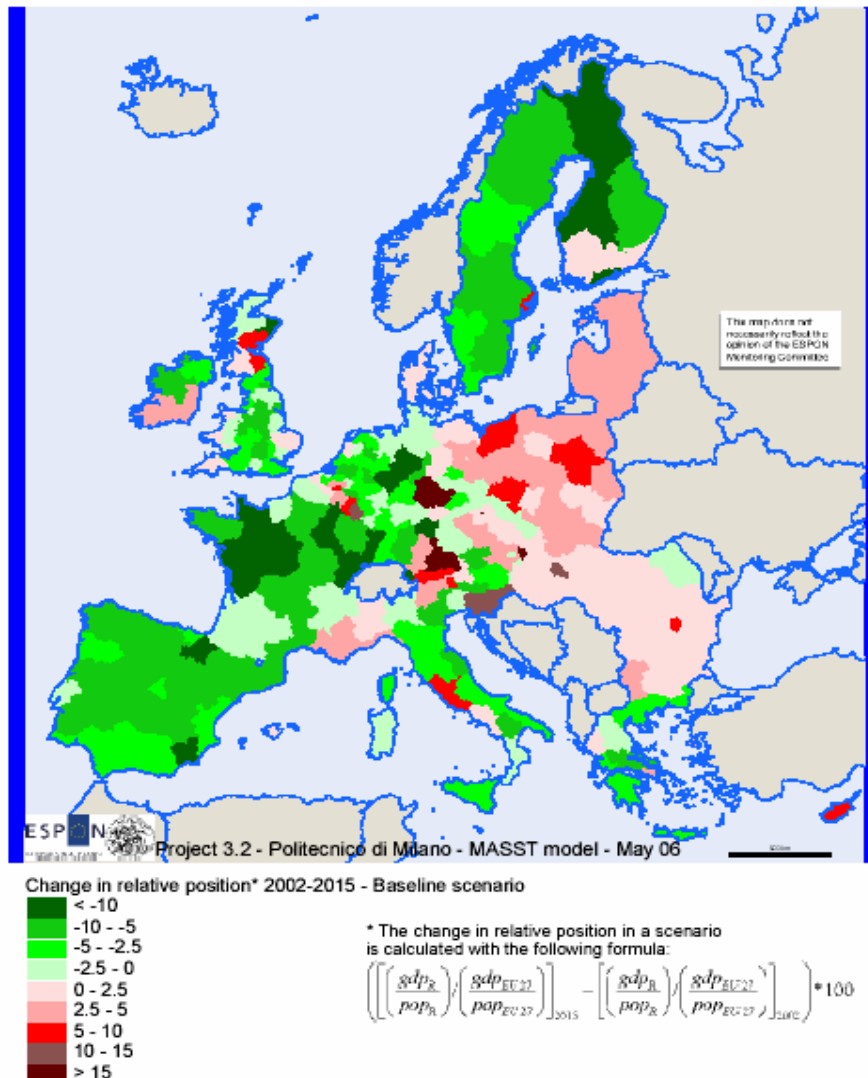
East-European regions show a modest growth rate: those along an axis stretching from Sachsen towards western Slovakia (excepting the large metropolitan areas) and a few regions in Romania. Growth is particularly significant in the Baltic States, Poland, eastern Slovakia, western regions of Romania and Bulgaria and Cyprus in the eastern Mediterranean. In Western Europe, the development pattern is more diversified. One can observe a greater performance of the Eastern border regions in Western European (EU-15) countries, from Denmark to Germany and Austria, accompanied by a general slow-down in the growth of more peripheral countries and southern regions. While most regions of the pentagon show sustained, but not top economic development, especially those with large metropolitan areas such as London, Paris, Milan, Hamburg, Frankfurt, Düsseldorf, Stuttgart and Munich (exceptions are eastern France and some German regions), a number of regions surrounding the pentagon perform less favourably, such as those of central and western France, the 'Third Italy', the Midlands, but others show stronger economic performances than most pentagon regions: the French southern belt, all Danish regions and a cluster with particularly strong growth along the Brenner axis, encompassing the Munich metropolitan region, western Austria and the eastern Alps in Italy. In the western periphery, higher or medium growth rates are observed in regions with metropolitan areas (Dublin region, central Scotland, metropolitan regions of Lisbon, Madrid, Rome Naples, Athens, Stockholm, southern Finland) and in some less urbanised regions (southern Ireland, northern Ireland, Wales, south-west Sweden), as well as in tourist islands (Balearic Islands, Rhodes, Crete). Large parts of the western periphery show however weak economic performances (most regions of the Iberian Peninsula, of the Nordic countries, of southern Italy and of Greece).



Winner regions¹⁸ (Map...) are mostly present in Eastern countries; within Eastern countries, the most successful areas are the agglomerated regions (namely capital regions and large city

¹⁸ Defined on the basis of the change in the relative position (with respect to the EU 27 mean) in per capita GDP level between 2002 and 2015.

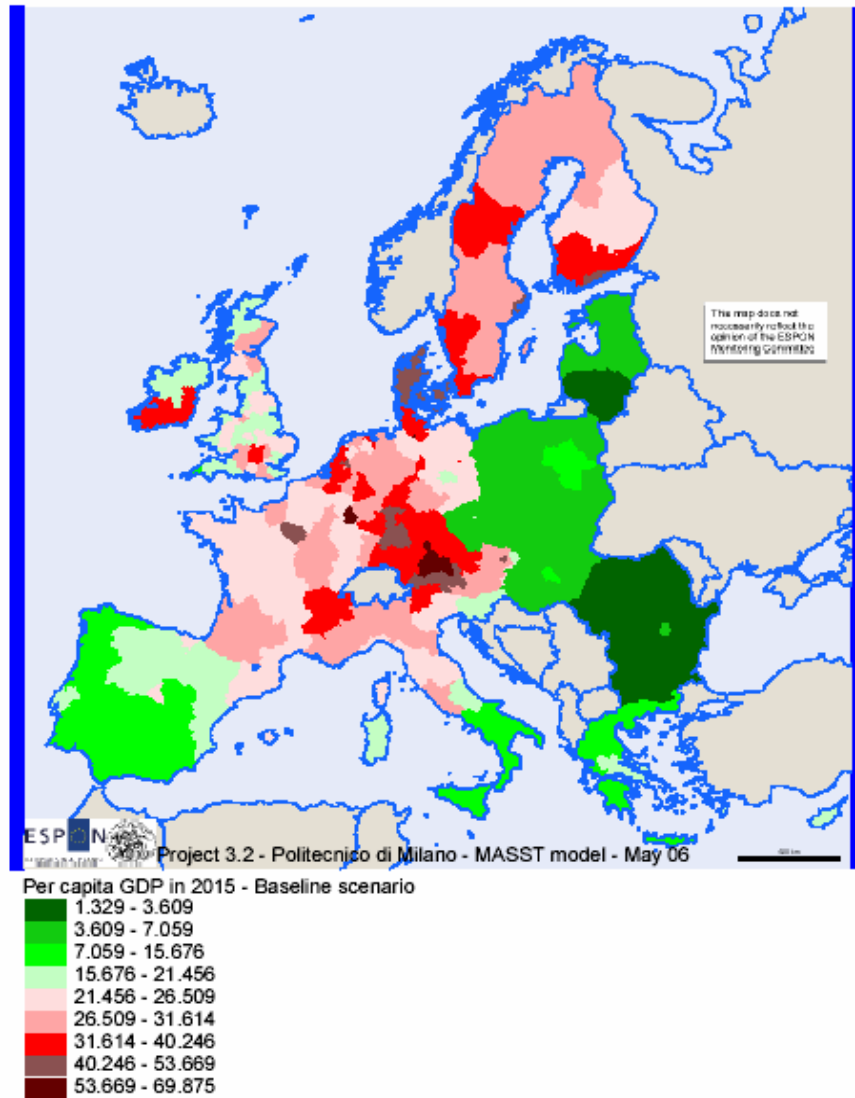
regions). A different picture is presented in Western Europe. In this part of Europe, in general regions lose their relative position with respect to the EU average: the loss is higher in rural areas (central part of France, most of Spain, of Portugal, of Greece), while it is more contained in agglomerated and mega regions like the Pentagon area, Southern England, Southern Ireland, most of Italian and Greek regions, Catalonia, Madrid and Valencia in Spain, Lisbon and Porto (Norte) in Portugal.



The results of the per capita GDP level achieved in 2015 (Map ...), witness additional tendencies, namely:

- *the catching-up of Eastern countries remains rather incomplete, since the East-West per-capita GDP differential will persist in the future. Among Eastern countries, the lowest level of per capita GDP is registered in Romania and Bulgaria;*
- regional disparities will very slightly decrease in the baseline scenario, as a result of two opposite tendencies: a decrease of the disparities among countries, counterbalanced by an increase of the disparities within countries (see the Theil index in Fig. 1);
- *peripheral regions of Western countries confirm their lower income level with respect to the EU average: Greece, Southern Italy, Spain (with the exception of Madrid), Portugal, Northern Ireland still demonstrate their weakness, despite the assumption that the structural and cohesion funds are maintained;*

- *the Pentagon area maintains its relatively high income level, together with France and Northern and Central Italy;*
- *the highest per capita income level is measured in Central-Southern Europe, and in particular in Southern Germany and Austria, and also in regions like the Randstad-Holland, Southern Ireland, Denmark and some southern regions of Scandinavian countries.*



