Strategic Evaluation on Transport Investment Priorities under Structural and Cohesion Funds for the Programming - Period 2007-2013

No 2005.CE.16.AT.014

Synthesis Report

Final

Client: European Commission, DG REGIO

ECORYS Nederland BV

In co-operation with:
Spiekermann & Wegener (Germany)

and:
Allied Progress Consultants (Czech Republic), Breshkov (Bulgaria), Consultrans (Spain), Cycleplan (Estonia), ECORYS Polska (Poland), Fundeuropa (Portugal), Omega Consult (Slovenia), Trademco (Greece), Transman (Hungary), Transport Research Institute (Slovak Republic), STDO (Romania)

Rotterdam, October 2006

ECORYS Nederland BV
P.O. Box 4175
3006 AD Rotterdam
Watermanweg 44
3067 GG Rotterdam
The Netherlands

T +31 (0)10 453 88 00
F +31 (0)10 453 07 68
E netherlands@ecorys.com
W www.ecorys.com
Registration no. 24316726

ECORYS Transport
T +31 (0)10 453 87 59
F +31 (0)10 452 36 80

Table of contents

Preface

Developing the transport infrastructure in Europe is seen as one of the key factors in stimulating economic development and integrating countries in the European Union. Large sums have been invested by the EU in this area and substantial financing will take place in the future. The total Commission's budget on structural development and cohesion for the 15 member states which are subject to this evaluation exceeds 200 billion Euros for the period 2007-2013. A major part of the budget will be spent on investments in transport infrastructure.

Despite these massive investment budgets, transport needs are even larger and choices have to be made on priority projects. For this reason the Commission has started a strategic evaluation on transport investment priorities in the 15 cohesion countries in the next programming period. A strategic evaluation on this scale is relatively new and has proven to be challenging both from a theoretical and practical point of view.

The current report is the reflection of this strategic evaluation. The study was carried out in the period September 2005 to June 2006, in close collaboration with country evaluator teams in all countries. The inclusion of prof. Michael Wegener and his collaborators of Spiekermann & Wegener proved to be indispensable for the current evaluation through the use of their SASI model.

The study would not have been possible without the assistance of a large number of people in both the Member States and the European Commission who have shared there valuable insight on the matter with us. We would like to express our gratitude to all of them.

A special word of thanks we would like to devote to the members of the Scientific Committee who gave guidance to our study team on the methodological approach and analyses in the study. This Scientific Committee consisted of Prof. Roger Vickerman UK), Prof. Piotr Kocelli (Poland), Mr. Jean Poulit (France) and Prof. Gines de Rus.

The evaluation has been carried out by an independent evaluation team. It should be noted that this report represents the views of the consultant, which do not necessarily coincide with those of the Commission.

Rotterdam, October 2006

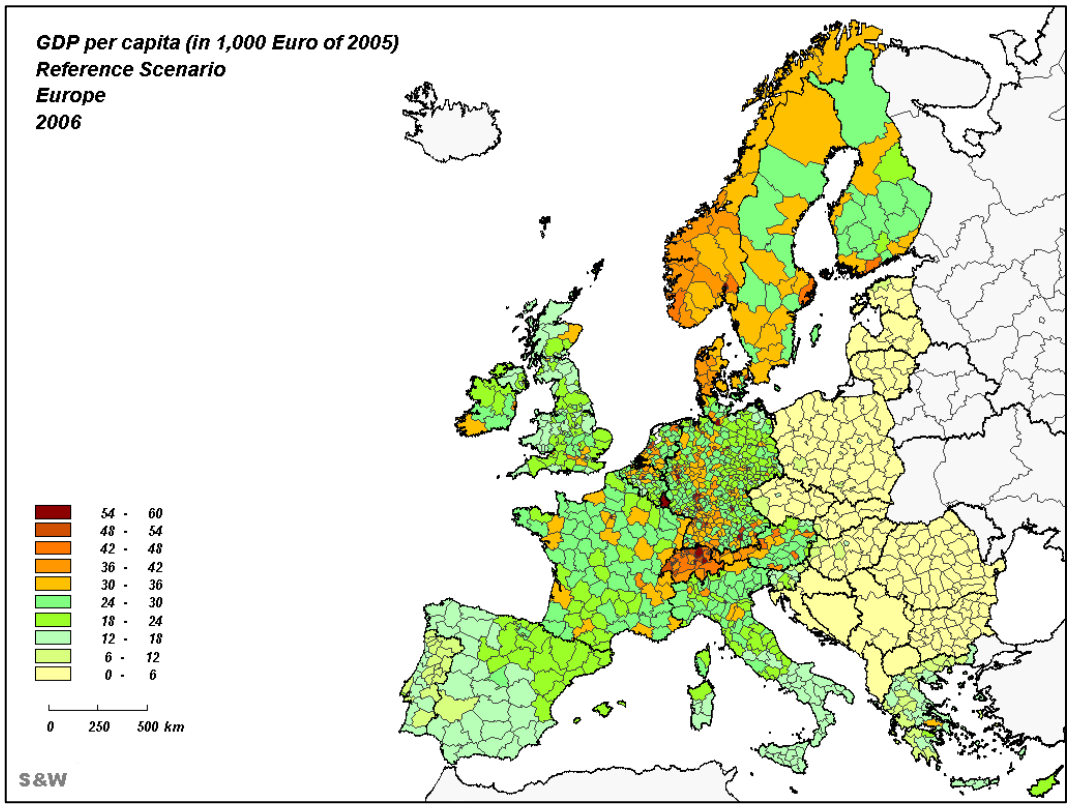
Executive Summary

Introduction

The large differences in GDP indicate the strong need for cohesion within the EU25

The recent enlargement of the EU to 25 Member States creates a new challenge with respect its Cohesion Policy. Disparity levels within the EU have increased substantially, and will further increase with the accession of Bulgaria and Romania in 2007. This is a clear point of attention as the Treaty states that, in order to strengthen its economic and social cohesion, the Community shall aim at reducing the disparities between the levels of development of various regions.

Figure 0.1 GDP per capita (Euro of 2005) 2006



Investing in transport fosters regional economic development

One of the key elements of the cohesion policy of the Commission is the contribution of the development of new transport infrastructure to regional economic development. Regions with better access to locations of input materials and markets will, ceteris paribus, be more productive, more competitive and hence more successful than remote and isolated regions. Extensive spending has taken place in this domain in ERDF, Cohesion Fund and ISPA.

For the new programming period 2007-2013 the Commission seeks to strengthen the strategic dimension of cohesion policy to ensure that Community priorities are better integrated into national and regional development programmes. For this reason the Commission has initiated strategic evaluation.

The Strategic Evaluation contributes to defining investment priorities

The current strategic evaluation on transport feeds in the process of determining transport investment priorities and the preparation of the national strategic reference frameworks and operational programmes. As such, it serves to enhance the quality, effectiveness and consistency of the Fund's assistance.

Three specific objectives have been formulated for this strategic evaluation:

- To provide an analysis of the situation in selected fields relevant to transport, using structural indicators across Member States, plus Romania and Bulgaria;
- To assess the contribution of Structural and Cohesion funds relative to the current and previous programming periods and draw lessons of relevance for the purpose of the study in terms of identification of potential shortcomings in the development of transport priority projects that might have hampered the utilization of those funds or their expected benefits;
- To identify and evaluate needs in the selected fields and identify potential investment priorities of structural and cohesion funds for the programming period 2007-2013.

Analysis of current transport system

The review of the present situation in the transport sector shows some interesting results with a view to future transport infrastructure investments.

Road

Motorway networks would merit further development and maintenance of the existing network is troublesome

The motorway network is not very well developed in most CF15 countries (with the exception of Cyprus, Spain, Portugal and Slovenia). Densities are in general lower than the EU average. A separate analysis on the accessibility (the Red Flag analysis), where the need has been assessed on the basis of a composite Accessibility Problem index, which combines aspects on network quality with population density and regional disparity gives a more positive indication with respect to road accessibility in most new EU member states and indicates that it is generally better than the density data indicate. A main problem in many new Member States is the generation of sufficient funding for proper maintenance of the road network. This may partly be related to the in some cases still large national networks to be maintained by the road administrations and backlog maintenance issues.

Rail

Dense networks are of poor quality and further deregulation and liberalisation is essential

The rail network in the new member states is quite dense, when compared to the motorway network or the rail network in the old member states. However, as the red flag analysis shows, operational speeds in the railways are generally low due to deficient infrastructure (e.g. single tracks, non-electrified tracks). In some cases such deficiencies are also caused by lack of maintenance. Besides upgrading of infrastructure and services, also rationalisation of the network may be required in some cases. Generally, the EU

border and coastal regions suffer most from low road and rail accessibility. This holds in particular for railways, but also for roads. What is important for rail transport is the urge to deregulate and liberalise the rail sector in order to enhance its competitiveness.

Inland waterborne transport

IWT is mainly focused on the Danube river

Inland water transport services are only carried out in substantial amounts along the Danube. It appears that there are bottlenecks, some of them outside the EU, which prevent reaping the full benefits of river transport potential.

Air

Air transport is increasing rapidly with a diminishing role of the public sector

Air passenger transport is rising fast in Europe including the CF15 countries and is, or is becoming, vital to economic development, in particular of the tourist sector in the Mediterranean (and Black Sea) countries. The public role in this sector is less dominant than in the past, with many private operators being active. The public role remains important, though, in terms of provision of infrastructure and safety/security measures.

Urban transport

Urban Transport is one of the key areas to combat urban congestion problems

Urban transport is another component of the transport system in the Member States which deserves attention. Increasing car ownership combined with growth patterns which at times appear to be concentrated around the major urban centres, create an increasing pressure on the public urban transport systems in many larger urban settlements.

In general transport policy follows EU policy

The transport policies of most new Member States are following the policy priorities of the EU in terms of separation of infrastructure and operations in rail, application of (road and rail) infrastructure user charges, stimulating public service obligations and sustainable transport, and are taking measures to improve road safety. Such policy objectives are, however, not always sustained by effective measures. In various fields and countries stronger, more effective measures will be needed to realise the objectives.

Past experiences with transport investments

EU support to CF15 amounted to 31 bn€ in the period 1994-2004

During previous programming periods of the Cohesion and Structural Funds in the older Member States a shift in emphasis can be seen with respect to transport infrastructure investments. Whereas in the first periods the emphasis was particularly in road projects, this has shifted towards rail infrastructure in later years, in particular in the Cohesion Fund. The new member states show a similar pattern with a stronger focus on road projects in the first years of the Cohesion Fund.

EIB funding was even larger at 50 bn€ in the same period

Next to the Cohesion and Structural Funds various other sources of funding are available. In particular EIB is an important source of funds, having provided some € 50 billion for transport projects in the period 1995-2004 in the CF15 countries (as compared to EU support of € 31 billion for transport investments in the same period). Almost half of this amount went to the road sector (45%), while the remainder is divided over rail (20%), metro (18%) and ports (14%).

PPP experience is still limited to a few large projects, but increasing

Another potential source of financing is the private sector. Until today however, the number of public-private partnerships has been limited to a few large projects.

Different studies indicate the positive long term economic effect of these investments

Various studies have been carried out recently on the impact of (transport sector) investments under the Structural Funds. Reviewing the evidence of the various studies, it can be concluded that economic modelling geared at capturing the net economic effect of infrastructure investments is still developing. Although positive effects have been found of infrastructure investments, these are partly due to demand increased associated with the investments, while at the same time negative macro economic effects can be noticed at the macro economic level. Nevertheless, invariably positive long term effects are found in the modelling studies, which in some cases can be substantial. At the same time, however, it is also clear that the effect of the CP/CF funding should not be overrated. Such funding cannot do more than marginally help to narrow the gap between income levels in CF countries and the EU-average.

Investment priorities 2007-2013

Priorities should fit in the Community Strategic Guidelines, and ..

The context for identifying strategic investment priorities is set by the Community Strategic guidelines. These give the priorities of the Community with a view to promote balanced, harmonious and sustainable development. In addition to these strategic guidelines a number of other factors shape the eventual establishment of transport investment priorities. These other factors include:

... are determined on the basis of various factors

- Costs and benefits of projects;
- Availability of other sources of funding;
- Appropriateness of transport policy
- Administrative capacity to adequately absorb and manage funds.

Key impacts are assessed on competitiveness, cohesion and sustainability

An important aspect of assessing the importance of different investment opportunities is the extent to which they impact on different criteria. Three criteria have been identified which correspond with the core objectives set out in the Strategic Guidelines. These are:

- Competitiveness,
- Cohesion
- Sustainability.