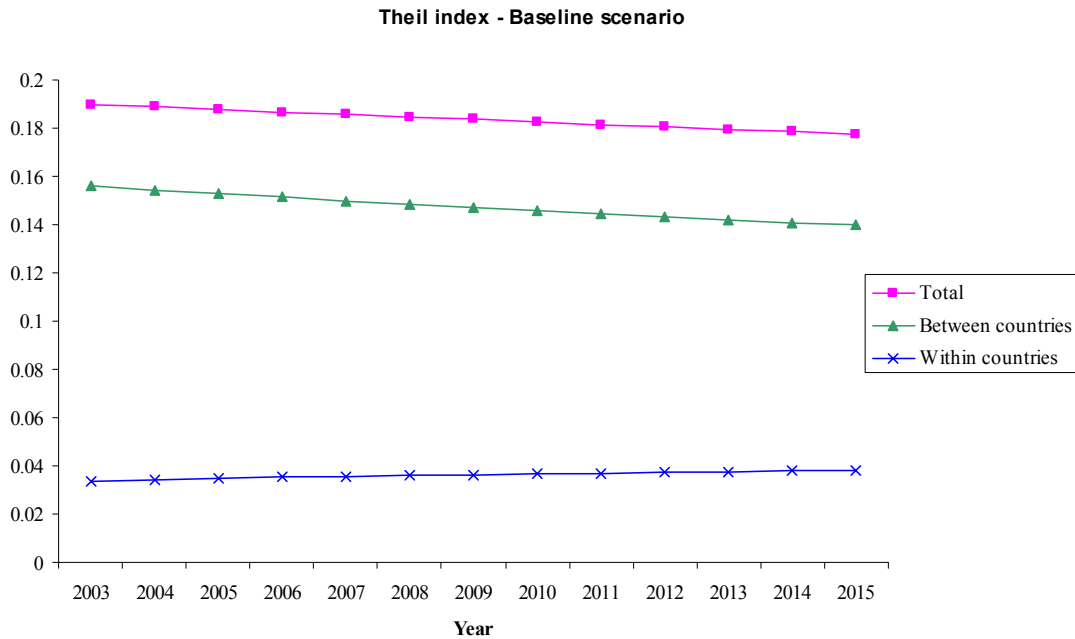


Fig. 1 – Regional Disparities in the Baseline Scenario

Thanks to a continuation of European support, a number of regions along internal borders emerge as zones of integration and cooperation.. However, the results are very different, depending primarily on the economic, social and cultural situation *and* on the history of the respective borders. Within the European Union, barriers for cross-border mobility in the fields of infrastructure and institutions, which still existed at the beginning of the 21st century, have been, to a large extent, abolished in the meantime, although the lack of appropriate cross-border transport infrastructure is still affecting integration along specific borders, such as that between Romania and Bulgaria. Internal border-regions where prospering development cores with a diversified business landscape existed at the beginning of the 21st century, emerge as 'integration zones', i. e. spaces of intensive inter-firm cooperation (e. g. the Saar-Lor-Lux-Region, the Upper Rhine Region, the Country-Triangle CZ-PL-D (Euroregion Neißة). However, in border regions, where the endowment with factors of economic growth is rather poor, the quality and intensity of inter-firm cross-border cooperation remains low, whereas inter-municipal cooperation is evolving relatively successfully (e.g. along large parts of the German-Polish-border). In economic terms, many of these economically weak border regions are still pure transport corridors whereas economic cooperation takes primarily place between the agglomerations of the hinterland. The continuing European support for the border regions contributes much to the positive changes along the internal borders. Beneficiaries are primarily the better-off border regions which have since long practised cooperation. However, policy measures are not capable to tackle hindrances for cross border cooperation which are primarily of intangible, mental character. Overcoming the 'barriers in the brains' takes decades, as the experiences along the German-Polish and German Czech border show.

Contrary to the internal borders, the quality and intensity of cross-border cooperation along the external borders is still significantly lower, since strict border-control-procedures set limitations for cross-border mobility. Furthermore, deficits in terms of infrastructure (both border crossing infrastructure and accessibility of the hinterland) set limitations for the evolution of – desired – 'cooperation spaces'. Whereas many internal border regions tend to become spaces of integration and cooperation, the majority of regions along external borders remain 'spaces of division'. The most problematic regions remain the border areas between Poland and Belarus, Poland and Ukraine, Hungary and Ukraine, Slovakia and Ukraine, and (after 2008) Romania and both Moldova and Ukraine. In all of these areas, the existence of an ancient 'informal' and transient economy, added to the incongruence between ethnic, social, and even family patterns and national borders,

makes a rigid implementation of the Schengen Border Control Regime politically problematic for the Member States involved. Their reticence over this issue however causes major concern in the former EU-15 countries where security concerns predominate.

Up to 2015, the pattern of regional economic development is one of continuing the catching up process in all new member countries, with more or less intensity. After 2015, the pattern of growth accentuates the contrast between metropolitan and non-metropolitan areas, both in western and Eastern Europe. This process of differentiation was also observed up to 2015 within the pentagon, the growth of which was not homogenous. Stronger differentiation can also be observed after 2015 among rural areas, with some being rather wealthy on the basis of residential and tourist functions, especially related to the attraction of retired people, others being devoted to intensive agricultural production and others again being subject to depopulation and marginalisation.

Unemployment in the new member states, in Spain, Eastern Germany and Southern Italy remains substantially higher than in the core areas of the EU. In the new member states, Structural Funds resources are being spent mostly on infrastructure, transport and environmental improvements, which does not raise employment substantially. FDI establishes highly mechanized and automatised plants with relatively few workplaces, while – at least in some countries such as the Baltic States, Poland, Romania, and Bulgaria – agriculture sets free a large number of people. Another factor generating unemployment is the fact that these countries, in order to join the euro-zone, have to apply a strict austerity economic policy, and to achieve low inflation in a relatively short time which, according to the rule of the Philips curve, does not promote employment. In the richer countries and regions of the EU, unemployment and labour shortage are simultaneously present. Unemployment, because priority is given to low inflation, balanced budget and exchange rate stability, also in medium term, and this – perhaps to a lesser extent than in the new member states, but still significantly – limits growth and employment. And labour shortage will emerge, partly for demographic reasons – the post-war baby-boom generation is entering the retirement age – partly because social care enables for unemployed people to refuse low-wage and low-prestige jobs and immigration remains under strict control and limitation.

With regard to rural areas, the influence of CAP reform¹⁹ – coupled with movements in product prices in the global market that favours bulk production in non-European countries (cereals and sugar in Brazil, meat in Argentina and Australia, etc.) – means that European agriculture follows a triple tendency: bulk production, niche-market development for high value products (taking advantage of high-productivity know-how, such as is required for organic farming) and extensive management of semi-natural areas (principally through grazing). Agricultural production remains concentrated in the central regions of the EU, both in terms of gross yields and net returns; the growth in yields increases rapidly in the eastern part of the EU, however. The relative importance among agricultural commodities increasingly depends on factor markets at the world level.

On a longer term perspective, CAP budgets are being reduced and resources progressively shifted from Pillar 1 to Pillar 2. The macro-economic impacts are considerable. The enormous transfers from consumers and taxpayers to agriculture – more than €120 billion in 1999 – are being reduced to approximately € 60 billion. The reduction by 50% of import tariffs and the abolition of export subsidies enable the developing countries at last to generate approximately € 10 billion more extra welfare per year. The budget for Pillar 1 is being reduced from € 37.5 billion in 2005 to € 20 billion in 2030 (almost 50%). Pillar 1 resources are exclusively used for direct payments to farmers and market support has been abolished. The Pillar 2 budget, however, is subsequently increased from € 7.5 billion in 2005 to € 20 billion in 2030 (250%). Intensification and scaling-up of agricultural production in fertile areas are stimulated by the further liberalisation of agricultural production and the progressive reduction of the CAP budget. On the other hand, experience farming increases in rural areas located in urbanized regions and in rural areas with small-scale landscapes in the Pentagon and in Eastern and Southern Europe. Consumers are willing to pay a higher share of their income for organic, regional and other quality products. The increase of rural development

¹⁹ Scenar 2020 pp. 48-50. Scenario study on agriculture and the rural world. European Centre for Nature conservation et alia. First interim report March 2006. European Commission.

programmes and the growing demand for environmental quality stimulate agrarian nature and landscape management, particularly in small-scale landscapes. Subsistence farming in the peripheral regions of the CEECs is significantly being reduced.

Rural areas where agriculture dominates generally diversify, but not everywhere. In the fertile areas of France, Germany and Central Europe, agricultural production modernizes further. In these areas food production competes with the production of energy crops. In Eastern and Southern Europe, numerous rural areas, stimulated by RDP and the SF's, also become economically more diversified. This applies for instance to areas attractive for tourism (Spain). It should however not be overlooked that only a part of the southern and eastern rural areas are diversifying, while others are declining. In an increasing number of rural areas where the demographic situation (high level of population ageing), the production conditions (low level of soil fertility, increasing drought) and the attractiveness are unfavourable; marginalisation and abandonment progress. This type of evolution is to be found both in Western and Eastern Europe.

A strong driver for the future of the rural world is demography. There are significant out-migration flows of young people from various southern, northern and eastern rural areas of the European Union, and their destinations are not only the urban centres at the national level, but also the major service sector centres of the EU as a whole. Many rural areas elsewhere are, nevertheless, in a healthy state, both keeping and receiving population; some of the new population results from the residential relocation of people with generally higher income moving out of urban centres in contrast to a contrary migration of younger persons seeking work or higher education in cities.

Urban-rural partnerships further intensify in a number of regions. The promotion of public interests is concentrated on the strengthening of local competitiveness by investing in infrastructure, industrial estates, residential areas and landscape elements. Cooperation between urban and rural partners takes place on the local and regional level. This happens on a voluntary basis. The subsidiarity principle is loosely implemented. Urban-rural partnerships are relatively open: public authorities, the business sector and NGOs are involved. Cooperation is coherent because of the implementation of some kind of 'open method of coordination' but its effectiveness is limited because of the competition between local authorities and of the lack of binding policy-instruments. Remote rural areas subject to marginalisation and decline are generally not involved in urban-rural partnerships.

Transport

The transport context in Europe in a baseline perspective

The transport situation in the baseline scenario is conditioned by the general economic conditions of modest economic growth in Europe, compared with other industrialised countries and especially with a number of large emerging economies such as China, India or Brazil. Transport flows continue however to grow under the influence of progressing European integration and of accelerating globalisation. In addition, the nature and geographical distribution of flows is changing under the influence of structural evolutions in the economy (progressive move towards a more intangible economy with less heavy industry and more high-tech productions and high-level services) and of EU enlargements.

The sustainable character of increasing energy price (in particular of oil) is a major constraint in the transport sector, both for goods and people's transport. The new energy paradigm has also significant impacts on mobility and on technological development. From 2004 onwards, the behaviour of European citizens regarding mobility has been progressively changing with a new trend of car sharing, the search of residential locations closer to cities and other working areas, more intensive use of public transport, substitution of physical mobility through the use of ICT services.

Mobility is also influenced by the demographic evolution. Population ageing and the increasing number of retirees generate new forms of mobility, very different from the classical home-work relations. This does not mean that mobility significantly decreases (although higher energy prices

work in this direction), but rather that that it is more linked to recreation, cultural activities, travelling, health care etc. The territorial differentiation of demographic structure (more younger generations in metropolitan areas and more retirees in rural areas) is accompanied by a corresponding territorial differentiation of mobility patterns.