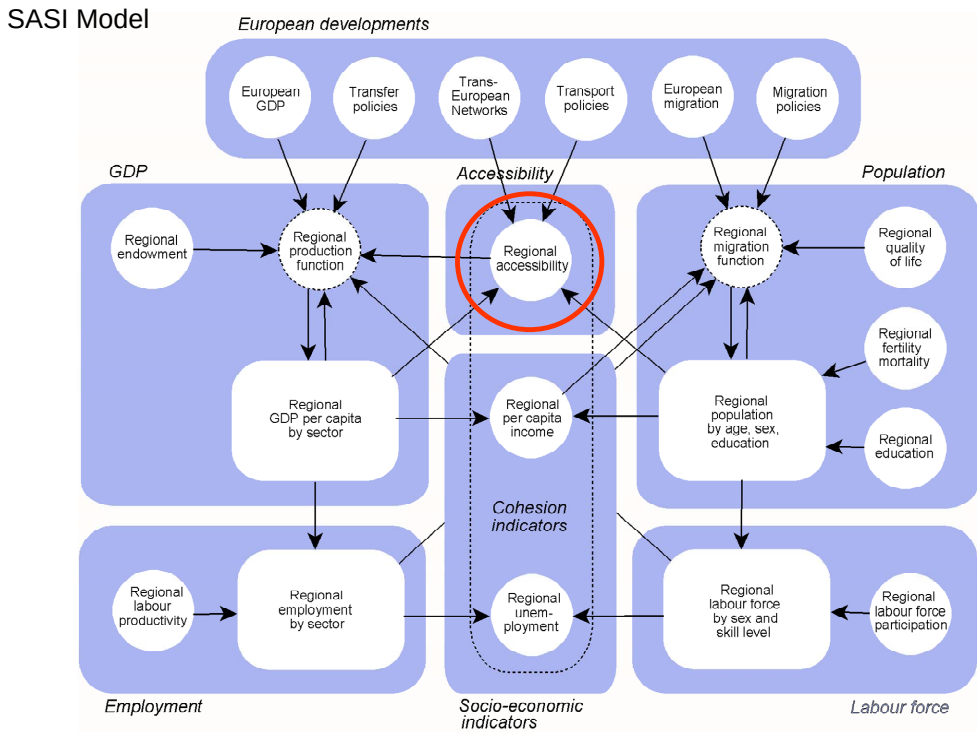
To assess these impacts scenarios have been constructed, which are assessed on their merits with respect to each of these core objectives.

The SASI model is an regional economic model used to assess the different impacts

The impacts are assessed with the SASI model. The SASI model is a recursive-dynamic simulation model of socio-economic development of 1330 regions in Europe. The model was developed to assess socio-economic and spatial impacts of transport infrastructure investment and transport system improvements. It has been applied and validated in several large EU projects including the IASON and ESPON projects.
Figure 0.2 presents the main sub-models of the SASI model and their interactions

Many of the spatial impacts modelled in SASI are long term effects: location decision of firms result in changes in economic activity and employment only after some time, and secondary effects of economic activity, such as the attraction of other firms, take even longer. The SASI model is specifically relevant for projects that serve a function on a European level (e.g. the TEN projects). Such projects cannot be adequately evaluated using traditional cost-benefit analysis on a national scale, since they are less able to capture the international effect and the indirect effects occurring in non-transport sectors.

Figure 0.2 Main structure of the SASI model



Impacts by country

The SASI model has been used to assess the impacts of the various investment scenarios on the objectives of cohesion policy. Various indicators have been used to assess these impacts, of which the following will be used in the next sections:

- *Competitiveness*: GDP per capita, average speeds of interregional road or rail trips
- *Territorial cohesion*: Gini-coefficient of distribution of accessibility and GDP per capita among the countries regions.
- *Sustainability*: the share of rail in interregional passenger trips

Different investment scenarios are applied

Besides the Reference scenario, which reflects all projects that are already under construction and will be operational in at latest 2007, the following investment scenarios have been developed:

- The **Maximum** Scenario, which comprises a listing of possible projects[1] that have been identified in the respective countries;
- The **Balanced** Scenario, which applies a budget restriction (with in parallel an assessment of additional financing opportunities). Projects are prioritised on the basis of their benefit-cost ratio and their contribution to specific objectives and needs (sustainability, regional disparity, and contribution to accessibility[2]).

[1] The impact assessment in SASI has only been done on a selected set of road and rail projects. This is done because these sub-sectors in general will receive the majority of funding and an assessment of their impacts can be done without having to go into too much project detail. It is assessed that this approach gives sufficient feedback on the potential impacts.

[2] Are projects solving “missing links” in the network.

On the basis of the maximum scenario, two sub-sets are determined: the **Maximum Road** Scenario and the **Maximum Rail** Scenario which illustrate the differential impact of rail versus road projects.

Results

Transport investments typically raise GDP with 0.2%-0.6% (if countries are assessed individually), ...

Table 0.1 shows the effects on GDP per capita of the various investment scenarios. As GDP will grow substantially between 2006 and 2031, the 2031 levels in the Reference scenario are quite different from present day levels. In this growth perspective the impact of the infrastructure improvements on GDP per capita is generally modest. Although the impact differs by country and scenario, typically the investments foreseen result in an increase in GDP per capita of between 0.2 and 0.6 percent compared to the Reference Scenario in the same year. Relatively high impacts are found in Latvia, Lithuania and Romania.

Table 0.1 Impact of transport infrastructure investment scenarios on GDP per capita (Euro); per individual country

		Scenarios				
		Reference	Maximum Road	Maximum Rail	Maximum	Balanced
	2006	2031	2031	2031	2031	2031
High impact						
Lithuania	2,390	4,361	4,362 *+0.2%*	4,442 *+1.9%*	4,443 *+1.9%*	4,440 *+1.8%*
Latvia	3,108	6,490	6,491 *+0.0%*	6,603 *+1.7%*	6,604 *+1.8%*	6,595 *+1.6%*
Romania	1,693	3,528	3,570 *+1.2%*	3,548 *+0.6%*	3,589 *+1.7%*	3,570 *+1.2%*
Czech Republic	6,525	15,180	15,228 *+0.3%*	15,234 *+0.4%*	15,281 *+0.7%*	15,287 *+0.7%*
Poland	5,158	14,003	14,086 *+0.6%*	14,055 *+0.4%*	14,136 *+0.9%*	14,121 *+0.8%*
Portugal	13,814	28,075	28,113 *+0.1%*	28,475 *+1.4%*	28,512 *+1.5%*	28,284 *+0.7%*
Hungary	6,263	14,906	14,947 *+0.3%*	14,951 *+0.3%*	14,992 *+0.6%*	14,992 *+0.6%*
Moderate impact						
Greece	13,739	21,548	21,590 *+0.2%*	21,594 *+0.2%*	21,635 *+0.4%*	21,625 *+0.4%*
Malta	10,677	21,657	n.a.	n.a.	21,751 *+0.4%*	21,749 *+0.4%*
Spain	18,660	30,914	30,947 *+0.1%*	31,050 *+0.4%*	31,083 *+0.5%*	31,021 *+0.3%*
Slovakia	4,909	11,952	11,970 *+0.2%*	11,960 *+0.1%*	11,978 *+0.2%*	11,981 *+0.3%*
Slovenia	14,309	27,276	27,310 *+0.1%*	27,278 *+0.0%*	27,312 *+0.1%*	27,307 *+0.1%*
Bulgaria	2,012	5.344	5,364 *+0.4%*	5,360 *+0.3%*	5,379 *+0.6%*	5,350 *+0.1%*
Estonia	4,543	9,002	9,015 *+0.1%*	9.144 *+1.6%*	9,156 *+1.7%*	9,015 *+0.1%*
Cyprus	18,192	33,670	n.a.	n.a.	33,680 *+0.0%*	33,677 *+0.0%*

... mainly as a result of accessibility improvements in road, ...

The impact of the investment scenarios on average interregional road speeds is larger: in many countries the investments in the Maximum Road scenarios increase road speeds by 5-10 percent. Somewhat lower impacts are found in those countries where average road speeds are already relatively high (Spain, Portugal and Slovenia). Highest potential impacts are expected in Bulgaria, Czech Republic, Romania and Poland.

… and rail transport.

The absolute levels of average interregional rail speeds are substantially below those of roads. The impacts of the scenarios, in particular the Maximum Rail scenario, on these rail speeds are generally larger than on road speeds and around 10 percent. A particular strong improvement can be noticed in the maximum scenario case of Portugal (some 35 percent).

Territorial cohesion

Territitorial cohesion within countries is limited as all regions profit from increased accesibility

The investments in the various scenarios have limited impact on the income distribution as measured by the Gini-coefficient of GDP per capita of the various regions. It thus appears that all regions within a country profit from the increased accessibility and the ensuing economic growth.

European synergies

European impacts of investment in transport are pointing to the strong synergy and cross border impacts of these investments.

Table 0.1 showed the national effects of the projects in the particular country. However, the total effect of transport infrastructure investments is usually larger, as they also have impact on the accessibility of neighbouring countries. Table 0.2 compares the effects on GDP per capita in the Maximum and Balanced Scenarios of the European scenarios (in which all project in all countries are implemented) on the fifteen CF15 countries with those in the Maximum and Balanced Scenarios of the national scenarios (only countries in the country itself plus adjacent cross-border connections are realised). The comparison clearly confirms that for all countries the effects in the European scenarios are much larger than those of the national scenarios.

Table 0.2 European synergies: Impact on GDP per capita (all projects, all countries)

	National Scenarios		European Scenarios	
	Maximum	Balanced	Maximum	Balanced
	2031	2031	2031	2031
High impact				
Lithuania	*+1.9%*	*+1.8%*	*+2.7%*	*+2.5%*
Latvia	*+1.8%*	*+1.6%*	*+2.7%*	*+2.1%*
Romania	*+1.7%*	*+1.2%*	*+2.6%*	*+1.8%*
Czech Republic	*0.7%*	*+0.7%*	*+1.2%*	*+1.2%*
Poland	*+0.9%*	*+0.8%*	*+1.4%*	*+1.2%*
Portugal	*+1.5%*	*+0.7%*	*+2.0%*	*+1.0%*
Hungary	*+0.6%*	*+0.6%*	*+1.6%*	*+1.4%*
Moderate impact				
Greece	*+0.4%*	*+0.4%*	*+1.0%*	*+0.7%*
Malta	*0.3%*	*+0.3%*	*+0.4%*	*+0.4%*
Spain	*+0.5%*	*+0.3%*	*+0.6%*	*+0.4%*
Slovakia	*+0.2%*	*+0.3%*	*+1.2%*	*+1.0%*
Slovenia	*0.1%*	*+0.1%*	*+0.8%*	*+0.7%*
Bulgaria	*+0.6%*	*+0.1%*	*+1.6%*	*+0.9%*
Estonia	*+1.7%*	*+0.1%*	*+2.2%*	*+1.4%*
Cyprus	*0.0%*	*+0.0%*	*+0.0%*	*+0.0%*

Conclusions

The analysis reveals that in general impacts are strongest in smaller countries where the relative impact of transport investments is large, especially if these investments succeed in connecting countries to the economic core of Europe. If these countries are surrounded by other European countries where transport is further developed the impact is getting an additional impetus. An important conclusion is the large European impact of projects outside the country in which the investment takes place, in particular if these investments fit within European transport corridors. This clearly identifies the strong need for cross-border co-ordination in realising these corridors.

Conclusions & recommendations

On the basis of the assessment a number of guiding principles and recommendations can be defined in prioritising transport investments for the period 2007-2013 which have clear relevance for all different countries involved. Apart from advice on the prioritisation of projects, a number of recommendations are formulated which should aid the implementation of these projects in practice and contribute to the success of the cohesion policy in the European Union.

Address missing (European) links

A key notion in prioritising transport investments is to address missing links in the networks. The benefits of constructing of a missing link are much wider that the user benefits on the section alone, as network and spill-over effects will be substantial. This is comparable to putting the last bolt in a machine which makes it working. A relatively small additional investment may generate large benefits.

With respect to the completion of network the analysis shows that the projects generate substantial cross-border impacts: the European impact of projects is generally double the national impact. These cross border effect is stronger for projects that clearly address a substantial European dimension. In this light it is recommended:

- To concentrate CF investments on roads with a substantial European dimension. This implies focussing on European corridors (including cross border sections) and less on roads that are primarily of national importance. In order to set such priorities, it is recommended that DG REGIO identifies the main priority axes in each of the CF countries and concentrates a large part of the funding on these. Clear reference in this respect is made to the 30 TEN-T priority projects that have already been identified by the Commission.
- With respect to rail transport especially rail freight has a clear European dimension (important role in longer distance freight transport). Passenger transport is mainly important from shorter distance nationally oriented inter-urban transport. Investments in rail networks for freight movements can only be effective if an integrated corridor approach is taken, in which the investments are a part of comprehensive plan to develop the corridor, including operational, safety and service improvements. As the CEE CF countries still have a relatively large rail share in freight movements, while rail passenger services are already limited, the rail network might be divided into freight corridors and passenger sections, each deserving different forms of attention. It is recommended that rail master plans are developed by member states, in which integrated plans are formulated and prioritised. Such plans could form the basis for projects to be financed from CF. Again in this respect also reference is made to TEN-T prioritiy projects.

Enhance cross-border co-ordination between projects

Strongly related to this issue is the need to enhance cross-border co-operation. If the timing of connecting parts of infrastructure in different countries deviates strongly, benefits of earlier investments can only be partly realised. Examples of this issue can be found at many places, for example in motorway development in border regions of Czech and Poland and Slovenia-Croatia. The Commission has already clearly realised the importance of this co-ordination and has, for example, established TEN-corridor coordinators, although these only partly address the corridor investments relevant in the CF15 countries.

Nevertheless the characteristics of the programming system in which countries individually define to a large extent their own programming priorities will automatically lead to these failures in cross-border co-ordination. Not only because different bottom-up programming in different countries leads to differences in timing, but also because the importance of completing corridors differs between countries. In general, a country will be more inclined to invest in a connection to the core of Europe than in a missing link toward more peripheral neighbouring countries.

With respect to cross-border co-ordination between projects a number of practical recommendations are made:

- Create more favourable financing conditions for projects that have been identified as serving a clear European interest (especially in those cases where benefits are not fully realised in the country itself). Examples could be TEN-T budget mark-ups for joint cross-border projects, or further differentiation in support rates;
- Tie EU financial support to the condition to develop less attractive parts of the network (adopt a more holistic approach and not an approach per section);
- Establish truly cross-border project organisations which develop a joint planning, and possible tendering. Examples of this type of organisations are the secretariats that are formed for certain European projects (e.g. corridors, Via Baltica, Danube). Essential is that these secretariats have sufficient mandate, financing and political commitment in the countries that are supporting the secretariat. The possibility created by the Commission to establish a European Grouping of Territorial Cooperation (EGTC)[3] also suits this purpose.
- One step further would be to establish an EU organisation for projects which are hard to realise from a national perspective but are of clear European interest. Such an organisation would also need to have a clear mandate and access to funding;
- Draft best practices which serve as examples to be followed

Also the organisational setting of DG REGIO itself, by being organised in different geo-units contributes to this. Further internal co-ordination within DG REGIO on border-crossing projects is advisable. For example:

- Identify a list of EU important multi-country projects. The TEN-T priority list serves as a good starting point. Oblige countries to indicate how cross-border co-ordination is realised;
- Establish co-ordinating points within DG REGIO for projects that match with corridors for which no TEN-T coordinators have been appointed;
- From each geo-unit: identify projects which are cross-border relevant and liaise with relevant geo-unit involved in connecting country at programming stage;
- At the project definition phase apply additional check, possibly assisted by external technical assistance, on cross-border co-ordination (process but also technical);

Connect networks to improve intermodality

Often it is thought that investment in more environmentally friendly modes, by adding additional sections to the network is a stimulus in creating more demand for multimodal transport. To the extent that this is alleviating bottlenecks this is most definitely true. However, an often undervalued aspect of intermodality is the lack of interconnections between different modal networks. Typical examples are a lack of (or badly connected) intermodal freight terminals, or bad connections between the rail network and ports.

Concrete recommendations in this respect are:

- To commission studies per country to identify the most relevant bottlenecks or to require specific attention to this aspect in country specific strategic planning documents (e.g. OP related support documents).

[3] See Regulation (EC) No 1082/2006 of 5 July 2006.

- Related to this would be the idea to give further guidance on specific issues (content-wise) which need to be addressed in each programming documents (give format and prescribe indicators to be presented). This would enhance the comparability and quality level of the different countries, which obviously always will show a certain level of differentiation.

Invest in smart sustainable transport

With economic growth and improved accessibility, transport demand will continue to grow rapidly. This will put an increased burden on society as emissions and other negative impacts, such as noise and congestion, will increase. There is a clear need to stimulate sustainable transport and promote environmentally friendly transport modes. In the past this has for example led to specific requirements by the European Parliament in the Cohesion Fund that rail projects should receive half of the funds (and roads the other half). This does not per definition always lead to the best projects for a country.

It is advised to identify projects in this field which generate the highest impacts. This do not always have to be rail projects, but can also be port projects (motorways of the sea) or urban transport projects. Typical high impacts projects are:

- Projects which address a bottleneck in the transport chain. This can be missing links, but also access points to existing networks (e.g. river ports, multimodal logistics centres), or sub-optimal performing nodes (e.g. ports with insufficient capacity);
- Projects which increase the utilisation of infrastructure. This includes improvements in the access to existing networks, increased quality and competitiveness of both the physical infrastructure and the services which are offered, the introduction of traffic management systems and traveller information systems.

For rail transport it is suggested to invest in international freight corridors. With respect to passenger rail sections, a rational approach is recommended. This means that alternative measures for providing public transport should be scrutinized. Assistance to passenger rail services and network sections should be tied to a well functioning PSO system

The role of IWT and short sea transport should not be neglected. Although less involvement of the government is needed in this sector than in the rail sector, the CF may concentrate on financing those parts which are less attractive for private financing, i.e. river infrastructure works, access roads/railways to ports etc

Urban transport projects can alleviate serious congestion (and environmental) problems in urban environments. Urban transport projects involving the extension of metro, tram or urban bus/rail services, could be made more effective by applying congestion charging schemes or stricter parking policies. It is recommended that financing of such investments is made dependent on such policies or citywide plans to combat urban congestion. An integrated approach addressing transport, energy and environmental issues at the same time is thought to be effective in this respect. Not only investments in physical infrastructure are suggested to be considered, but also investments in rolling stock to replace ageing fleets.

Examine new technologies to utilise existing infrastructure

Investments which improve the utilisation of infrastructure have been indicated as potential high impact investments. These include the use of Intelligent Transport Systems (ITS) and improved traffic management. Especially in congested urban areas the opportunities for investments in this area are promising as the space for physical expansions of infrastructure is scarcer and more expensive. It can also be used in modernising the transport system and hence enhance its attractiveness (e.g. improved traveller information in rail and urban transport).

Focus investments

In general, a large fragmentation of investments is expected to be less effective than a focused approach. Make a clear distinction in which parts of the network has to offer which functionality. For roads and rail this is related to a clear distinction between the trunk network and the secondary network. It is not necessary to turn every road into a motorway. Focus the backbone network on connections between main population centres and international corridors and led the secondary network function as a feeder and distribution network. A similar principle holds for nodal networks of ports and airports. Not all ports and airports are equally important and not all regions need to possess an airport with offers the same functionality.

This may even lead to the recognition that parts of the current network where are lowly utilised have to be closed down since these put a heavy financial burden on the existing organisations blocking further progress. This is for example valid for some of the new Member States which have inherited dense rail networks.

Focused investment can also have positive impacts on the administrative capacity (on the condition that an adequate project organisation is being set up) to manage and prepare projects, since it is easier to investment in project management for large projects which show some level of continuation over a longer period.

A pragmatic approach to stimulate a focused approach is the introduction of a minimum project size.

One of the counter-effects of focusing on large project alone is that is the risk that these projects absorb all capital available in a country which may lead to crowding out effects for smaller projects. In this context it is recommended to reserve part of the total budget for smaller scale projects. One of the ideas in this respect could even be to set up a specific funding facility/window in the beneficiary countries for smaller projects, for which part of the funding is reserved.

The absorption capacity of the national engineering/civil works market is another point of attention. In those cases where the national market is still restricted adequate phasing of different investment should be considered. However also sufficient opening of the market (e.g. by real open international tendering) is a clear point for attention. Examples in other countries (e.g. Hungary) have shown that this can lead to significant cost reductions.

Address regional disparities within countries in a rational manner

The analysis reveals that the economic (cohesion) benefits of including links to sparsely populated remote areas is relatively low and significant effects on improving territorial cohesion are lacking. When investing in links to these regions, it is recommended to set up a set of social criteria which such investments needs to satisfy.

Apply an integrated project approach where possible

To optimise the impacts of projects as much as possible an integrated approach should be followed. To a certain extent this has already been addressed through the introduction of a programming approach, but this is in general at a relatively high level. Also on a project level it is strongly recommended to follow an integrated approach.

For example the impact of a railway project can be much larger if at the same time signalling and interoperability aspects (such as safety systems) are addressed. Or a motorway project is more effective if also the most important sources of traffic are connected (e.g. ports, logistics terminals, urban centres, main tourist areas etc.). A problem is not always due to a single cause but is quite often multi-faceted.

Fit projects in an appropriate institutional setting

Strongly related to the previous remark is that sufficient attention should be paid to the institutional and organisational surrounding of a project. Various analyses show that the impact of the EU funds can be optimised by ensuring that investments are made in an optimal institutional setting. If a project is completed but the institutional and organisational setting hampers the provision of adequate services or blocks the optimal use of the infrastructure, the effects of the investment will be strongly reduced.

This deserves sufficient attention in developing plans for investment. Investing in capacity expansion is also not always the answer. Modernisation and rationalisation of transport (including institutional reorganisations, deregulation and market access) can be equally or even more important, depending on the current state of the market and the country. Especially for rail and ports this is essential.

- In certain cases it is most definitely advisable to tie further reorganisations or market opening to giving support (make it conditional). For example, it is recommended that CF financing for rail freight corridor projects is tied to the opening of the network/corridors to foreign rail freight operators;
- In certain specific cases it may even be considered to use Structural Fund support to enable these reorganisation processes (e.g. fund redundancy schemes). This would require a careful consideration of the current eligibility rules;
- It is therefore recommended that the OPs include a progress report on the institutional setting, e.g. in light of the EU Rail Packages.

Involve private sector participation

The investment needs in most countries are significantly higher than the available funding. As a result not all growth potential can be realised. Involving the private sector can lead to an additional source of finance. Another advantage is that involving the private sector through PPP projects can increase the efficiency of projects if projects are put on the market in an adequate manner. PPP projects have traditionally a good record ob projects to be completed on-time, on-budget and to specification. When not only the

investment but also the maintenance phase is included in the concession the post-investment phase is better secured.

Private sector involvement is expected to show clear opportunities for port, air and road investments. With respect to road investments there may be ample scope for private involvement in terms of toll road concessions or PPP as road use may increase fast in the near future.

Such potential should be shown in the OPs. It there are bottlenecks in allowing such (financing) constructions in CF countries it is recommended that the OPs show how they will be solved in the programming period.

Another recommendation would be to gather sufficient knowledge in each Member States. Setting up specific PPP task forces or PPP centres clearly aids in this respect.

Finally JASPERS could be used. JASPERS is a joint initiative of the Commission, EIB and EBRD which aims at preparing major project. It allows project sponsors make use of the vast experience and expertise of the EIB and EBRD. Both organisation have gained ample knowledge and experience with PPP projects in the past (on the do's and don'ts, but also on contract forms, concessions contracts etc.). Advice on structuring PPPs is explicitly mentioned as one of the activities of JASPERS.

Look beyond the investment phase

A typical risk attached to any investment programme is that it focuses on the investment phase alone and does overlook the operation & maintenance phase after the construction has been completed. Risks attached to this are insufficient attention to the transport services which are offered, factors which influence the demand level (e.g. the price level), but also the financial (and institutional) sustainability. If insufficient guarantees or revenue streams are built in the risk exists that benefits of the project can only partly attained or the continuity of the investment on the medium term is endangered.

A specific recommendation in this respect is that a maintenance financing plan should be part of the investment. For road transport this may for example involve the incomes from road pricing in the form of a vignette system. All plans for upgrading of infrastructure should include a financial plan for future maintenance needs.

This aspect should be more explicitly built in the assessment of projects (as part of the quality assurance).