Technological evolution plays an important part in the evolution of transport systems in Europe. The network of high-speed trains expands within the pentagon and also in the direction of more peripheral countries (Iberian Peninsula, countries of central and Eastern Europe). A major factor in the boosting of technological evolution is the increase of oil prices. New engine technologies are being developed (hybrid cars, fuel cell engines) which become rapidly popular despite somewhat higher investment costs in the short term. In addition to lower energy consumption, the popularity of these new car generations is also justified by their lower environmental impact. Another sector of technological evolution in transportation is the generalisation of Intelligent Transport Systems, combining information flows and transport flows. Numerous applications are being developed and implemented in a variety of fields such as better guidance of transport flows to optimise the use of infrastructure and to increase security, better management of urban traffic, increased tracing of goods transported, reduction of pollution generated by traffic, improvement of accessibility etc.

Transport policies in the baseline scenario are somewhat contradictory. In line with the objective of sustainable development promoted at EU level throughout the 1990s and with the provisions of the White Paper and of the Kyoto Agreement, a number of measures are being implemented which contribute to alleviating the environmental footprint of transportation, such as road pricing (aiming at a better balance of transport modes), the development of less polluting engines, the promotion of public transport etc. On the other hand, the low economic performance of Europe in the early 2000s and the acceleration of the globalisation process lead a number of countries to adopt a much more liberal market-oriented approach, with a revival of motorway programmes and the abolishment of restrictive measures to road transport.

At EU level, the ERDF and the Cohesion Fund support significantly the development of transport infrastructure in the less developed countries and regions. Main beneficiaries are the new member countries where modernisation of infrastructure is a priority high in the agenda. Main trunk connections between metropolitan areas and between western and Eastern Europe have highest priority, at the expense of more local connections. In central and Eastern Europe, transport systems are evolving at the advantage of roads and motorways. This does not mean that the development and modernisation of transport infrastructure is neglected in the more central regions, especially in the pentagon. The high levels of traffic congestion in and around metropolitan regions as well as on major axes call for the increase of transport capacity and the elimination of bottlenecks. Various governments implement substantial programmes of infrastructure development. More and more public-private partnerships are developed to provide the necessary financial resources. The privatisation of networks is also progressing. Liberalisation is progressing in the railway sector, to reach finally passengers' transportation and urban public transport.

Simulations from the KTEN model

In preparation

Energy

Towards a new energy paradigm

The sudden increase of oil (and gas) prices after 2003 generates a variety of changes in the complexity of energy systems and in attitudes towards energy production and consumption which can be considered as the emergence of a new energy paradigm.

Although the energy intensity of the West-European economies had significantly decreased after the first and the second oil shocks of the 1970s and that of the East-European economies had shown an even stronger decline after 1990, the global energy consumption continued to grow, driven by

steadily increasing transport flows and the growing share of road and air transport, by the growing number of air conditioning facilities in houses and offices etc. By 2005 already, and increasingly in the following years, a number of significant changes can be observed in various fields related to energy consumption. Energy-intensive industries (for instance those producing aluminium or steel) are relocated outside Europe because of too high electricity prices. Numerous industries in East and West invest in energy saving techniques and technologies. Households invest in house insulation and in complementary renewable energy sources. People contain their mobility, develop car-sharing and make more frequent use of public transport services, in particular in home-work relations. The trend of steady increase in energy consumption which prevailed before 2003 can be curbed down mainly under the influence of market forces, but also of subsidies (to public transport, to building insulation) in a number of countries.

Oil shocks and technological innovation have been in the past the most important drivers for diversifying energy supply systems, although in Southern European countries oil dependence is still very high. In the field of technologies, the most important innovation of the post-war period has been the production of electricity out of nuclear energy. The decline of oil price during the 1980s and 1990s has been a constraint for the diversification of energy supply systems. This largely explains why the share of renewable energy sources in total energy supply was so low in the early 2000s (6% out of which 2/3 from hydro-power). The third oil shock is further boosting the process of diversification of energy supply systems from 2004 onwards. Main beneficiaries of this diversification process are the renewable energy sources (solar, wind, biomass and biofuels, geothermal energy, wave and tide hydro-power etc.). Their development is progressing rather significantly throughout Europe following Germany as the front runner country which has already accumulated a substantial know-how and has increased its activities in this field after the government had taken the decision to progressively abandon nuclear energy. Not only the advanced economies of northern Europe engage in the exploitation of renewable energy sources, but also various other peripheral countries and regions of Southern Europe, such as Portugal or Greece.

A significant revival of nuclear electricity production can be observed in numerous European countries thanks to new generations of nuclear power plants and to the pressure of certain lobbies (France, Italy, Slovakia, UK). Experiments are also carried out in the field of coal gasification, but the cost of such processes remains an obstacle for a long time. The production of hydrogen as energy driver also looks promising for the future, but the cost of primary energy (natural gas, electricity) needed to produce hydrogen is a significant handicap to mass production. Nuclear fusion remains a potentiality for the very long-term, with the 'Iter' project being implemented as a unique pilot project in this field.

In addition to the diversification of energy sources, new technologies are developed on the basis of conventional fossil energy supply, such as hybrid cars with both conventional and electric engines. Hybrid heating systems of houses using solar energy and fuel or natural gas become rather widespread and also contribute to the reduction of air pollution in towns and cities.

Territorial impacts of the new energy paradigm

Increasing energy prices add their impacts to the factors causing low rates of economic growth in Europe because of the high and increasing external energy dependency of Europe. Higher production costs make a number of activities less competitive in Europe, compared with countries with lower energy prices and/or with cheaper labour force. This mainly concerns energy-intensive activities such as metal production (steel, aluminium), petro-chemical and other chemical industries. The evolution of the European economy towards a service-based economy is accelerating. The increase of energy prices is also boosting inflation which is then counteracted by higher interest rates, constraining therefore economic growth.

While energy-intensive production sectors have progressively been abandoned, the immaterial economy has strongly progressed and Europe has become the world leader in technologies related to renewable energy and to new energy systems, favouring the technology regions of the Pentagon. Just like after the oil shocks of the 1970s, the European economic structure has made a

'quantum leap' in qualitative terms. Increasing energy prices affect therefore more strongly the countries and regions with traditional industries, both in western and Eastern Europe. In addition to this, the new member countries which are not yet part of the Euroland are facing much higher interest rates, a factor which limits the volume of investments (in new production systems and in energy-saving technologies) and therefore the rate of economic growth.

At European-wide scale, peripheral regions the economy of which is more dependent upon transportation, are losing a part of their competitiveness because no major substitution possibilities to road and air transportation are possible. This trend works against polycentricity at global European level. The gap between the welfare level of the Pentagon and that of regions outside of it is widening. Location preferences are more and more given to regions from where the transport costs to markets and suppliers can be maintained at a reasonable level. Most affected regions are those of Ireland, Scotland, the Iberian Peninsula, southern Italy, Greece, the northern periphery, as well as a number of peripheral regions of Central and Eastern Europe. Some factors counteract this trend up to a certain level. The availability of renewable energy resources (such as climatic factors in the case of solar energy or biomass) is not by itself a factor of economic or demographic distinction, but in combination with other factors (economic endowment, quality of life, accessibility etc.), it certainly is. Migration flows towards regions with attractive climatic conditions or the development of tourist activities in these regions are bringing with them wealth and jobs.

Rural areas are significantly affected by the new energy paradigm, both in positive and negative terms. As a consequence of high-energy input, agricultural production methods (for heating, treating and fertilizing), increasing energy prices lead to higher consumer prices for food produced in the EU, thus to less competitiveness compared to farm products from outside the EU where less energy is used in the production process. Higher transportation costs from and into the rural areas disadvantage the agricultural production in the most remote areas, as farmers from these areas are less competitive than farmers in the surroundings of the urban areas. On the other hand, high potentials exist for the production of bio-fuels. The production of energy crops progressively brings new sources of income to farmers, alleviating somewhat the problems of agriculture in peripheral rural regions. Set aside land is being reconverted into energy production. Southern regions are however less favoured in this respect because of increasing drought. Wind and solar energy are also of importance for numerous rural regions.

Large and medium-sized towns are being preferred as residential locations to regionally dispersed settlements which are too much dependent – as far as mobility is concerned – upon cars. At local scale (micro level), similar trends can also be observed. A clear move away from suburbanisation and towards more compact cities is taking place, although it is still counteracted by increasing prices for dwellings and houses in cities. Settlement systems are more and more coupled with public transportation. Urban and housing policies are favouring more energy-efficient types of settlements and buildings, making possible additional energy savings and increased use of renewables. In place where geothermal resources are available, powerful district heating networks are implemented. Not only the building techniques are improved, but also the distribution of urban functions, so as to diminish the need for mobility. Public transportation systems become the real backbone of settlement expansion and re-structuration policies. Large recreation areas close to the cities and accessible through public transportation are being developed. More retailing shops within and close to housing areas are being opened, making possible purchasing a wide variety of goods without using cars. Home working is strongly developing, as well as other types of ICT applications such as the access to public and private services, e-shopping, educational and cultural programmes etc.

The progressive change of energy paradigm brings with it both positive and negative aspects concerning the quality of the environment. Decrease in oil consumption is a major factor for the improvement of air quality. The development of new engine technologies for cars and trucks (hybrid cars, fuel cells etc.) also significantly contribute to the reduction of traffic-related air pollution, in particular in cities. In addition to this, the use of solar energy for heating is acting in the same direction. The development of biofuels has both positive and negative impacts on the environment. In the field of air pollution, the impact is clearly positive in terms of CO₂ emissions, as the CO₂ balance of biofuels is neutral (the combustion of biofuels produces broadly the same

quantity of CO₂ as that which was absorbed by the plants during their growth process). In terms of soil and groundwater pollution, the situation is far less positive because the production of energy crops is causing a revival of intensive agriculture and of the use of chemical fertilizers and pesticides and the increasing dissemination of genetically modified crops.