Apply CBA and use it in prioritisation of projects

Integrated in the assessment methodology of investment projects that are funded by the Commission is the application of a cost-benefit analysis for large projects. Often these CBA measures are used to assess whether a projects passes a certain threshold level. To prioritise a programme on a project level it is advised to compare (high level) CBA outcomes between different projects. Selected projects can than be subjected to a more elaborate CBA.

Improve the quality assurance of proposed projects

This recommendation is not new. Also in the ex-post evaluation of the Cohesion Fund a strong call was made to improve this aspect in order to improve the quality of projects. The reason why it is repeated here, is that the first experiences with the increased influx of funding generates similar problems for new receivers as where identified in the early days for the "old" CF Members States. Since this may greatly endanger the quality of the projects and implementation this recommendation is repeated.

Specific points for attention are:

- Adopt a multi-annual planning approach in which both project preparation and implementation are planned on a multi-annual time frame;
- Create a pipeline of projects;
- Request active public consultation before submission of application;
- Request fully developed technical (design and feasibility) studies before application. This also includes sufficient attention to the environmental aspects of a project. This could be improved by creating a special facility for technical feasibility studies;
- Apply more rigorous traffic forecasting, as this is a major weakness in many project assessments;
- Request good quality CBAs. Too often standard (non project specific) are used or the assessment of impacts is poor and external effects (including environmental effect) are not included. Possibly further assistance can be supplied in this respect (also aiming at further harmonisation across countries);
- Request appropriate risk assessment before submission;
- Apply technical quality assurance on applications for financing. If relevant develop a standard technical checklist in this respect;
- Approve only projects which are close to or have completed tendering (this would require a system of pre-funding at the member states to avoid unnecessary start-up delays);
- Offer beneficiaries methodological support (SF/CF manuals, CBA, impact & performance indicators, technical advice).

A specific point of attention is the use that can be made of JASPERS. This initiative has been specifically set up to enhance the maturity of projects and improve the quality of proposed projects. Use of JASPERS could even be made obligatory for projects above a certain size.

Enhance the administrative capacity

The analysis of the administrative capacity reveals that many CF15 countries are confronted with apparent deficiencies.

Specific issues are the quality and quantity of the staffing and continuity. A number of recommendations can be made:

- Establish separate project or programme organisations or agencies for major projects (or a series of projects in a specific field). This would not only allow additional flexibility with respect to recruitment and labour conditions for staff,

but also allows to build sufficient expertise and knowledge, without being subtracted by other (policy) duties or tasks.

- The Commission should consider the option to directly co-finance outsourced management as part of the total costs of a project;
- Require HR development plans to be made for the administrative bodies involved, concurrent with the OPs. These HR plans should outline how the organisations will keep their staff at the required level (both in numbers and knowledge and what (financial) measures will be taken to ensure this.
- If outsourced management or own sufficient staff experience is not available make use of technical assistance either through an own framework contract for TA or by the Commission's framework contract. Again JASPERS could also be used as a source of expertise.

Other recommendations with respect to the institutional/management capacity include:

- Require a clear delineation of responsibilities (avoid overlaps) between administrative bodies. Establish a transparent and straightforward organisational model with limited layers and sufficient access to technical know-how. Also in this case the outsourcing of (part of) the management to separate bodies/organisations should be considered. This could even go as far as to outsource the management of programmes as is being done for the Structural Fund in various countries.
- Put additional efforts in solving any remaining inadequate legal provisions, e.g. with respect to public procurement, expropriation of land for construction purposes and the issuing of permits for construction.
- Connected to this, establish training of local, regional and central institutions to overcome a lack of experience with new legislation in this respect and offer assistance at a central level.

1 Introduction

1.1 Cohesion policy and transport infrastructure

Cohesion policy

The recent enlargement of the EU to 25 Member States clearly creates a new challenge with respect its Cohesion Policy. Disparity levels within the EU have increased substantially, and will further increase with the accession of Bulgaria and Romania in 2007. This is a clear point of attention as the Treaty states that, in order to strengthen its economic and social cohesion, the Community shall aim at reducing the disparities between the levels of development of various regions and the backwardness of the least favoured regions or islands, including rural areas. This aim lies at the core of the Commission's regional policy.

Achieving this objective has triggered substantial spending through the Commission's Structural Fund and Cohesion Fund instruments (and ISPA funding in the pre-accession phase). For the next programming period 2007-2013 support for Cohesion Policy will be further streamlined.

In light of the lessons learnt, as well as the Lisbon and Gothenburg agendas, the Commission proposes that actions supported by Cohesion Policy should focus on investment in a limited number of those Community priorities, where intervention can be expected to bring about a leverage effect and significant added value.

The proposal for a regulation laying down general provisions of the ERDF, the European Social Fund and the Cohesion Fund[4] for the next programming period (2007-2013) indicates a focus on a limited number of thematic priorities. The type and range of actions to be financed within each priority shall reflect the different nature of the "Convergence", "Regional competitiveness and employment" and "European territorial cooperation" objectives.

The proposed instruments for the "Convergence" objective are ERDF, ESF and Cohesion funds and a total of € 164 billion is allocated for the period 2007-2013, of which ERDF and ESF account for 67% and the Cohesion Fund for 33%. The "Regional competitiveness and employment" is funded through ERDF and ESF (proposed amount of € 57.9 billion) and the "European territorial cooperation" objective is funded though the ERDF (proposed amount of € 13.2 billion)[5].

[4] COM(2004) 495 final.

[5] Working Document on the proposal for a regulation of the European Parliament and of the Council on the European Regional Development Fund - Committee on Regional Development - Rapporteur: Giovanni Claudio Fava- 17.01.2005

An important development for the period 2007-2013 is a revised delivery system[6] that aims at further simplification and decentralisation of responsibilities to partnerships in the Member States with programming being one of the cornerstones.

Cohesion policy and transport infrastructure

One of the key elements of the cohesion policy of the Commission is the contribution of the development of new transport infrastructure to regional economic development. Extensive spending has taken place in this domain in ERDF, Cohesion Fund and ISPA.

The important role of transport infrastructure for regional development is one of the fundamental principles of regional economics. In its most simplified form it implies that regions with better access to locations of input materials and markets will, ceteris paribus, be more productive, more competitive and hence more successful than remote and isolated regions.

However, the relationship between transport infrastructure and economic development has become more complex than ever. There are successful regions in the European core confirming the theoretical expectation that location matters. However, there are also centrally located regions suffering from industrial decline and high unemployment. On the other side of the spectrum the poorest regions, as theory would predict, are at the periphery, but there are also prosperous peripheral regions such as the Nordic countries. To make things even more difficult, some of the economically fastest growing regions are among the most peripheral ones.

TEN-T: Trans-European Transport Networks

In this situation, the European Union hopes to contribute to reducing the socio-economic disparities between its regions by the development of the Trans-European transport networks (TEN-T). The Community guidelines for the development of the TEN-T[7] have defined outline plans with a 2020 horizon for each country. The 10 new Member States and Romania and Bulgaria have been included in the Accession and draft Accession Treaties. Total required investment in the Trans-European Network is estimated at € 600 billion. As part of a broader review of these Community guidelines, a High-Level Group[8] has in 2003 identified the 30 priority projects of the TEN-T up to 2020[9] on the basis of proposals from the Member States and accession countries.

The priority projects only include: *"the most important infrastructures for international traffic, bearing in mind the general objectives of the cohesion of the continent of Europe, modal balance, interoperability and the reduction of bottlenecks".*

However, although the TEN transport networks are among the most ambitious initiatives of the European Community, the TEN-T programme is not undisputed. Critics argue that many of the new connections do not link peripheral countries to the core, but strengthen the ties between central counties and so reinforce their accessibility advantage. Some

[6] COM(2004)492 final
[7] Decision No 1692/96 EC, Decision No 1346/2001/EC
[8] Chaired by Mr. Karel van Miert
[9] Decision 884/2004/EC of 29 April 2004. The total investment of the 30 priority projects amounts to € 225 billion at the 2020 horizon.

analysts argue that regional development policies based on the creation of infrastructure in lagging regions have not succeeded in reducing regional disparities in Europe in the past, whereas others point out that it has yet to be ascertained that the reduction of barriers between regions has disadvantaged peripheral regions. From a theoretical point of view, both effects can occur. A new motorway or high-speed rail connection between a peripheral and a central region, for instance, makes it easier for producers in a peripheral region to market their products in large cities; however, it may also expose the region to the competition of more advanced products from the centre and so endanger formerly secure regional monopolies. These issues have received new attention through the recent enlargement of the European Union.

1.2 Programming of Transport Infrastructure

For the new programming period 2007-2013 the Commission seeks to strengthen the strategic dimension of cohesion policy to ensure that Community priorities are better integrated into national and regional development programmes. In accordance with the Council Regulation[10], the Council established Community Strategic Guidelines for cohesion policy to "give effect to the priorities of the Community with a view to promote balanced, harmonious and sustainable development"[11].

These Strategic Guidelines form the basis for identifying investment priorities, which will then be elaborated in National Strategic Reference Frameworks at the Member State level. These Frameworks are subsequently further detailed in Operational Programmes (OPs) for thematic areas.

A Commission proposal on these Strategic Guidelines was published in July 2005[12]. They will be adopted by the Council after the adoption of the new regulation for the ERDF, ESF and Cohesion Fund[13]. In parallel, Member States have already started preparations for their National Strategic Reference Frameworks and OPs, which have to be agreed with the Commission. This process is expected to be completed in 2006.

1.3 Objectives of the strategic evaluation

In the draft Regulation for the next programming period the Commission has indicated that evaluations on a strategic level should be undertaken "*to examine the evolution of programmes in relation to Community and national priorities*". The strategic evaluation aims to appraise the "*impact with respect to strategic objectives of the Community, to Article 158 of the Treaty, and to specific structural problems affecting the Member States and regions concerned, while taking account of the needs of sustainable development and strategic environmental assessment*"[14].

[10] See Council Regulation 1083/2006 of 11 July 2006, laying down general provisions on the ERDF, ESF and the Cohesion Fund, Title II Strategic Approach to Cohesion, Chapter I Community strategic Guidelines on Cohesion, Articles 25 and 26.
[11] COM(2004)492
[12] COM(2005)299 Cohesion Policy in Support of Growth and Jobs: Community Strategic Guidelines, 2007-2013.
[13] COM(2004)492
[14] Art 45 of COM(2004)492 final

The present evaluation should be seen as one of these specific strategic evaluations. The strategic evaluation feeds in the process of determining transport investment priorities and the preparation of the national strategic reference frameworks and operational programmes. As such, it serves to enhance the quality, effectiveness and consistency of the Fund's assistance.

Three specific **objectives** have been formulated for this strategic evaluation:

- To provide an analysis of the situation in selected fields relevant to transport, using structural indicators across Member States, plus Romania and Bulgaria;
- To assess the contribution of Structural and Cohesion funds relative to the current and previous programming periods and draw lessons of relevance for the purpose of the study in terms of identification of potential shortcomings in the development of transport priority projects that might have hampered the utilization of those funds or their expected benefits;
- To identify and evaluate needs in the selected fields and identify potential investment priorities of structural and cohesion funds for the programming period 2007-2013.

The scope of the strategic evaluation is wider than a straightforward needs assessment of specific projects. It aims to identify areas[15] for future support and accompanying policy measures which have to be undertaken to ensure the highest success and leverage of EU funds in the recipient countries.

The evaluation assists both Commission and Member States

The main advantage of a strategic evaluation on a multi-country level is that it adds to the consistency and coherence of transport programming across Member States and thus offers a clear advantage above individual Member States' programmes. It also adds to assess effects that occur on a European scale instead of looking at the national perspective alone. As such the evaluation not only offers the Commission support in its discussion with the Member States, but also offers Member States valuable new insights, which can support them in their programming effort.

1.4 Structure of the report

Besides this Synthesis Report, reports have been written for each individual country. In these Country reports specific information can be found on the transport sector situation, transport sector policy, past trends in investment and future priorities. The present report focuses on the common elements for these countries and addresses the objectives of DG REGIO at the policy level.

The report is structured as follows.

[15] as opposed to projects.

Chapter 2 describes some main trends in the CF15 countries[16] in the transport sector and transport policy. Chapter 3 focuses on past trends in transport sector investments and presents best and worst cases.

Some of the key findings of these two chapters are summarized in a SWOT analysis in chapter 4

Chapter 5 looks towards the next programming period and describes various approaches that can be taken on (prioritising) future investments in the transport sector, within the expected budget restrictions for 2007-2013. Such approaches have been translated in scenarios. The chapter also gives an insight in the impacts of these scenarios in terms of cohesion policy objectives.