Wind energy facilities become rather widespread. They contribute to reducing the share of electric power produced by conventional or nuclear power plants, but they also cause damages to a number of valuable natural or semi-natural landscapes, although a number of countries adopt procedures to guide the location of wind energy facilities and to protect valuable landscapes, in particular natural and cultural landscapes. In a number of countries (Greece, Spain), wind mills counteract tourist frequentation. The progressive change of energy paradigm brings with it other threats to the environment. The use of coal and brown coal becomes again attractive when the prices of oil and gas reach very high levels. Not only imported coal is being used, but also European coal, the extraction of which is characterised by a revival of interest. Due to the fact that the gasification of coal does not progress rapidly, especially in the poorer European countries, the impact of coal use on air quality is rather negative. Nuclear energy is further developed in numerous countries despite the protests of green parties and of anti-nuclear-minded citizens. Not only old and obsolete nuclear power plants are replaced by modern ones using new technologies, but the production capacity of nuclear electricity is being significantly expanded to compensate for the reduction of electricity produced in conventional power plants using oil and gas. Public-private partnerships are being set up to provide the financial resources necessary. The new generations of nuclear power plants generally reduce technological risks, but the issue of nuclear waste remains an important one, although experimental technologies are developed to strongly reduce the radiation potential of nuclear waste. Moreover, they do not provide a solution to Europe's energy problems in the short to medium term because of the lengthy commissioning process that has to take place.

Climate change has various impacts on the energy sector. First, it changes the pattern of energy consumption, mainly territorially. Global warming reduces the need for heating during spring and autumn in numerous European regions, but it increases the needs for air conditioning, in particular in Southern Europe. Climate change has therefore no significant impact on global energy consumption, but the regional patterns are changing. In Southern European cities and tourist resorts, energy demand tends to increase. The impact of climate change on energy production is also significant, mainly in Southern European regions. The development of solar energy facilities makes possible to compensate partly for the increase of energy demand. Regions prone to drought have to face a double constraint: rainfalls are not sufficient any more to provide enough water to hydro-power plants and to enable the production of energy crops in agriculture. Drought favours forest fires and reduces the availability of wood and biomass to be used as energy sources.

Environment

Water resources and flooding

During the period of investigation up to 2030, water consumption is subject to contradictory evolutions. Domestic water consumption by households in Eastern Europe is significantly increasing, but this increase is compensated by decreasing water consumption in power plants and manufacturing industry. Also in Western Europe new cooling systems for power plants are being implemented, so that water consumption in this field is not significantly increasing, although the power generation capacity is growing. Southern Europe faces higher water stress. Shortages of water force politicians and business to take decisions on water prices and investments in alternative ways to deliver water (desalination, water transfers from other basins). Irrigation techniques become slightly more efficient, due to water pricing and increasing risk of low water availability, so that the increase of irrigated areas in Southern Europe does not lead to increased water consumption. However, the most water-consuming crops (e.g. corn) progressively disappear. Lack of water increases the risks of forest fires and makes landscape management in semi-abandoned areas more difficult. In areas with severe water shortage, water transfer from other river basins is still being implemented.

As far as water quality is concerned, pollution levels of European rivers generally decrease, particularly in industrial zones and urban fields. Some countries perform better than others, due to stronger focus on the chemical treatment of waste water. Thanks to EU regulations and support, increasing waste water volumes are dealt with by modern sewage systems driven by the EU waste water directive. In the EU-10, implementation is paid to a great extent by structural funds. In a number of areas with intensive agriculture, in particular where energy crops are produced, pollution levels remain stable or tend to increase. Agricultural intensification takes place in the most productive areas and tends to increase nitrate diffusion levels. In Western Europe, the most affected areas are the Paris Basin, the Benelux regions, northern Italy and northern Germany. In the fertile areas of the EU-10, the use of fertilizers rapidly catches up with western levels. Ground water quality is deteriorating in most areas with intensive agriculture, leading to high costs for drinking water production. This happens although EU policies on diffusive nitrate pollution oblige farmers to a more effective use of fertilizers in agriculture. Agricultural interests attenuate however this evolution by successfully lobbying for a less restrictive implementation of the nitrate directive. Eutrophication also remains a problem in numerous rural regions. However, some countries apply more severe measures than others, resulting in some 'fore-front countries' like Germany and Denmark.

Increasing heavy rainfalls in Northern and Central Europe, but also in Southern Europe, where they may reach extreme intensity, cause more damaging river floods and hazards which are only partly attenuated by spatial prevention measures like the reservation of water retention areas. Risks are increased by the expansion of built up areas, also in potentially threatened zones. The EU Water Directive fosters international cooperation on river basin level. It stimulates measures to prevent river flooding, particularly the reservation of emergency flooding areas and retention areas, but much resistance has to be overcome to implement it. Resources affected to prevention measures are insufficient because they require significant investments often considered as non-productive. In spite of higher coastal flood hazard levels, vulnerability is decreasing thanks to investments in early warning systems and efficient evacuation plans.

Air pollution

Continued road traffic growth, despite higher energy price, driven by economic development and infrastructure investments means more potential emissions. Technological evolution and more severe legislations make however possible to contain and even reduce, up to a certain extent, air pollution. The environmental legislation fosters technological developments and accelerates the implementation of certain existing technologies (carbon black filters). Other technologies (hybrid cars, fuel cells engines) lead to lower air pollution levels, in particular in urban areas. Air quality improves more rapidly in Western Europe than in Eastern Europe, mainly because new technologies are more rapidly adopted. In addition, the move towards the service economy is stronger, which leads to a reduction of the environmental footprint of manufacturing industries. In Eastern Europe, the share of coal in total primary energy consumption is higher and the price increases of oil and gas tend to maintain coal consumption at a substantial level and even to increase it. The implementation of the Kyoto Agreement has been more or less successful. Greenhouse gas reductions are achieved up to a certain extent, especially within the EU-15. The EU Member States' emission levels do not decline quickly enough to see the now enlarged EU technically meet its target requirements. The health situation has been improving in most European cities and territories. However, hot spots of high traffic volumes remain with high concentrations of small particulates. Ozone remains a problem, essentially in Southern European countries. Regarding ecosystems, vulnerability to acidification is virtually disappearing. By 2010, only a few forests in Germany and the Benelux are still suffering from acid deposition above critical load levels.

Natural areas

The evolution of natural areas and biodiversity is subject to contradictory evolutions. The Natura 2000 sites are sufficiently protected, but connectivity between different protected areas, as foreseen by the Directive, are not fully reached. Particularly in the Pentagon, linkages are thin and weak. In some Southern European countries, where most part of the Natura 2000 areas are to be

managed by traditional farming techniques, budgets are too low to manage all areas properly, and nature value falls. Urban sprawl and fragmentation of natural areas take place in and between growth regions, particularly in the pentagon area and in economically well performing metropolitan areas in Central and Southern Europe. Under the pressure of infrastructure, tourism and second homes, many coastal areas are further developed at the expense of valuable natural landscapes and wetlands. Pressure on accessible, attractive mountain areas rises.

Overall, biodiversity decline is only curbed, not stopped, due to remaining lack of connectivity between protected areas, and a continuing pressure on natural areas and High Nature Value (HNV) farmland. Widespread energy crops production introduces monotonous landscapes potentially causing a further decline of biodiversity. Emigration from areas unprofitable for agriculture, takes place particularly in Southern Europe, and leads to the abandonment of low-intensity farming systems. This causes the invasion by a limited number of species, forest fires and further desertification. Shifting climate zones urge species to move northward or to higher altitudes. Some species cannot move rapidly enough; some have no space to move (mountain tops, lack of corridors).

Many natural areas in the new Member States are changed into farmland. This is compensated to some extent by nature development and forestation programmes. In the open fields in the polders and deltas where agriculture increasingly industrialises, many landscape elements are removed. Many small-scale landscapes are changed into open fields. The environment is affected by the increased use of chemicals and irrigation. This is only limited to some extent by agri-environmental measures. Efforts to concentrate intensive cattle farming and horticulture are not very successful. Increased emissions of ammonium are putting nature and landscape increasingly under pressure. RDP programmes stimulate the restoration of some small-scale landscapes'. Forestation programmes and extensive farming on abandoned farmland in mountainous areas reduce to some extent the risks of avalanches, landslips etc..

Impacts of climate change

The impacts of climate change are becoming evident, like the increased occurrence of natural hazards (floods, droughts and heat waves) and shifting climate zones. Floods cause much damage, more so in countries which had not invested in preventive measures. In addition, energy supply is threatened, both in southern areas dependent on hydro-electricity and in traditional power plants (which need the water for cooling) because of low river discharge. Drought leads to the abandonment of dryland agriculture in Southern Europe. Desertification increases and biodiversity declines. In mountain areas, (Alps, Pyrenees, Carpaths) winter sport is no more possible at altitudes below 1000 meters. Inter-regional tensions for the appropriation of water resources are emerging. In Spain, for instance, tensions are developing between developed Mediterranean regions than need more water and other less developed regions than can provide more water. In northern European regions, on the contrary, more favorable situations appear. In Finland, positive effects of climate change are observed on agriculture, forestry and in energy consumption.

Increased scientific evidence and knowledge about climate change enables better projections on the magnitude of climate change and its impacts. Public opinion shows increased interest on climate change impacts and possible measures how to deal with them. Society (politicians, public, business) shows however an ambiguous attitude towards costly adaptation measures, particularly on international level. Climate change is therefore recognized as a major problem, but measures to adapt to its consequences are principally taken at national level. As a result, large differences develop between countries. Germany invests heavily in flood prevention, whereas Eastern Europe hardly does so. Mediterranean countries focus on water availability in coastal areas and cities, combining water pricing and more diversion of water from high precipitation areas. EU policy is rather limited, Ambiguity is reigning between severe and costly adaptation measures and a focus on most cost-efficient measures.

Territorial image of Europe by 2030

In a baseline perspective, the characteristics of the European territory in 2030 reflect a number of important changes, compared with the situation in 2005. By 2030, the European population is, in average, much older than in 2005, with strong variations, however, from region to region. The total population has declined, despite the existence of new growth impetus of fertility rates in a number of countries after 2000. Areas with a particularly old population (average age above 50 years) are East-Germany, northern Italy and Sardinia, Corsica, north-west Spain, Scotland, northern Sweden, central Greece. In the countries of central and Eastern Europe, population ageing is counteracted by low life expectancy, despite very low fertility rates, both factors generating population decline. In regions with very old population structure, a number of related impacts can be observed, such as weakness of labour markets which reduces the propensity of enterprises to invest and to create jobs, the slowing down of internal demand, the reduction of services of general interest caused by progressive population decline etc.