Chapter 6 finally draws conclusions and presents a number of recommendations for further consideration.

[16] The CF15 are: Bulgaria, Cyprus, Estonia, Czech Republic, Greece, Hungary, Latvia, Lithuania, Malta, Poland, Portugal, Romania, Slovenia, Slovakia, Spain.

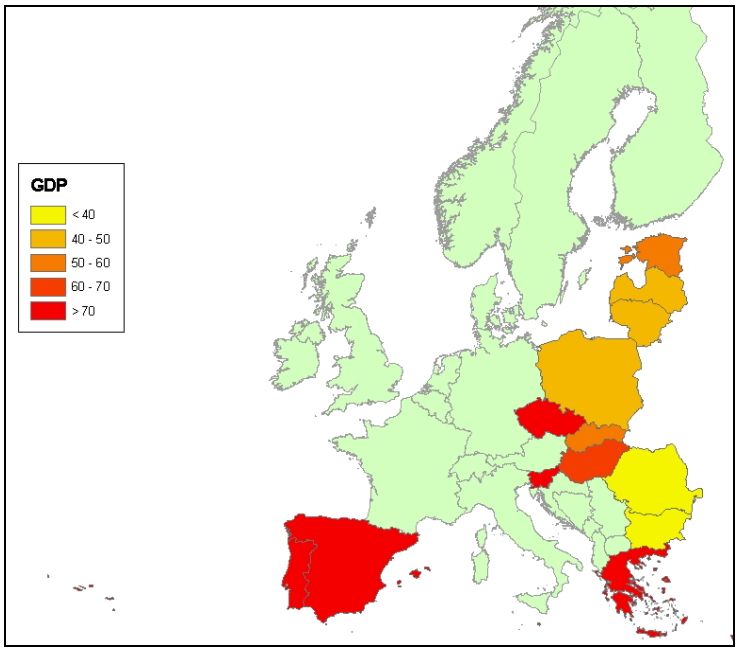
2 Trends in the Transport Sector: a short review

2.1 Introduction

This chapter briefly describes some characteristics of the CF15 countries in terms of transport sector characteristics and transport policy. It does not pretend to be a complete overview of the very diverse transport sectors of the 15 countries, but rather points out those (common) characteristics and major trends that may have relevance for the strategic evaluation.

Figure 2.1 shows the CF15 on the map of Europe. It presents per capita GDP (2005) in purchasing power standards of the countries, expressed as a percentage of the EU25 average. The figure confirms the regional disparity of income in these countries in relation to the EU25 which is the main driver behind the Commission's cohesion policy.

Figure 2.1 GDP in CF15 (in PPP) as percentage of EU25 average



Source: Eurostat.

2.2 Roads and road transport

2.2.1 Road infrastructure

Table 2.1 presents data on the length of the total motorway network in the CF15, as well as the density of the network, expressed as the length of the network in relation to the country's area and its population. It shows a relatively high motorway density in Cyprus, Slovenia, Portugal and Spain.

Table 2.1 Density of the motorway network (2003 or 2004 data depending on availability)

Motorway network	Length (km)	Km per 1000 km2	Km per 100.000 inh
High density			
Spain	24857	49.1	57.8
Portugal	3279	35.7	31.1
Cyprus	268	28.8	35.8
Slovenia	483	23.8	24.2
Medium density			
Greece	1172	8.9	10.6
Hungary	686	7.4	6.8
Czech Republic	546	6.9	5.3
Slovakia	322	6.6	6.0
Lithuania	417	6.4	12.2
Low density			
Bulgaria	331	3.0	4.3
Poland	785	2.5	2.1
Estonia	98	2.2	7.3
Latvia	135*	2.1	5.9
Romania	210	0.9	1.0
Malta	-	-	-
EU15	57211	14.4	12.5
EU25	54173	16.7	14.1

Source: ECORYS based on Eurostat and national statistics;

* own estimate based on data Latvia State Roads.

The national road networks are less easy to compare, as they are defined in different ways in the countries. The state of maintenance of the national road network also differs by country, with relatively low qualities in Bulgaria and Romania.

Various countries (e.g. Romania, Bulgaria; Latvia, Lithuania) have some kind of financing system in place by which revenues are generated from user charges which are specifically meant to cover maintenance costs. Where such systems exist, however, in various cases the revenues are not sufficient to cater for normal maintenance needs.

In other countries toll roads exist (e.g. Spain, Portugal) or a general vignette system is in place. In such cases the revenues are directly tied to road operations (tolls) or are used as general revenues for the government, which among other things might be used for road maintenance and construction.

With respect to toll roads a new trend can be noticed in which operating companies become larger and extend their work area across their previous national boundaries as markets are getting more international in this respect. A latest development in this respect is the intended merger between Autostrada and Abertis which was announced in 2006. As apart from Spain, France and Portugal, not many toll roads are privately operated, this trend does not yet affect the other CF15 countries.

2.2.2 Passenger car ownership

Passenger car ownership is increasing rapidly in almost all of the CF15 countries. In many countries car ownership more than doubled in the period 1990-2004. The differences among the CF15 countries (ranging from 56 to 309 in 1990) are also diminishing (ranging from 149 to 525 in 2004).

Table 2.2 Car ownership (per 1000 inhabitants)

Country	1990	2003	2004	Avg. growth rate 1990-2004[a]
High				
Portugal	258	572	n.a.	6,3%
Malta	n.a.	522	525	n.a.
Slovenia	289	446	456	3,3%
Spain	309	441	454	2,8%
Cyprus	304	414	448	2,8%
Medium				
Lithuania	133	365	384	7,9%
Greece	170	348	370	5,7%
Czech Republic	234	363	373	3,4%
Estonia	154	321	350	6,0%
Poland	138	294	314	6,0%
Bulgaria	152	296	314	5,3%
Latvia	106	280	297	7,6%
Hungary	187	232	275	2,8%
Slovakia	166	252	222	2,1%
Low				
Romania	56	142	149	7,2%
EU15	394	495	n.a.	1,8%
EU25	355	465	n.a.	2,1%

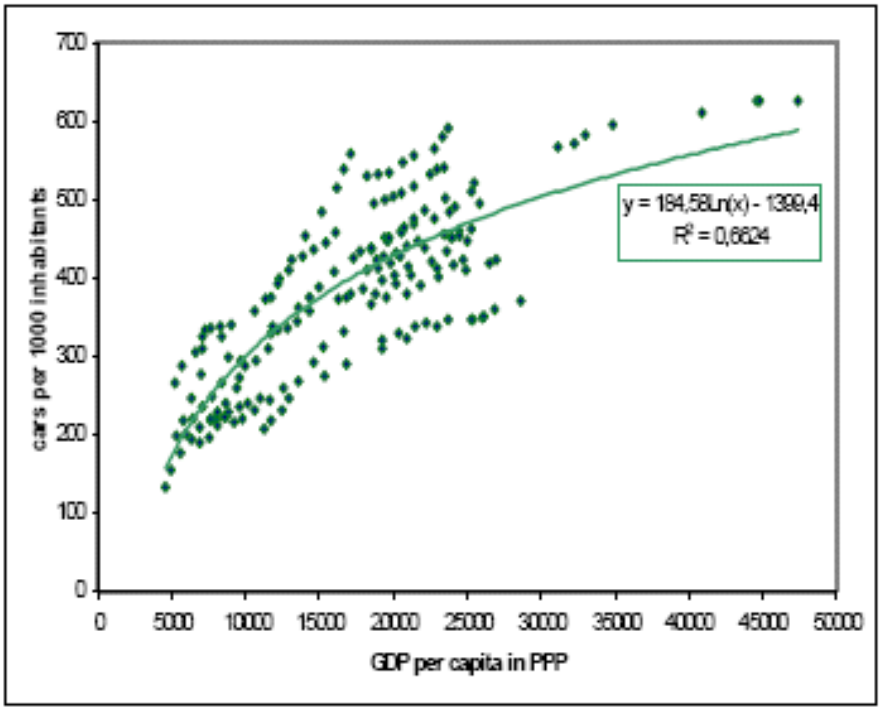
[a] 1990-2003 (where 2004 data are not available)

Source: Eurostat

The development of motorisation is closely linked to the economic development and the growth in GDP. Figure 2.2 depicts the relationship between GDP and car ownership based on a sample of the EU25 Member States in the period 1995-2002. What can be concluded from the graph is that car ownership will continue to increase in most CF15

countries as a result of further economic growth and convergence in Europe[17]. Motorisation rates of 600 cars per 1000 inhabitant appear to indicate current saturation levels in the highest income countries in the EU. This would double current car ownership levels in many of the CF15 countries and lead to a very strong demand for road based transport.

Figure 2.2 Car ownership and GDP (in Purchasing Power Parities) in EU25



Source: COWI 2006

2.2.3 Road Safety

With rising car ownership, road safety situation could be in danger. At the same time, though, traffic behaviour is improving, partly due to stricter limits and enforcement. As a result the relative number of road deaths relative to the population has been diminishing in many countries. Nevertheless, it is still at worrying high levels in many CF15 countries. In the mid-term evaluation of the Road Safety Action Programme[18] it has been concluded that the goal of halving the number of road deaths by 2010 (from 2001) may not be reached in all countries.

[17] Source: COWI (2006) , Feasibility study on Rail Baltica Railways, Interim report.
[18] ECORYS (2005), Mid-term evaluation of the Road Safety Action Programme, DG TREN

Table 2.3 Road fatalities per million inhabitants

country	1994	1998	2003	2004
High-very high				
Latvia			213	224
Lithuania			206	220
Cyprus	184	149	128	156
Poland		160	146	150
Greece	176	204	146	146
Medium-high				
Slovenia	258	167	121	137
Czech Republic			142	135
Hungary			131	128
Estonia	246	204	117	126
Portugal	265	183	147	123
Bulgaria	165	122	121	122
Romania			103	112
Slovakia	121	151	113	113
Spain	143	150	133	110
Low				
Malta	16	45	41	32
EU25			102	94

Source: Eurostat, national statistics

2.3 Railways

2.3.1 Network density

As compared to the EU25 average, rail density in the CF15 is generally high, both when related to the countries areas, as well as related to population. However, a substantial part of the network is single track and/or non-electrified and some countries (e.g. Poland) are actively taking rail links out of operation, as the economic rationale has fallen away with increasing availability and use of roads.

Also in quite a few countries (e.g. Romania, Slovenia) speed limits are in place on various sections, which result from a poor condition of the rail track linked to a low level of maintenance.

The following table thus rather gives a picture of the network presently operated by rail infrastructure managers. It does not give information on the part of the network that can be operated in a qualitatively satisfactory way.

Table 2.4 Rail network density (2003 or 2004 data depending on availability)

Rail network	Length (km)	Of which electrified	Km per 1000 km2	Km per 100,000 inh
Above average density				
Czech Republic	9.612	31%	122	94
Slovakia	3.657	43%	75	68
Hungary	7.950	36%	85	79
Poland	19.906	60%	64	52
Slovenia	1.229	41%	61	62
Below average density				
Romania	11.364	35%	48	52
Bulgaria	4.318	66%	39	56
Latvia	2.270	11%	35	98
Portugal	2.818	38%	31	27
Spain	14.387	57%	28	33
Lithuania	1.760	7%	27	51
Estonia	959	14%	21	71
Greece	2.414	3%	18	22
Cyprus	-	-	-	-
Malta	-	-	-	-
EU25	197949	50%	50	43

Source: Eurostat, national statistics

2.3.2 Organisation of the rail sector

The rail market is undergoing a process of transformation in most EU countries. This process of deregulation and liberalisation is strongly stimulated by the European Commission as part of its Rail Package..

One of the European regulations in this respect refers to the separation of rail infrastructure providers and rail operators. In some CF15 countries a separation has been made between the provider of the rail infrastructure and rail operating companies. In this [19]respect some new EU members are rather advanced as compared to the EU15. In other cases, however, like Czech Republic, Greece, Hungary, Latvia and Slovenia, are in the planning stage or in the throes of structural change[20].

In some cases the separation appears (for the moment) to be a formal exercise rather than a real separation, as the rail operator and infrastructure manager may still be part of the same holding, or may not yet have separate financial accounts. The latter is required by the EU regulations in order to determine the costs of operations and infrastructure, implementing effective charging systems and ruling out cross-subsidisation.

The European Rail Package also requires a gradual opening of the rail markets for freight services. The first EU Rail Package requires opening of the network for international

[19] See COM(2006)189, Annex 2
[20] see COM(2006)189, Annex 4

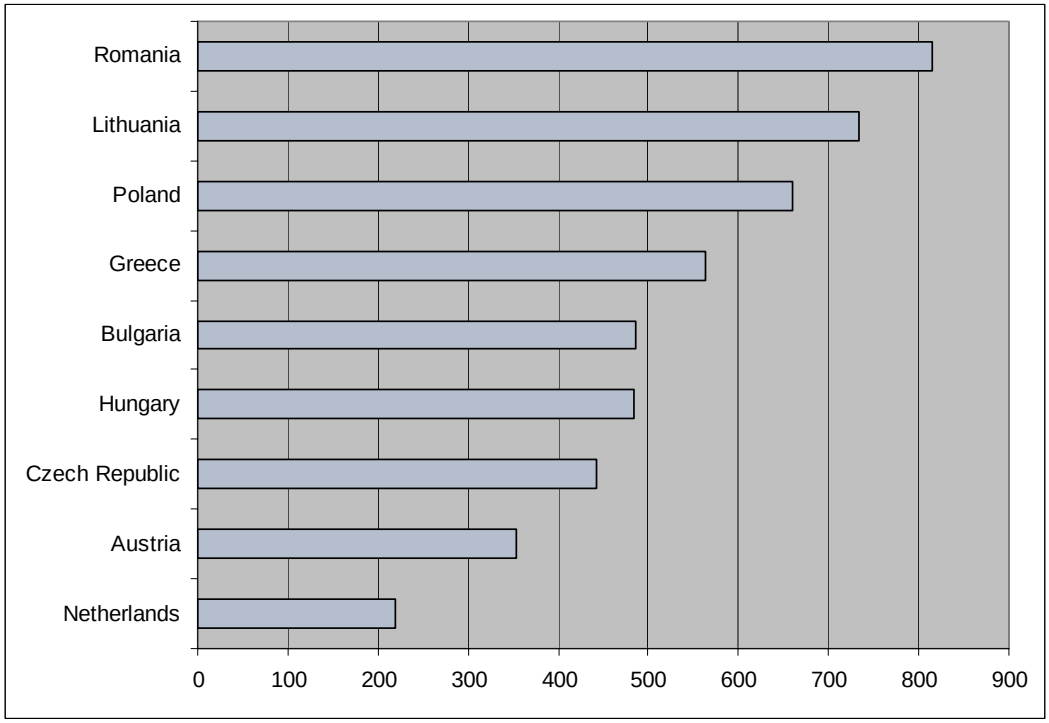
freight services (on Trans European Network) per 15 March 2003. The second requires open access to all EU rail undertakings for all kind of rail freight services as of 1st January 2007. A recent review on the status of the market opening shows that in February 2006 various CF countries had not yet put in place regulation to open up the markets from 2007 onwards (viz. Greece, Latvia, Lithuania, Portugal and Slovenia). In all countries except one (Greece) open access for domestic operators has already been put in place.

Despite these positive developments, which are expected to help to improve the rail freight services, marketing still appears to be a weak spot of the rail sector. The corridor approach, which accounts for some successes in rail operations in the EU, might help to improve the position of the railways in the CF15 countries, as it would make the use of railways more simple and attractive for (international) shippers.

Efficiency

Liberalisation and deregulation of the rail market is expected to lead to an improved competitive position of rail transport. Based on an indicator of operational efficiency (work force per trainkm) it is observed that there still are large differences within Europe.

Figure 2.3 Operational efficiency rail for selected European countries (staff in railway company per mln trainkms)



Source: ECORYS based on UIC (2006)

Another indicator which gives indirect information on the competitiveness of rail traffic is the utilisation of the rail track (see table 2.5). Although also linked to specific country circumstances, low utilisation rates signal an inefficient use of the available infrastructure (which both leads to a higher cost base per ton freight and passenger transported and also reflects a relative low attractiveness of rail services to users).

Table 2.5 Utilisation of rail infrastructure

	Passengers (1000 pkm/km rail)	Freight (1000 tkm/km rail)	Passengerkms as a ratio of tonkms
Above average freight use/below average passenger use			
Estonia	209	10949	2%
Latvia	352	8194	4%
Lithuania	227	6591	3%
Slovenia	651	2848	23%
Slovakia	602	2652	23%
Poland	914	2406	38%
Below average utilisation overall (freight focus)			
Czech Republic	687	1571	44%
Romania	757	1496	51%
Bulgaria	556	1204	46%
Below average utilisation overall (passenger focus)			
Hungary	1321	1044	127%
Portugal	1313	816	161%
Spain	1321	792	167%
Greece	704	249	283%
No rail			
Malta	-	-	
Cyprus	-	-	
EU15	1771	1917	92%
EU25	2064	1689	122%

Source: ECORYS based on Eurostat (2005) and UIC (2006)

What can be clearly observed is that the network is intensively used for freight transport in new Member States like the transit countries Estonia, Latvia, Lithuania and to a lesser extent Poland, Slovakia and Slovenia. In all these countries freight is the dominant use of the rail network.

The situation in the old Member States Greece, Portugal and Spain is exactly the opposite. In these countries passenger transport is the main use of the railways. Total use of the network in the three counties is strikingly low, though, even when compared to the EU15 average. In the new member states/accession states below average utilisation rates for both freight and passenger transport are found in Bulgaria, Czech Republic, Hungary and Romania.

2.3.3 Share of railways in modal split

Despite a substantial decline in the past decade, in the share of railways in the movement of freight in all new member states is still higher than in EU15. In four countries the share of railways is larger than 30% in total national and international freight movements in the country, although in two cases (Estonia, Latvia) this is predominantly due to international (transit) traffic. The rail freight share in the older member states Greece, Portugal and Spain is very low, even when compared to the EU15 average.

Despite the relatively favourable position of rail transport in freight movements, the position is threatened by other modes, in particular road. Strong marketing of the rail sector and improvement of the efficiency of rail services are needed to stop this declining trend in the share of railways in both freight and passenger movements.

Table 2.6 Modal split for freight movements (on the basis of tonkms, 2004)

Modal split in freight	Road	Railways	Inland Waterways	Pipelines
Road dominance				
Cyprus	100.0	-	-	-
Malta	100.0	-	-	-
Greece	97.3	2.7	-	-
Portugal	94.7	5.3	-	-
Spain	91.8	4.7	-	3.5
Medium road, strong rail				
Czech Republic	72.6	23.8	0.6	3.0
Slovenia	72.0	28.0	-	-
Bulgaria	65.9	28.6	3.8	1.6
Slovakia	64.0	33.6	2.4	-
Hungary	61.9	24.9	5.7	7.5
Romania	59.0	26.9	11.1	3.0
Poland	58.2	27.1	0.6	14.0
Rail dominance				
Lithuania	43.6	41.1	0.0	15.2
Estonia	32.7	67.3	-	-
Latvia	25.3	63.5	-	11.3
EU25	72.6	16.4	5.6	5.4

Source: Eurostat

With respect to the modal split in passenger transport, throughout EU25 the movement of passengers by air transport is growing vastly, while growth in the use of buses/coaches and railways is below average. Also the growth in use of tram and metro is lagging behind, though less than for busses and railways. The use of passenger cars, by far the dominant mode in passenger transport with a share of 74%, is at average level.

Table 2.7 Recent trends in modal split in passenger movements in EU25

	Modal share 1995	Modal share 2003	Growth 95-03
Passenger cars	74.1	74.4	16.4%
Powered 2 wheelers	2.3	2.4	17.2%
Bus & coach	9.0	8.1	3.7%
Railway	6.3	5.8	7.1%
Tram Metro	1.2	1.2	12.5%
Air	6.0	7.5	46.3%
Sea	1.1	0.6	-36.7%
All	**100**	**100**	**15.8%**

Source: Eurostat

With respect to the modal share of rail in the CF15 countries the weak position of rail transport is striking, a in most of these countries the use of railways for passenger movements is below EU25 level, with the exception of Hungary, Poland and Czech Republic. In many countries this is compensated by an above average use of bus transport. However, still in 6 out of the CF15 countries the share of passenger cars is close or above the EU25 average. Given the overall tendency of a diminishing share of rail and bus transport and the expected increase in motorisation levels especially the position of rail transport is worrying.

Table 2.8 Modal split in passenger movements (on the basis of passenger kilometres, 2003)

	Passenger Cars	Buses and Coaches	Railways	Tram & Metro
High share of car				
Malta	90.0	10.0	-	-
Slovenia	89.4	6.1	4.5	-
Portugal	86.9	9.4	3.0	0.7
Lithuania	86.5	11.5	1.9	-
Spain	82.3	11.7	4.6	1.3
Cyprus	82.3	17.7	-	-
Medium to low share of car				
Estonia	79.5	18.2	1.4	0.8
Poland	76.1	13.2	8.7	2.0
Latvia	73.2	18.7	5.6	2.5
Czech Republic	73.7	10.1	7.0	9.2
Greece	71.5	25.1	1.8	1.6
Slovakia	70.7	21.9	6.5	0.9
Hungary	59.6	24.0	13.2	3.2
Romania	n.a.	n.a.	n.a.	n.a.
Bulgaria	n.a.	n.a.	n.a.	n.a.
EU25	83.2	9.0	6.5	1.4

Source: Eurostat

Also the older CF countries show a surprisingly low share of railways, in particular when seen in the light of the heavy investments in the rail sector in the previous periods. For Spain the investments have contributed to an increase of the share of high speed in total rail transport, from 12% in 2000 to 14% in 2004. But even in Spain, with impressive growth in rail passenger transport of 24% in the period 1995-2004, i.e. far above the EU average, rail passenger transport could not keep track with car use (+38% in this period). The only EU country in which rail transport outperformed car utilisation is France, which probably is due to the high share of high speed rail transport in total rail passenger movement (55.9%).

The evidence thus suggests that substantial improvements in rail services will be needed to maintain, let alone expand, the share of railways in the modal split of passenger movements in the EU countries. However, it also suggests that with high quality (speed) services such a goal is not impossible to attain.

In many countries at least a part of the public transport services are being carried out on the basis of public service obligations. Such arrangements appear not always beneficial to the operator, resulting in operational losses and diminishing quality of the service. This will again negatively affect use of public transport. In such cases the regulation and implementation of public service obligations clearly need to be improved.

2.3.4 Other public (urban) transport

Table 2.8 shows that the use of public transport means other than rail is substantial in most CF15 countries. This is mainly related to the relatively high share of buses/coaches in the modal split. It appears that buses/coaches play an important role in long distance movements, due to lower car ownership levels in the new member states. The one exception to this is Slovenia, where car utilisation is above EU25 level and comparable with Malta and Cyprus, the two member states that do not avail of railways, metro or trams.

Many CF15 governments consider stimulating the use of public transport, in particular in urban areas, as one of their policy goals. As car ownership and car use increase, such policies have not always been effective (see e.g. Malta). It is thus striking that only in one country, Czech Republic, the share of tram and metro in the modal split is substantial. Czech Republic is also among the few countries in EU25 in which the use of tram and metro has been increasing since 1995 (+12%). Increase in such use also occurred in Greece (+100%), Spain (+30%) and Portugal (+60%), due to substantial investments in high quality public transport (including metro systems).

In all three cases the increase in use can be attributed to the expansion of urban infrastructure networks. Apart from the availability of infrastructure, also policy measures are used to stimulate the use of urban transport systems. As public urban transport is indispensable in large urban areas and is complementary to passenger car use, strong measures to limit car use in city centres may be needed (i.e. paid or restricted parking policies, charging schemes, etc) might be needed to stimulate the use of (improved) public urban transport.

2.4 Inland Waterways

The main navigable waterways in use in the CF15 are the Danube River (Hungary, Slovakia, Czech Republic, Romania, Bulgaria) and various waterways in Poland. Use of the inland waterways, however, is generally low, in particular when compared to the extensive use of waterways in North-Western Europe (Germany, The Netherlands, Belgium, France). Only Romania and Slovakia show utilisation figures which are in line with the EU25 average.

Only some (but not all) of the countries bordering the Danube show a relatively high share of IWT in their modal split. The low use of the Danube is attributed to a few bottlenecks in the development of the river for long distance freight movements, like the navigability restrictions due to water levels and physical restrictions, in Serbia and elsewhere.