The result of three decades of moderate economic growth and of insufficient competitiveness in Europe in a context of accelerating globalisation is that a number of large European companies have been taken over by foreign multinationals from North America, Japan and emerging economies (Asia, Brazil). Strong restructuring and rationalisation has taken place in the related European branches. Europe is leader in a few sectors, such as aeronautics, some new energy technologies and specific sectors of biotechnologies. Especially in the capital-intensive sectors of biotechnologies, energy and transport (railways in particular) a strong concentration of enterprises has taken place. A number of successful privatised ports were taken over by foreign companies, especially from the Middle-East. A few large energy companies control the production and distribution of electricity, the sectors of renewables (in particular the production and transformation of energy crops, the wind energy parks), the development, renewal, operation and maintenance of nuclear power plants, the distribution of natural gas, the coal gasification plants, the production and distribution of hydrogen. Service industries and advanced tertiary activities are much more developed than they were in the early 2000s, as are household related services. On the opposite, numerous industrial activities with low and medium technological level have disappeared from Europe, even from the countries of central and Eastern Europe, for reasons of insufficient competitiveness. The same has happened to energy-intensive industrial activities, especially metal production, petrochemical and basic chemical activities. These trends, accompanied by asymmetric shocks, have led to strong territorial differentiation and specialisation.

Considering the long-range economic trajectories of regions, the European territory of 2030 shows that sustained growth processes are specific to a few categories of areas, in particular those characterised by high-level metropolitan or gateway functions, those attractive for specific population groups such as retirees, tourists etc. or those with new, significant economic activities such as in the field of new energy technologies and renewable energy supply (production of biofuels in particular). The catching-up processes characterising less developed countries during the years following their accession to the EU, on the opposite, is valid only for the short and medium term (generally not more than 15 years). After that, significant processes of territorial differentiation take place, based more or less on the same principles as those prevailing in the more central areas, with on the one hand, metropolitan regions continuing above-average development and, on the other hand, rural and intermediate regions lagging behind in their development pace if they don't have specific advantages of attractiveness. By 2030, these types of long-range economic trajectories appear to be valid not only for the new member countries of central and Eastern Europe, but also for a quite number of regions in the EU-15, in particular the peripheral ones.

Urban Europe

In a world-wide perspective, European global cities have become more competitive, compared with the situation prevailing in the early 2000s, but their distance from the global cities of North America and Asia has remained quite unchanged. At Europe-wide scale, the metropolitan areas of the pentagon, together with a few others, have strengthened their leading European position. The pentagon, as defined in the late 1990s, has been expanding along major corridors with significant

metropolitan areas, towards the British Midlands, the southern parts of the Nordic Countries, the Rhone Valley, the Danube Valley until Budapest. The network of high-speed trains interconnects most of the metropolitan areas of the wider pentagon. A number of networks of cities has been emerging inside and outside the pentagon, supported by efficient cooperation in RDT. The consolidation of these networks has led to the development of wider areas, especially the Baltic Sea Region and the new 'Triangle' of central and Eastern Europe, formed by Vienna, Warsaw and Budapest, including Prague, Dresden and Bratislava. The development of polycentricity takes place through the expansion of the pentagon rather than through the development of alternative global economic integration areas.

Remote peripheral regions, and even those with large cities, have generally not been successful in generating or maintaining sustained development processes, so that no global economic development area emerged outside the wider pentagon. As a result, large cities in the peripheries remained rather isolated in their development process and have not significantly benefited from network and synergy effects.

At intermediate scale, the level of polycentricity in the national urban systems of the countries of central and Eastern Europe and of the southern peripheries has been reduced, compared with that of the early 2000s. This is a result of territorial differentiation in the long-range economic trajectories of regions. In the countries of central and Eastern Europe, rural-urban migrations have been significant up to 2030, precisely because of the process of territorial differentiation. In Western Europe, both urban-rural migrations (retirees, self-employed etc.) and rural-urban migrations (young employed, students) have been co-existing during the three decades since the early 2000s, so that the demographic structure of large cities is generally much younger than that of numerous rural areas. A territorial division of generations has progressively taken place. In a significant number of regions with traditional industries, both in eastern and Western Europe, the large, medium-sized and small towns have been declining in the context of accelerating globalisation and are facing, by 2030, serious difficulties to recover and to generate new activities. In the wider Europe, a number of regions attractive for residential and tourist functions have however developed, some of them strongly, even in the absence of significant cities. ICTs have contributed to such processes.

Main differences with the urban systems of the early 2000s can however be identified at the local/regional level. A number of factors with cumulative impacts have contributed to reshape urban settlements, the two major ones being increasing insecurity in cities and increasing energy prices. Insufficient economic, social, educational and cultural integration of ethnic minorities (mainly young people from immigrant families) has strengthened social and physical segregation in cities and favoured sporadic troubles and even riots. The social housing estates where these people live, as well as their surroundings, have been left by the population of European origin and by the better-offs among the members of immigrants families, who moved to more 'secure' and quiet areas, either in other parts of the agglomerations or into smaller settlements of the surrounding rural areas. In numerous cities as well as in tourist resorts, gated communities have emerged. Electronic security facilities are omnipresent in cities and in public transport. This type of evolution is stronger in the metropolitan areas of the pentagon and of Mediterranean regions. As immigration has also significantly increased in the countries of central and Eastern Europe, urban social and physical divide has been growing also.

The impact of growing energy prices on settlements has been rather opposite to that of integration issues. High oil prices have favoured compact cities, with lower volumes of commuting movements, higher use of public transport systems and better integration of urban functions. Recreation and leisure facilities were developed at proximity of agglomerations. Densification and new urban developments took place in the surroundings of the stations of public transport networks. Home working has significantly progressed, so that numerous active people do not need daily commuting into the cities and prefer residential locations in surrounding rural areas, in particular those well connected by public transport. The urban pattern at local/regional level is one of increased social/physical segregation combined with compact approaches to new developments and redevelopment. It is however clear that this global pattern is largely differentiated according to the

types of regions. It takes different shapes in booming metropolitan areas and in declining industrial medium-sized cities.

The environmental quality of urban areas has progressed as far as air quality and noise levels are concerned, mainly through the wide adoption of new car engines (hybrid cars, fuel cells engines). Social tensions and physical segregation has however led to the widening of areas with degraded environment and derelict character. The quality of the living environment in cities is more and more subject to a dual process with, on the one hand, areas of improving environment and gentrification and areas of popular character with poor living environment.

Rural Europe

During the three decades following the year 2000, European rural areas were subject to strong dynamics. The diversification process already initiated in the 1990s in Western Europe continued and was also extended to central and Eastern Europe. The new member countries benefited from CAP support, the CAP itself being subject to various reforms, including the implementation of WTO decisions. The strong development of the production of biomass and energy crops gave a new impetus to rural areas, including less fertile ones. Finally, the acceleration of climate change proved to be rather detrimental to rural areas in the southern half of Europe, while those in the northern half were beneficial.

By 2030, rural regions and landscapes in Europe are much more diversified than they were in the early 2000s, despite a strong trend to dualisation in the agricultural sector. Some have substantial population density in relation with their proximity to large towns and metropolitan areas and to their attractiveness for residential and tourist functions. These are spread throughout East and West in the surroundings of large cities, in coastal areas, in attractive valleys of mountain regions and in a number of Mediterranean regions with favourable climate. The degree of economic diversification of these rural areas is rather high. At the other extreme, a significant number of remote rural regions strongly affected by out-migration and population ageing, less attractive for residential and tourist functions, are more or less abandoned. Various types of intermediate situations can be observed, with some rural regions taking advantage of EU support (CAP and RDP) for stabilising lastingly their economic performance, while others with smaller production structures and declining industrial activities are engaging into a downwards spiral. Numerous rural regions of central and Eastern Europe, with the exception of those surroundings large towns, have lost population after their accession to the EU, despite substantial support to agriculture.

Up to 2030, numerous changes have taken place in agricultural systems, both in eastern and Western Europe. A dual system of agricultural economy has been consolidated, boosted by further liberalisation of agricultural exchanges and by European integration:

- in large, fertile areas and/or close to the main consumption centres (agglomerations, tourist areas), large-scale, highly mechanised agriculture has developed, employing very few people. Large farms dominated already in the early 2000s in the UK, in the Czech Republic, in Slovakia, in East-Germany, in north-west Poland and in a few regions in France. After 2010, a rapid concentration took place in Hungary, Romania and Bulgaria. These large and cheap agricultural areas attracted numerous farmers from Western Europe (Netherlands, Germany, Austria, Denmark, and Sweden) to buy or rent land and to set up large farms. Large farms have successfully resisted to the pressure of global competition and produce the dominant part of agricultural products; a significant share of them develops export-oriented productions. In such areas, large energy companies have bought large agricultural estates to produce energy crops;

- in less fertile or less favourably located areas, especially those dominated by small farms, a more diversified evolution has taken place. The luckiest of these regions could change the profile of their activity (rural tourism, traditional handicrafts, organic farming) or strengthen some specificities ('terroir' products, regional brands). CAP subsidies (direct payments to farmers) as well as the production of energy crops at smaller scale, also contributed to stabilise the economic performance of such regions. In less favourable areas, numerous farms have been abandoned, being pushed out

from agricultural production by competition. Many areas of this type are to be found in the European peripheries, but also in some more central regions.

The impacts of climate change have been detrimental to numerous rural regions in the southern half of Europe. Drought has severely reduced agricultural production and has even led to the abandonment of agricultural activities in areas where irrigation was no more possible and where alternative agricultural productions could not be successfully envisaged. Forest fires have generalised and destroyed irremediably traditional landscapes, adding to the drought problems, because of the reduction of the humidity retention capacity of soil in mountain areas. Indirect negative impacts have taken place on rural and coastal tourism and on hydro-power production. As a counterpart, rural areas in the northern half of Europe have benefited from this evolution. Demand for specific agricultural productions has increased, as well as for rural tourism. New growth impetus benefited especially to rural regions in the northern parts of central and Eastern Europe (Poland, Baltic States, Czech Republic, Slovakia, East-Germany).

The rural environment has been subject to contradictory evolutions. The generalisation of EU environmental legislation throughout the wider Europe has brought with it positive impacts on the protection of nature and surface water, while the intensification of agriculture in the most fertile areas and the acceleration of climate change were detrimental to ground water quality and resources, to traditional cultural landscapes, to soil protection.

Territorial images by 2030 in the European macro-regions

Atlantic area

By 2030, demographic trends have compounded imbalances evident at the turn of the century, with the enduring attraction of many coastal areas continuing to grow, but interior areas which had low densities still shedding remaining populations. External immigration has added to this effect, particularly in the British regions and Ireland and the major conurbations of Portugal²⁰, the only areas containing multi-cultural clusters where the issue of integration has become a key one. Across the rest of the area a relatively high level of mono-culturalism has reduced the incidence of ethnic or religious tensions. Growing divisions, instead, focus on generational and socio-economic divides, as the population ages more, especially in the South, and as wealthier retirees and 'remote' workers continue to re-locate in appealing coastal areas.