Table 2.9 Navigable waterways in use

	Length (km) of waterways in use (latest year available)	Movements, 2004 (in mln tonkm)	Utilisation (1000 tkm/length waterway)	Share of IWT in freight movements
Poland	3,640	1.1	302	0.6%
Romania	1779	7.0	3935	11.1%
Hungary	1.440	1.9	1319	5.7%
Czech Republic	664	0.4	602	0.6%
Lithuania	477	0.0	0	0.0%
Bulgaria	470	0.7	1489	3.8%
Latvia	347	-	-	-
Estonia	320	-	-	-
Slovakia	172	0.7	4070	2.4%
Portugal	124*	-	-	-
Spain	70*	-	-	-
Greece	6*	-	-	-
Malta	-	-	-	-
Slovenia	-	-	-	-
Cyprus	-	-	-	-
CF15	**9,509**	**11.8**	**1241**	
EU25	**Ca. 37,000**	**130.3**	**3522**	**5.6%**

Source: Eurostat; *: only used by sea going ships

2.5 Sea Ports and Short Sea Shipping

2.5.1 Organisation of the port sector

The port and maritime sectors play an important role in the movement of goods from and to both coastal and landlocked countries in Europe. The island states Malta and Cyprus are even more dependent on the ports, having no overland connections available. In particular ports in Estonia, Latvia, Lithuania, Romania and Bulgaria are important for transit goods to other (landlocked) EU and non-EU countries.

Table 2.10 shows both total and container traffic in the port. Clearly not all of the main ports in CF15 countries handled substantial amounts of containers. This is partly due to lack of infrastructure in the port and hinterland, partly a result of the composition of cargo with large volumes of bulk cargoes (oil products, minerals, steel etc) being handled in some of these main ports.

Table 2.10 Port traffic in main European ports

	Main port	Port traffic (mln tonnes), 2003	Container traffic, 2003 (1000 TEU)
Bulgaria	Bourgas	12.9	
Cyprus	Limassol	3.8	255
Czech Republic	-	-	
Estonia	Talinn	37.5	
Greece	Pireaus	21.4	1,605
Hungary	-	-	
Latvia	Ventspils Riga	27.4 21.7	
Lithuania	Klaipeda	21.2	
Malta	Marsaxlokk	15.0[a]	1,300
Poland	Gdansk/Gdynia Szceczin	21.3 14.3	309
Portugal	Leixoes	13.5	320
Romania	Constantza	43.2	
Slovakia	-	-	
Slovenia	Koper	11.0	
Spain	Algeciras	56.7	2,516

[a] Containerised cargo

Source: various sources

Among the transport sector, the port sector is the one traditionally attracting substantial private investments. Also in those countries with heavy state involvement in the sector, participation of the private sector is rising. In most countries legal and institutional arrangements, if not yet geared to private investment in the ports, have recently been or are being changed. State owned port terminals are being privatised.

Private participation is substantial in container terminals. In this respect substantial concentration has taken place in this sector worldwide, resulting in a few major players owning a major share of the terminal capacity. Such parties are dedicated port operators like PSA, Dubai Ports and Hutchison, or shipping companies, like Maersk. As container traffic in the Eastern European countries may be expected to increase in the future, such global players may also become involved in terminal operations.

The opening of previously state owned port sectors to foreign investors and operators, may also help to improve the port efficiency. Table 2.11 shows that, while the median number of clearance days is quite competitive in most CF15 countries, port efficiency is deemed generally lower in these countries (including old member states!) compared to ports in The Netherlands, France, Belgium and Germany.

As an increase in port efficiency is likely to be reflected in lower transport costs, increased port competition and private sector participation is likely to reduce costs of imports and exports.

Tabel 2.11 Port efficiency indicators (selected European countries)

	Median clearance days	Port efficiency index (1-7)[a]
CF15 countries		
Spain	4.0	4.88
Greece	n.a.	4.28
Portugal	8.0	3.81
Bulgaria	2.0	3.68
Poland	3.0	3.34
Estonia	1.0	n.a.
Lithuania	1.0	n.a.
Romania	3.0	n.a.
Slovenia	2.0	n.a.
Other EU countries		
Italy	2.0	4.11
Germany	5.0	6.38
Belgium	n.a.	6.17
France	3.0	5.39
Finland	n.a.	6.26
Netherlands	n.a.	6.64

a: Port efficiency index: one-to-seven index ranking port efficiency based on surveys performed to representative firms of each country (1 = low efficiency, 7 i= high efficiency)

Source: X. Clark, D. Dollar, A. Micco (2002), *Maritime Transport Costs and Port Efficiency*, World Bank Policy Research Working Paper 2781

2.5.2 Short sea shipping

The merchant fleet of EU25 measures some 9,400 vessels totalling 290 mln dwt. The majority of the fleet (in size) is controlled by Greek companies (3,000 vessels; 156 mln dwt). The fleets of other CF15 countries together amount to some 900 vessels (17 mln dwt). Among these, Spain, Cyprus, Portugal and Bulgaria are the main seafaring nations controlling 1.5 mln dwt or more.

As the Greek fleet is known for its large number of large oil tankers, many of the other fleets consist of smaller vessels that can (also) be used in short sea shipping. Domestic and intra-EU25 sea transport is estimated at 1.5 mln tonkilometers, or 39% of the total relevant freight movements in 2004. This share has been rather stable in recent years (38% in 1995).In fact, this freight segment appears to be able to keep track of the growth in road freight transport, whereas the growth in t rail and inland waterway freight movements stay behind.

This trend is in line with the EU transport policy which sees stimulation of short sea shipping (Motorways of the Sea) is an important objective, in particular with a view to it being more sustainable than road freight movements.

Despite this favourable conclusion, in some country overviews it is mentioned that improvement of the connections to the ports (both road and rail) is needed to further expand short sea shipping.

2.6 Airports

As shown in the modal split of passenger movements, air transport is a rapidly growing transport sector in many CF countries. For Malta and Cyprus air transport is even indispensable, as it complements ferry connections and brings many tourists to the islands.

The table below relates the number of outgoing air travellers to the population of each country. It clearly shows the importance of air transport for Cyprus and Malta, as well as for Greece, Portugal and Spain.

Table 2.12 Air transport passenger movements from EU countries

	Outbound traffic to other EU countries (1000 passengers)	Outbound passengers per inhabitants
High air traffic		
Cyprus	5220	7.0
Malta	2496	6.2
Spain	115960	2.7
Greece	25821	2.3
Portugal	15366	1.5
Medium to low air traffic		
Czech Republic	7520	0.7
Estonia	758	0.6
Hungary	4491	0.4
Slovenia	601	0.3
Latvia	688	0.3
Lithuania	782	0.2
Poland	6112	0.2
Slovakia	658	0.1
Romania	1320	0.1
Bulgaria	805	0.1

Source: Ecorys, based on Eurostat. Bulgaria and Romania refer to all outbound passenger movements at Bucharest and Soifa airports

The state involvement in air transport companies is reducing, with more private operators competing with (previously) state owned national carriers. The public role tends to be confined to the provision of air terminals and safety arrangements.

Access to/from and location of airports near urban centres is in various cases seen as problematic, giving rise to plans for rapid transport links (Budapest, Ljubljana) or (plans for) investments in new airports (Lisbon, Warsaw).

2.7 Intermodal transport

Intermodal terminals are important elements in promoting sustainable transport They enable the transfer between road transport and other modes, like railways and water transport. Although intermodal terminals are a political priority in various CF countries, they are not everywhere widespread. Bottlenecks in their development are restricted demand for such services, lack of private parties willing to invest and the need to supplement the private investments with public support in terms of provision of basis terminal infrastructure and access links. It generally appears to be a sector in which more development is required, provided, of course, that a commercial market is developing for intermodal transport services.

2.8 Accessibility problems: Red flag analysis

2.8.1 Introduction

This section describes the reference situation with respect to road and rail accessibility of regions in Europe. The central indicator for this description is the Accessibility Problem Index (API). The higher the value of the index, the higher the need for intervention. The index identifies main areas for intervention in rail and road transport for the current situation (2006). This approach has been labelled as the “red flag” analysis.

The composite Accessibility Problem Index is a combined measure, which addresses transport network quality, population density and regional disparity (a more elaborate explanation is provided in Annex A). As such, the accessibility analysis is much more linked to cohesion policy than a more traditional accessibility analysis.

2.8.2 Methodology: Accessibility Problem Index

To determine the need for transport investments, the SASI model has been used to assess the present situation of the road and rail systems in each CF15 country, without the national transport projects to be examined later. For this the accessibility provided by the road and rail systems in each country has been evaluated from both a national and a European perspective. The objective is to identify regions with serious accessibility deficits that could be addressed by European transport policy, taking account of the stated EU goals competitiveness and territorial cohesion. In the SASI model accessibility, which is directly influenced by transport policy and investments, is judged to play a crucial role in promoting the realisation of the cohesion objectives.

To determine the appropriate assessment of transport investment needs from the cohesion policy perspective, an indicator of accessibility is required. Traditional accessibility indicators are not useful for this purpose. They measure the total effect of both

geographical location (periphery versus core) and quality of transport provided by the transport system. As a result, they always show a steep gradation in accessibility from the core to the periphery. However, public policy cannot change the fact that some regions are central and some are peripheral. Public policy can only alleviate disadvantages through unequal transport provision.

This distinction is relevant for European transport policy. To invest only in transport in the most peripheral regions with the lowest accessibility according to such an indicator would benefit only the relatively few people living there. It would ignore the needs of the densely populated central regions to combat traffic congestion and so endanger the competitiveness goal of the Lisbon Strategy of the European Union. On the other hand, to invest only in transport in the most densely populated central regions with the greatest congestion problems would not only lead to ever more traffic, but also widen the existing gap in accessibility between the central and peripheral regions, and would so run counter to the territorial cohesion goal of the European Union.

The new accessibility indicator recognises transport network quality. population density and regional disparity

To avoid this dilemma, a new composite accessibility indicator has been defined which distinguishes between geographical location and quality of transport. This indicator assumes that people in the peripheral regions cannot expect to enjoy the same level of accessibility (measured in traditional terms) as the central regions, but that they can demand to be able to reach relevant destinations with the same **travel speed** ("as the crow flies") as the people in the central regions. In addition, the indicator recognises the utilitarian principle of the happiness of the greatest number, i.e. that the transport needs of **densely populated regions** should be given more weight than those of regions with only few inhabitants. And finally, the indicator recognises that **economically lagging regions** with severe deficits in accessibility may offer greater potential for stimulating economic effects by transport investments than regions which enjoy already high accessibility.

These three principles avoid the pitfalls of both an extreme egalitarian view, which postulates that all regions in Europe should enjoy the same level of accessibility, and a purely efficiency-oriented view which postulates that accessibility in the already highly accessible central metropolitan areas should be further strengthened because they bring the largest economic benefits. In other words, the three principles aim at a rational trade-off between the stated EU goals of competitiveness and territorial cohesion. Annex A gives a more elaborate description of the composite Accessibility Problem Index.

2.8.3 Results of the accessibility analysis

Figures 2.4 and 2.5 on the next page show regional population density and GDP per capita in Europe today. This is based on a calculation of the SASI model based on empirical 2001 data and including developments in the period 2001-2006, which also comprises transport developments that are completed by that year.

The great differences in population density between core and periphery, i.e. the densely populated belt of regions from the south of England across Western Europe to the north of Italy become visible (Figure 2.4).

In terms of GDP per capita (Figure 2.5), the continent is divided between west and east by the still existing great disparities in income between the old and the new member states.