Trends persistent over this period have thus reinforced the contrast between densely populated areas concentrated in a few small urban areas, and a much larger number of de-populated areas (most of Scotland, Wales, Ireland, the interior regions of France, the north-western Spanish regions, and the interior of Portugal) creating a barrier between centres of population and the main core of Europe. However some exceptions to this have occurred with an increase in development along corridors or 'belts' connecting the main centres to key coastal regions, a spatial pattern driven by a sustained increase in mobility and distance working and the increase in house prices in desirable coastal areas. But the build up of these routes has not significantly increased the integration of the area as a whole; rather it has strengthened the 'glove like' structure spilling out from national centres.

The success of coastal areas has varied according to the degree of environmental fragmentation, and responses to it, and their appeal to flows of retired persons or tourists. Tourism has retained its presence in the summer months and for more extended periods in some more specialist resorts offering additional recreational attractions, such as water sports. However the Atlantic Area has started to lose its market share of tourism to East Asia and the Pacific as inter-continental travel becomes more competitive. The most underdeveloped rural areas have virtually become obsolete, as maintaining minimum services and infrastructures became unviable. Some cases of successful diversification in inland rural areas have however been evident, with 'green' tourism creating some new jobs in the Atlantic Area, but such initiatives have obviously not been feasible for the most neglected, remote rural areas.

²⁰ Also Centro and Galicia in Spain and Centre, Limousin, Brittany, Poitou-Charentes and Aquitaine in France.

In economic terms too, regional variation has persisted. The indicators relating to performance regarding progress towards the Lisbon objectives have remained relatively poor, with the sustained, though slow increase in R&D investment, diversification and job creation, being confined primarily to the 'motor' areas, such as those in Dublin and Greater Manchester. Similarly manufacturing outcomes have been variable, some industries, such as ship-building have retained their importance, others have experienced marked decline, damaging communities.

The fishing industry has continued to diminish, both offshore and coastal, with a fall in fish stocks and conservation measures hitting the Atlantic Area hard with several small ports closing and decreasing job opportunities in the sector. The development of aquaculture has supported some local communities, but at the cost of increasing damage to the surrounding sea and local fish populations. Exports from the region are still handled mainly by ports in the North East and Mediterranean and the large ports of the Atlantic Area have seen a continued fall in bulk and container traffic. There are signs though of the new trans-shipment port west of the English Channel picking up feeder traffic consignments linking the north-south network, and along the Atlantic Rim there have been some small revivals in ferries and other 'roll-on-roll-off' traffic. The connectivity of Portugal and of the North-West of Spain has also improved with the building of new high speed train lines.

Investment in renewable forms of energy has gained momentum as oil and gas production has failed to keep up with demand, concern about nuclear energy expansion and the effects of global climate change are increasingly felt. This has been beneficial to the Atlantic Area both economically and environmentally and EU supported integrated actions to maximise research into appropriate forms and use of renewable energies, especially wind, solar and tidal energy sources, have helped to distribute those benefits. However integrated action and the accomplishments in the field of renewable energy though clearly offering a lifeline to the Atlantic Area, have not typified the situation as a whole in this coastal region. Trans-national co-operation is still limited and the structures supporting the territorial imbalances in the region at the turn of the century have been insufficiently challenged to produce anything as yet approaching a genuinely new global zone of economic integration.

North-West Europe

By 2030, NWE can still be considered the economic powerhouse of Europe. A significant part of the European 'Pentagon' area falling in this region ranks highly in terms of innovation and competitiveness. There are relatively high levels of cultural workers in NWE, a sign that this region has been well poised to meet the demands of the new economy. The absolute level of urbanisation, density of infrastructure, economic production and energy consumption is still among the highest in Europe. Yet this does not necessarily mean that these indicators hold in relative terms: the density of road and rail infrastructure per capita, for example, can be much lower than elsewhere. Nor is the NWE territory homogeneous: some areas exhibit very high levels of economic development, whilst others have features more often associated with 'peripheral' regions.

There has been a continued and steady growth in diversified service centres such as London, Paris, Brussels and the Dutch Randstad. Still higher growth rates have been found outside of the major central metropolises as Denmark, central Scotland and Southern Ireland demonstrate. As a whole, NWE has enjoyed a reasonable rate of growth, maintaining in numerous regions higher levels of GDP/capita than the European average. It should be pointed out, however, that the most dynamic growth in the European context has taken place in the new member states. Consequently, the relative position of NWE by 2030 is less prominent than by 2005.

With regard to transportation and accessibility, after the current stock of priority projects have been completed, very few TENs have been initiated in NWE. Attention has shifted eastwards, to connecting for instance Greece to Estonia. By 2030 NWE still has the highest density transport network in Europe, yet it is showing serious signs of strain and congestion and of obsolescence of various parts of the transport systems. This is aggravated by the ongoing growth of population, especially in metropolitan areas, and the lack of policy attention at European level. Economic

growth and higher transport density have increased energy consumption, although the move towards a more service-based economy had the opposite effect. External energy dependency has increased in NWE since the potential for renewable energy is limited. In this regard, the high rate of urbanisation and consequent high land prices, especially in the core area, did not provide much room for biomass production in NWE, except in the French and a few others rural areas, where this has been providing a viable alternative to declining CAP support.

Like the rest of Europe, NWE has been subject to accelerated population ageing and a decline of population growth. In the global cities London and Paris and MEGAs like Brussels and Amsterdam, however, the ageing process is slower and population growth higher than in the EU as a whole. The reason for this is that these cities attract many young people, skilled as well as unskilled, and that the fertility rates are higher than elsewhere. Old industrial areas like the Ruhr area and Lancashire, however, which are only partly successful in restructuring themselves, are unable to halt depopulation decline. Many highly skilled people have migrated towards other areas of NWE or to North-America and Southeast Asia.

Regarding urbanisation, the Pentagon has been expanding towards the British Midlands, southern Scandinavia, the Rhone valley, the Central European MEGAs. In urban areas with high transport density, like the Randstad and other metropolitan areas, growing energy prices have favoured compact cities with contained volumes of commuting movements, higher use of public transport and better integration of urban functions. In the global cities, spatial/social/ethnic segregation, manifesting itself in the development of no-go areas and gated communities, has been increasing. In regions with traditional industries, large, medium-sized and small towns have been declining. These regions have been facing serious difficulties in recovering and generating new activities.

Public policies aiming at the reduction of illegal immigration have been unable to stop the influx of low-skilled people into NWE. These people, who usually settle in the global cities and MEGAs, have been facing serious difficulties with regard to the labour market and society. Measures taken by local authorities have been rather incoherent and resources insufficient to solve the problems. In cities like Paris, Birmingham, Antwerp and Rotterdam violent manifestations and riots have periodically erupted. Xenophobia and political radicalism have increased and a significant number of people have decided to migrate to the rural surrounding these cities and towards tourist regions.

In more polycentric metropolitan areas like the Ruhr area and the Randstad, which have further developed as urban networks, partnerships between local authorities have intensified, but are limited mainly to industrial/service estates, residential and recreation areas and transport infrastructure. Their effectiveness is limited because of the competition between local authorities and the lack of binding policy-instruments.

The urban environment in the NWE region has continued to experience problems with air quality, although the introduction of cleaner car technologies has somewhat improved air quality in cities. However, the increasing transport intensity has made improvements difficult in the large metropolitan areas, in spite of strict EU regulations. Population growth and the attraction of highly skilled, demanding immigrants had strong impacts on the rural areas close to metropolitan areas (like areas around Paris, London and large parts of the Benelux). These areas have evolved into residential/recreational landscapes, largely determined by market forces, and only regulated by little public investments. Recreational/natural values are competing with further suburbanisation and high-tech or intensive agriculture.

North Sea Region

The NSR has fared relatively well with solid economic growth figures. The only areas which have lost ground, to some extent, are the port cities of Hull, Newcastle and Aberdeen in the UK and (to a lesser extent) Hamburg and Bremen in Germany. Other port cities like Rotterdam and Antwerp have developed better. The best performance in the entire region has been recorded in the metropolitan area of Edinburgh. Economic development has had a positive impact on the development of maritime traffic between the ports in the Benelux and the Baltic Sea Region,

especially Copenhagen. Rail freight lines have also developed along this main corridor connecting the two maritime basins.

The progressive depletion of the energy resources of the North Sea (oil and gas) has nevertheless been a major problem for the economy of the NSR, explaining partly the economic drawbacks of a number of coastal sites which had directly benefited during several decades from the exploitation of oil and natural gas. The external energy dependency of the NSR has significantly increased and impressive programmes have been implemented in the field of renewable energy. Numerous offshore and onshore wind parks were developed, taking advantage of the huge wind energy potential of the region, but creating sometimes conflicts with the protection of landscapes and natural coastal sites and with maritime traffic in the straights (especially the Copenhagen region). Technologies in the field of tidal energy have become mature, so that various large-scale equipments were built.

By 2030, the NSR shows a pattern of decreasing population growth and increasing population ageing, with the exceptions of MEGA's like Oslo, Copenhagen or Amsterdam where population growth is faster than in Europe as a whole and population ageing is slower. These MEGA's have developed more advanced economic activities and have therefore attracted more young immigrants. A large number of attractive rural areas, particularly those located along the coasts from the Strait of Dover over Belgium, the Netherlands and Germany to the Danish west coast have been subject to population increase as a result of the migration of retired people and of free-lance workers from large cities. The same is true for medium-density areas, e.g. in south-west Sweden, Jutland in Denmark and north Germany. At the same time, cities with traditional industries like Leeds and Sheffield have become more and more depopulated. This is also the case in the peripheral rural areas such as the Scottish Highlands, south-western Norway and the Wadden islands.

Most of the metropolitan areas in the region are connected by a dense network of highways and high-speed train connections. Urban settlements have become influenced by the increasing insecurity in cities, strengthening spatial/social segregation like no-go areas and gated communities in cities like Antwerp, Rotterdam and Sheffield. At the same time they have been also reshaped by the growing energy prices, favouring compact cities with lower volumes of commuting movements, higher use of public transport and better integration of urban functions, like in the Randstad-Holland. Cities with traditional industries have been declining. They have been facing serious difficulties in recovering and generating new activities. Towns in the peripheral rural areas have generally declined as well.

Illegal immigration has continued until 2030 despite public policies aiming at the containment of this process. As a result, more people with low education and skill level have settled particularly in the seaport cities Antwerp, Rotterdam, and Hamburg. They have been facing tremendous difficulties to become integrated into society and the labour-market, with periodically violent manifestations and riots in cities. Reactions ranged from political radicalism and increasing xenophobia to population moves towards the rural areas surrounding these cities and towards high-level tourist and retirement areas, particularly along the North Sea coast from the Strait of Dover to the Danish west coast.

The Kyoto agreement has been implemented, but transport has been further growing so that the reduction of emissions has not been achieved, despite the introduction of less polluting car engines. The evolution of rural areas has been differentiated, depending on the competitiveness of the established agricultural sector and on the proximity of large cities. In the south (England, Benelux, Germany, Denmark), focus has been on industrial agriculture, with some small investments in protected areas and cultural heritage. Pressure from metropolitan areas has increased. In the north (Norway, Scotland), rural development has been supported by promoting tourism. Eutrophication of the North Sea has continued, due to the use of chemical fertilisers in intensive agricultural areas in the southern parts of the NSR.

Northern Europe²¹

The Baltic Sea and Northern Periphery area detailed in this section stands out among the other meso-regions covered here as being fundamentally heterogeneous and dichotomous in nature, thus making comparative conclusions for the area as a whole, difficult at best. The most obvious examples of this are the population density divide between north and south and the economic divide between east and west.

Thus in demographic terms up to 2030 current trends have continued to sub-divide the area along these north-south, east-west, and urban-rural lines. In Denmark and Norway population growth continued, while Finland and Sweden witnessed urban growth but rural decline. On the south coast of the Baltic, Poland and the German BSR area saw the reverse, with urban decline and rural growth in population terms, while the Baltic States and the Russian BSR area all saw a continuing overall decline in population terms.

Population ageing increased across the area with the exception of the areas encompassing the major Nordic capital regions, with Poland and the Baltic States in particular seeing significant further population ageing. Furthermore, while immigration policy had little more than a limited impact on the 'receiving' areas (e.g. the Nordic capital regions) it further exacerbated the demographic problems within particular age groups in the eastern part of the region.

In economic terms, this region is again fundamentally heterogeneous in nature. While general economic growth in the region (with the exception of the German and Russian BSR areas) continued to outpace the EU average, with labour productivity increasing, spatial polarisation was increasingly exacerbated. At the beginning of the period in question, the BSR area, while hosting many of the EU's wealthiest regions, also included 56% of the 100 poorest EU regions.²² The addition of Russia and Belarus to this calculation would of course see this percentage figure rise even more dramatically. Moreover, sub-regional polarisation remained sharp in the German BSR and in the Baltic States, though it was generally only marginal, but increasing, in the Nordic countries. Regional disparities increased across the board, with the urban-rural divide being particularly important here as economic development was generally concentrated to urban growth poles.

Similarly, in the nexus of transport, energy and environmental policies, the BSR region and its Northern Periphery extension remained highly differentiated in many respects. One constant here was however, the increasing reliance on nuclear energy across most of the region, a second was – despite energy price rises – increasing reliance on car transport and thus on motorway construction. The BSR did however remain committed to maintaining its lead in the development of 'alternative energy' products, particularly in relation to wind and hydropower.

In environmental terms, while the 'clean up' of the eastern part of the region continued, serious questions remained in relation to the prevailing conditions in contiguous areas such as Belarus and the Russian BSR, while global climate change continued to have a potentially fundamental impact on the fragile and vulnerable ecosystems of the far north.

In sum, the area as a whole has been continuing to develop at its own pace, though with marked spatial differentiation occurring at almost all levels. While economic improvements are made, these were generally concentrated to the major urban centres and their immediate surroundings, with the eastern part of the region in particular shedding rural population much of which feeding the growth of the service sector in the cities or migrating to the west. The northern part of the region meanwhile underwent a slow but steady decline, except where dynamic urban environments could attract a 'critical mass' of development potentials to counteract the general trend.

²¹ Baltic Sea Region and northern periphery.

²² Figure for 2002, measured on the basis of NUTS 3 areas.

Alpine Space

Until 2030, population ageing has caused severe impacts in the Alpine Space. Since 2015, many peripheral areas in higher altitudes and remote valleys have lost a large part of their working age population to urban agglomerations in the foothills of the Alps like Milan, Zurich, Geneva, Lyon, Torino, Munich, Vienna and Ljubljana. This is where the population has been concentrating. Simultaneously, the overall population density for the Alpine Space has slightly risen. Taking into account that the habitable space is very limited by topography, the settlements exhibit very high densification and an enormous urban sprawl. The remaining population in the peripheral valleys has entered a vicious circle of low infrastructure endowment and maintenance, reduced public services and less attractiveness for potential newcomers. As a consequence, by 2030, many traditional Alpine villages have been more or less abandoned. Some regional centres with good accessibility to transit routes, such as Grenoble, Lucerne, Innsbruck, Bozen, Trient, and Villach/Klagenfurt, have experienced some growth, which enhances their resources for skilled manpower but also increases urban sprawl along valleys.

Despite the EU enlargement in 2008 and an increased external migration, these events have played no important role for the economy of the Alpine regions as immigrant workers have preferred the urban context of the agglomerations in the Alpine foothills. In cities like Lyon and Zurich sociocultural tensions have grown as the integration measures for foreigners have not been sufficient. Most of the bigger agglomerations in the Alps have experienced problems related to the abandonment of city centers, including neglected infrastructure and buildings, leading to a further spatial expansion of the settlements and stronger segregation processes between core cities and suburbs. In the villages and towns located in the most beautiful parts of the Alps, there has been a strong demand for second homes, as for example in the regions of Mont Blanc, Gran Paradiso/Aosta, Valais, Engadin, Oetz Valley, Upper Tauern, and the Dolomite Alps. This demand has led to the creation of ghost towns, which boast a highly developed infrastructure but are only inhabited three months out of the year. In order to cope with the seasonal imbalance in regional income, Switzerland, Austria, France and Italy have reinforced the establishment of regional natural parks both for the protection of the mountainous environment and the diversification of income through tourism and the promotion of regional products (as, for example, cheese, herbal products, berries, and local handicrafts).

Agriculture in the Alpine Space has been in continued decline, despite more direct payments and CAP adaptations. Small holdings in the higher altitudes are the first to be abandoned. Alpine agriculture has lost its competitiveness and its contribution to the GDP is minimal. Some surviving farms have become projection screens for nostalgia, marketed by tourism managers. Farmers in the upper Alps have turned into landscapers to conserve the near-nature character of mountain areas for attracting tourism. Agricultural production has concentrated and intensified in bigger farms in the flatter lowlands of the Po and Rhone rivers, as well as in Bavarian Danube valley and the Swiss lowlands.

Due to climate change, the snow line has mounted and the season for winter sports has shortened by over one month on average. Tourism associations have taken adaptation measures to intensify tourism in the other seasons. Thus, tourism has developed in two ways: a concentration of mass tourism for winter sports in several Alpine tourist centres in high altitudes (for example, in the regions of Arlberg, Tyrol, Salzburg region, Carinthia, Styria, Aosta Valley/Piemont, South Tyrol/Dolomite Alps, Venezian Alps/Friuli, Trentino/Lombardy, Upper Berne area, Grisons, Valais, Upper Savoy, Isère, Savoy, Mediterranean Alps) and experience-based eco-tourism combined with wellness holidays (thermal cures, beauty, golf and other outdoor recreation) in the lower Alps, valleys and lake regions.

The overall increase in individual mobility and goods transport has led to a steady rise of transit traffic concentrated on the Brenner, Gotthard, and Mont Blanc routes and tunnels. In parallel, frequent congestion on the North-South axis, noise exposure and bad air quality have led to strong efforts in Central Switzerland and the Inn valley to limit road transport and accelerate the construction of railway tunnels for transit.

By 2015, the new Gotthard basis tunnel has been put into operation, allowing for a massive transfer of road haulage onto rails and for high-speed railway connections between the Pentagon and Italy. The same effect has had the Brenner basis tunnel, finally finished in 2020, which is part of the TEN and key element of the Berlin-Verona transportation axis.

The taxation of greenhouse gas emissions from households and cars has been introduced but none of the Alpine countries were able to meet the goals of the Kyoto protocol. Ongoing climate change has resulted in the retreat of glaciers, droughts on slopes exposed to the South (especially on the Southern and Western side of the Alps in Piedmont, Lombardy, Savoy, Upper Savoy, and Northwestern Switzerland), regular flooding in river valleys and lakes, and environmental damages by storms and heavy rainfalls. Landscapes have been exposed to excessive erosion and destroyed. The agglomerations have also suffered under the heat island effect, thus increasing mortality rates of elderly people during summer months.

In a period of ongoing globalization, a large part of industrial production in the Alpine Space has disappeared. Only high-quality products based on research and development have been able to expand on the world market, such as pharmaceutical production, aeronautical engineering, space technology, the watch industry in Switzerland, and ecological engineering (photovoltaic installations, wood pellet burners etc.) in Austria. Despite increasing revenues from tourism, GDP per capita has decreased in the central Alps, and the spatial structure has become clearer: competitive economic centres (like Zurich, Lyon, Torino, Milan, Munich and Vienna) in the Alpine foothill regions in contrast to tourist centres in the winter sport resorts, and peripheral, non-competitive rural areas with ageing populations inside or outside regional nature parks. The region of Munich dominates the Alpine Space in terms of GDP per capita, which is also high in Tyrol, Baden-Württemberg, the region of Lyon, and South Tyrol. Mainly the region of Munich and the Tyrol have been able to improve their economic position. On the other hand, the regions of Besançon/Dijon, Alsace, but also southern Germany, the French Alps, and the Veneto have lost in their relative importance for the European economy.

The non-EU countries of Switzerland (mainly the cantons of Central Switzerland) and Liechtenstein have continued their low-taxation policy and maintained their banking secrecy, thus attracting the European headquarters of a large number of transnational corporations. This has led to a strengthened banking sector in these countries and additional related jobs in the service sector. Monaco, too, has remained a fiscal paradise.

High oil prices and increased energy consumption have favoured the use of renewable energies. In addition to the traditionally high share of hydroelectric power, solar energy as well as geothermal sources have been further developed, and their overall energy efficiency has been improved. Also farmers in the lowlands have begun to produce biofuels as a natural by-product of agricultural production.

Central and Eastern Europe²³

The CADSES area provides one of the biggest population mass potential in Europe, though its proportion is decreasing. In 2005 it comprised 39 percent of the European population, a percentage which has declined to 36 percent in 2030. Population decline has been especially strong in the Central and Southeast European countries (new members and non-members), caused by both weak or negative natural evolution and emigration.

Though the area as a whole has been catching up in relation to the average of the old member countries, the welfare gap is still substantial in 2030. The GDP per capita of the Eastern parts of the region amounted to 46 percent of that of the EU15 in 2005, it reaches roughly 75 percent by 2030. Disparities between the countries of the area have also been decreasing but they are still very large in 2030. The catching-up process was very strong between 1995 and 2010 (6-8 percent per year in some countries), but this was more or less a 'reconstruction period'. Growth rates decreased in the following period – partly because of the increasing energy costs – but were still

²³ Former CADSES area.

higher than the EU average. Simultaneously, disparities within the individual countries continued to increase. Some metropolitan regions (Prague, Bratislava, Budapest) – due to the extreme concentration of banking, financial and tourist services – even surpassed substantially the EU average level of income generation, other regions declined steadily.

In the reconstruction phase, the competitiveness of central and Eastern Europe decisively depended on the availability of foreign capital (a partial exception being represented by Slovenia). What was true for the national level was even truer for the regional level. Growth and competitiveness of regions has been a function of FDI in the respective regions. And, since the location of FDI has been rather selective and rather indifferent to cohesion considerations, the result has been a dramatic increase of economic and income disparities among and within the countries of central and Eastern Europe. Only in Ireland has the role of FDI been larger than in the central and Eastern European countries. In Hungary, for example, one quarter of the total GDP was produced by foreign enterprises as early as 2000. Foreign enterprises employed at that time 16 percent of the labour force, they financed 80 percent of R&D, produced 80 percent of manufacturing exports. In the other countries the respective figures were similar, though somewhat lower. Since then, the role of FDI has further substantially increased. Up to 2030 the share of foreign capital increased slightly, but it maintained its decisive role both in respect to economic growth and structure and to location patterns and disparities.

The western border regions of these countries have partly lost their original privileged position in FDI attraction. FDI moved gradually eastwards in these countries, as a result of improving accessibility. Some enterprises located here in the period immediately after the change of political system have moved farther eastwards, looking for even cheaper labour force. Furthermore, the former forms of 'bazaar economy', utilising the opportunities offered by the economic, institutional and legal gap along the collapsed 'Iron curtain' have gradually lost their attractiveness and profitability. Simultaneously, similar opportunities and phenomena have emerged along the new Eastern borders of the EU to the Ukraine, Moldova, Belarus, Russia and Turkey. On the other hand, the geographic and/or the political position of some very peripheral and backward areas (Montenegro, Albania, Kosovo, Macedonia, the Black Sea coast in Romania and Bulgaria) changed very favourably and these areas exhibited a very dynamic development.

Most countries of the area implemented a fairly large-scale motorway construction programme in the period 2000-2015. These programmes substantially improved the accessibility of some regions affected by this programme. The motorway construction programmes, however, absorbed the overwhelming part of resources available for transport development. None or very small resources were left to construct the feeder road system and for the modernisation of the railway network. Consequently, at the end of the period, the countries had to face – with respect to railways - similar incompatibilities with the Western countries, as was the case earlier with the road networks. Furthermore, an even larger contrast in the relative accessibility of the regions affected and not affected by the motorway programme emerged, and this spoiled the development chances of the latter even more than before.

In the early 2000s, there was an expectation with respect to the emergence of a new European Global Integration Zone in Central Europe, stretching from Warsaw and Berlin, through Prague and Vienna to Budapest. Indeed, these metropolises and their agglomerations have shown the highest rates of development and they were in many respects – up to 2030 – equivalent to the capital cities in Western Europe (obviously, London and Paris represent a different class of metropolises). Nevertheless, this development area is by far less contiguous than the Western European GEIZ. The areas between the metropolises are substantially more rural and less developed, less densely populated. Therefore this area has not become an equal counterpart to the Pentagon, not even in 2030.

Southern Europe²⁴

Until 2015, population ageing has been more intense in northwest Italy, Sardinia Corsica and central and northern rural Spain. By 2030, the problem has also affected the rest of the Mediterranean area, with the exception of south-eastern France, Crete and Cyprus, as well as south-western France. Life expectancy is at higher levels in South-eastern France and Italy than in Southern Portugal and in Greece (except from the western regions and Crete). The Mediterranean area (especially Spain, Italy and Greece) has been subject to strong pressure of external immigration. It has also benefited from internal immigration from Western Europe (retired people etc) related to its favourable climate conditions. By 2015 the demographic potential of the Portuguese regions, the region of Corsica in France, Piemonte, Emilia Romagna, Sardinia, Toscana and Lazio in Italy is expected to become very weak in comparison to the rest of the area. By 2030 almost all of the area has a weak demographic potential (in particular Sardinia, Corsica Portugal, northern Spain) apart from Crete, Cyprus and south-eastern and south-western France.

Only few Southern European regions have been improving their economic position in the European context (Lazio, Piemonte and Campania in Italy, Attiki and Epirus in Greece, Provence-Alpes-Côte d'Azur in south-eastern France and Cyprus). Most of these regions have large metropolitan areas, but this has not been an absolute pre-condition for success, since metropolitan regions in the Iberian Peninsula have not improved their relative position. In terms of GDP per capita, contrasts remain significant by 2015, with most regions of the Iberian Peninsula (except Madrid, Catalonia and the Bask Region), of southern Italy, of Greece, Cyprus and Malta being far behind the regions of southern France and northern Italy. This reflects the fact that the Lisbon Strategy has not been efficient in the south-western and south-eastern peripheries of Europe, with very few exceptions.

As a result of the increase of oil and gas prices, peripheral regions of Southern Europe which are more depended on transportation have become less competitive. Large cities (Milan, Rome, Madrid, Barcelona, Valencia, Athens etc) and medium sized cities have been in a better position than the small, dispersed towns. Rural areas have been more affected by the new energy paradigm. This has become a major problem for Southern Europe because it includes many rural regions that are still very depended on agriculture. However, because of the comparatively favourable climate conditions, the Mediterranean regions (particularly the coastal and insular areas) could reduce the negative effects by developing the use of renewable energy sources (mainly solar and wind energy) and promoting tourism.

Support to the TEN-T networks in more peripheral countries and regions has benefited largely to a number of regions of Southern Europe, mainly to the Greek and Portuguese ones. However, as TEN-T networks have given priority to the connections between metropolitan areas, polycentricity at national level in Southern Europe has been reduced. Large cities in the more peripheral zones remained rather isolated in their development process and have not significantly benefited from network and synergy effects.

Climate change has had detrimental impacts on water resources in Southern Europe because of severe and sustainable drought in most countries and regions, with the progressive abandonment of dry lands, the reduction of energy supply in areas depending on hydroelectric plants and the rise of the risk of forest fires. These have generalised and destroyed irremediably traditional landscapes. The impacts of climate change have been detrimental to the economy of numerous rural regions. Drought has severely reduced agricultural production. Tensions for water have intensified (i.e. in Spain, between developed regions that need water and not developed regions than can provide more water). Water pollution has generally been reduced (even in industrialised areas). However, intensification of agricultural production has been causing a rise in nitrate diffusion levels, such as in northern Italy. Not only the intensity, but also the frequency of heavy rainfalls has been causing important damages. Natural (especially coastal) areas have been subject to stronger pressures because of the development of tourism and second homes. Winter tourism has regressed in the mountains (Pyrenees) of Southern Europe, because of increasing average temperature. Gated communities have emerged in tourist resorts.

²⁴ Mediterranean region, Archimede, South-West Europe

Conclusions: territorial issues arising in 2030 from the baseline scenario

Europe-wide level

Significant regional economic disparities still exist in Europe by 2030, but less between East and West, as it was the case in the early 2000s, and more between metropolitan areas and remote rural regions with low attractiveness. New global economic integration zones did not emerge. Instead, the pentagon has been widening along major corridors, encompassing a number of additional metropolitan areas. The wider pentagon is by far the most competitive part of the European territory. Differences in global accessibility between the wider pentagon and peripheral areas remain significant by 2030 and are accentuated by the strong increase in the cost of transport (oil). Outside the wider pentagon, the level of economic development is more modest (except a few large metropolitan areas and some tourist regions). It is however much more modest in the East than in the West. The catching up process of weak and/or peripheral regions which generally took place after EU accession proved not to have a long-lasting character. After a period of 10/15 years following accession, a differentiation process took place between regions with large metropolitan areas and those with a more rural character. A significant amount of EU public resources allocated to weak regions (various types of infrastructures) has not generated significant amounts of private investments (weak leverage effect). Pressure of illegal immigration is significant in most countries, but especially in those along the Mediterranean and eastern borders

Intermediate level

The level of polycentricity has been diminishing in the new member countries of central and Eastern Europe and, possibly, in a number of western, less developed regions. In the new member countries, the relative accessibility of areas along major corridors has increased. In more remote areas, it has been reduced. Networks of cities have consolidated in certain transnational areas (Baltic Sea Region; Triangle of the CEEC), but not in all transnational cooperation areas. In some of them, transnational integration is still weak and few economic and technological synergies have developed. In a number of regions belonging to both East and West, the level of population ageing by 2030 is such that it generates a spiral of global decline and that revival strategies are difficult to implement. In a number of Southern regions, the lack of prevention and adaptation measures related to climate change has produced long-lasting and substantial economic and environmental damages, especially in rural areas.

Local/regional level

The internal differentiation of cities has been strongly increasing, with urban areas becoming more and more attractive and others more and more repulsive. Differences in real estate prices within cities are such that they accentuate the segregation process. Gated communities have been developing. Problems of economic, social, educational/cultural integration of young population from immigrant groups have increased in various cities and have contributed to reducing their attractiveness and competitiveness. Numerous retirees and self-employed have moved from cities towards attractive rural areas, where rents and real estate prices have strongly increased, generating housing problems for the local population. A number of attractive coastal areas and mountain valleys are facing strong densification and urbanisation processes generating pressure on traditional landscapes and on natural areas. In fertile rural areas, the intensification of large-scale agriculture (export-oriented productions, energy crops) generates environmental problems (ground water pollution, soil erosion).