Figure 2.4 Population density (population/sqkm) 2006

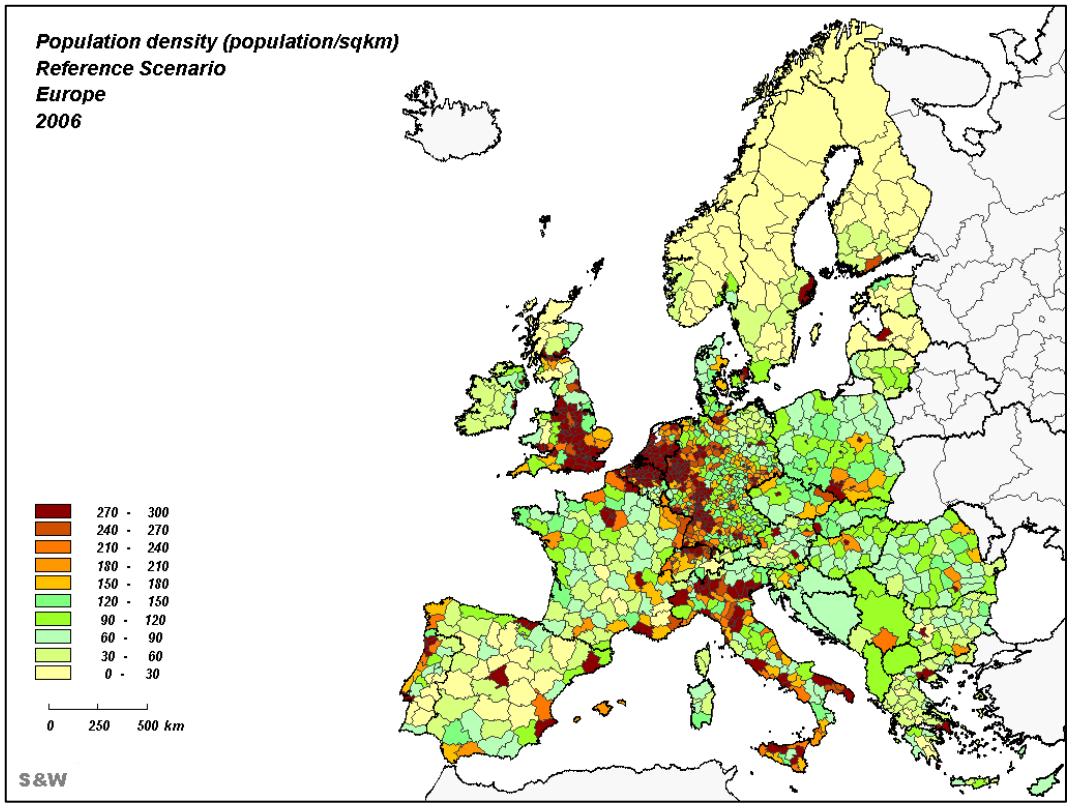
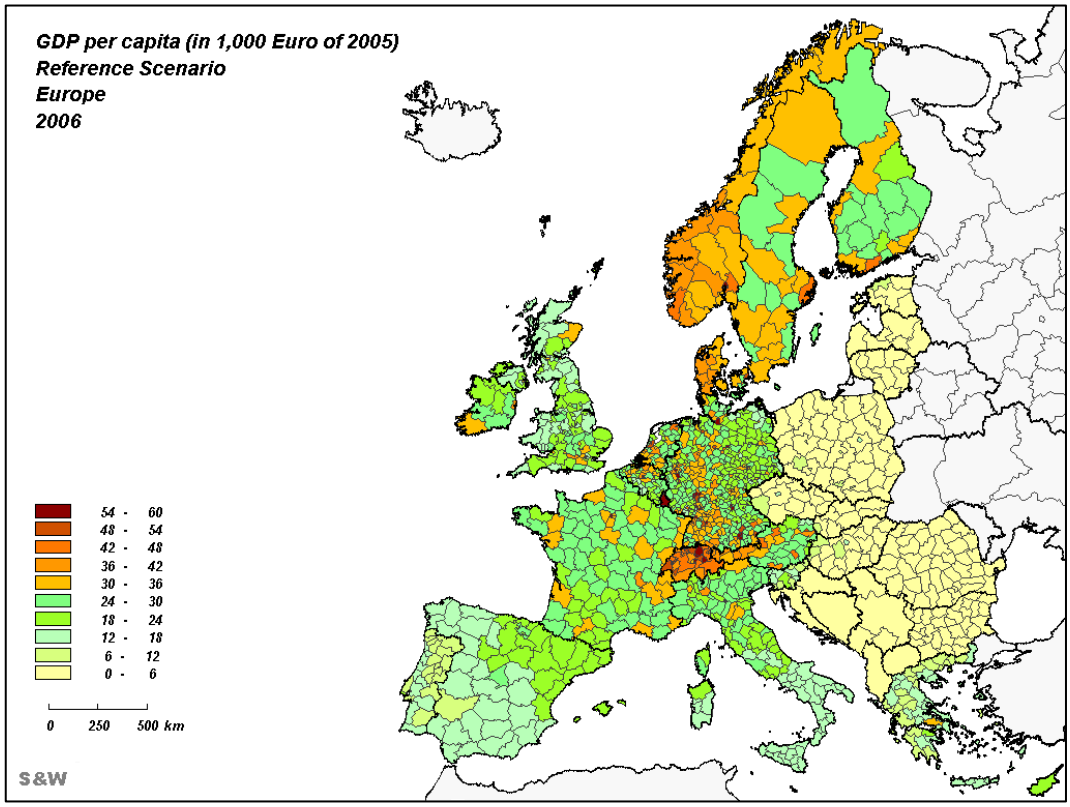


Figure 2.5 GDP per capita (Euro of 2005) 2006



ECORYS

Figure 2.6 Accessibility Problem Index Road (European) 2006

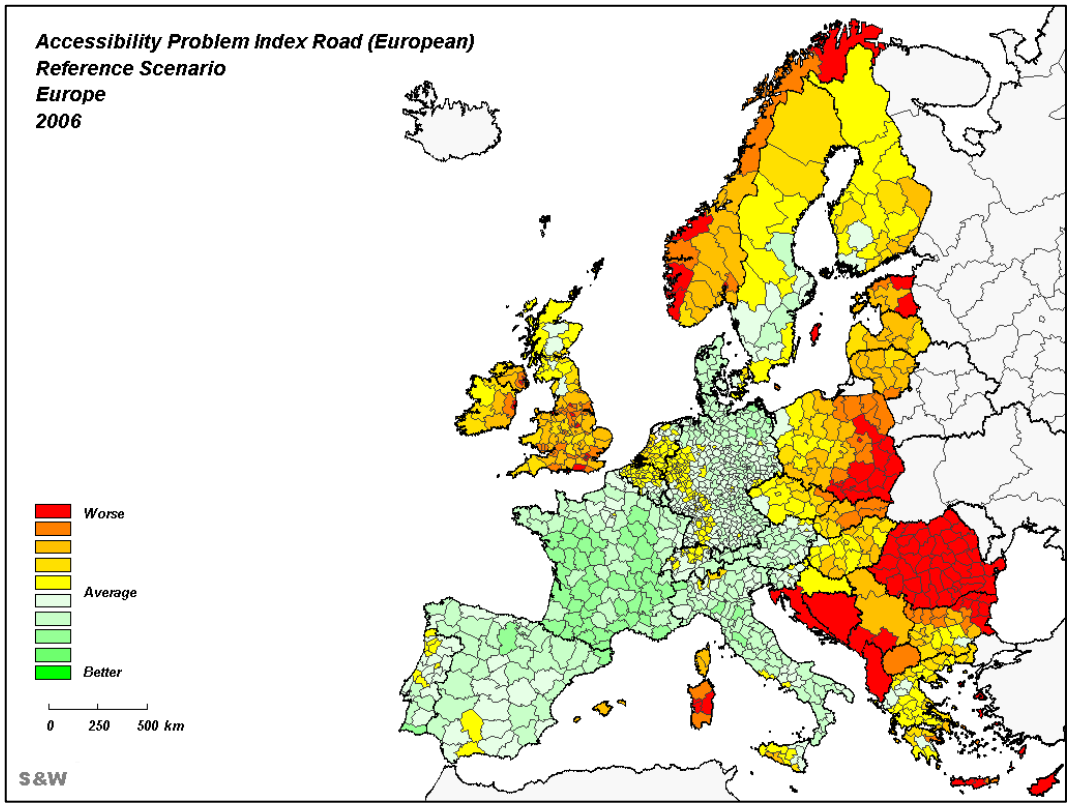
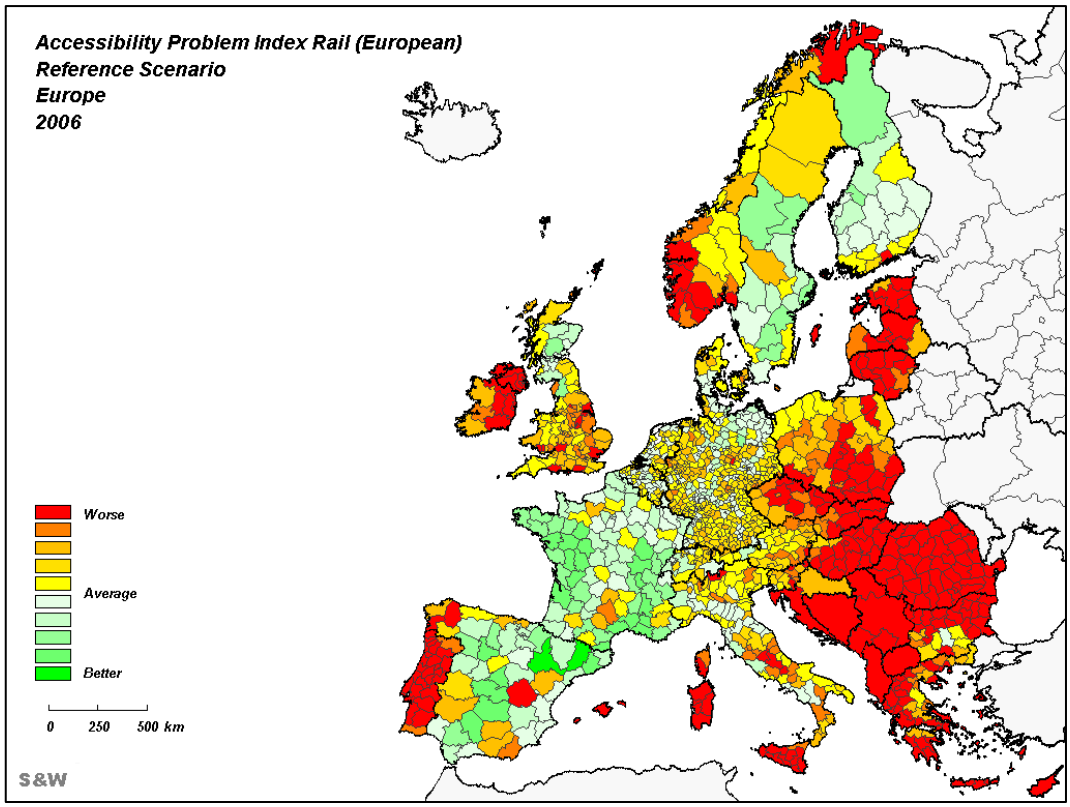


Figure 2.7 Accessibility Problem Index Rail (European) 2006



Figures 2.6 and 2.7 show the spatial distribution of the Accessibility Problem Index in Europe in the base year 2006. The colour scale of the maps resembles that of a traffic light: green shades indicate average regional travel speeds above the European average, yellow values speeds slightly above the European average and red shades speeds significantly lower than the European average. The European average is defined as the average of the European Union and the two accession countries Bulgaria and Romania (EU25+2).

The two maps replicate the division of the European continent between core and periphery and the old and the new member states. The most peripheral regions of the old member states (Portugal, Ireland and the Nordic states) and most new member states show severe accessibility deficits. Deficits in rail accessibility are in general larger than those in road accessibility.

When identifying the countries and regions with most severe accessibility problems, some general conclusions can be drawn.

First, the maps show that, not surprisingly, the island states are quite disadvantaged in terms of accessibility. Both Malta and Cyprus show lowest accessibility of the CF15 countries, which is due to the sea leg involved for overland road or rail journeys. Such legs clearly reduce the average speed of the journey, even if the adjoining road or rail legs are of high standards. Also the Greek, Portuguese and Spanish islands show unfavourable accessibilities. This underlines the importance of air transport for these countries and regions, rather than showing deficiencies in the road or rail transport system.

Second, many countries show decreasing accessibility towards the borders with non-EU member states. This indicates not that these regions are further away from economic centres in Europe, but rather that journeys towards these centres are generally slower, due to lower quality connections.

Third, in some cases regions show road accessibility above the European average, while other regions in the same country are substantially below the European average. The lowest road accessibility is generally found in the eastern parts of the EU: in the Baltic States, Poland, the Czech Republic, Slovakia and in the accession countries Romania and Bulgaria. Road accessibility is more evenly spread than rail accessibility with less regions being (strongly) disadvantaged. The countries mentioned stand out in this respect and might thus need relatively more investments in road infrastructure.

Finally, in general the accessibility situation is worse and less diverse in the railways than in the road sector. Rail accessibility problems are found throughout the CF15 countries and in particular in the EU border regions in Portugal, Greece, Bulgaria, Romania and the Baltics, but also in central regions like Hungary, Slovakia, the Czech Republic and Poland. In the latter cases these are also more mountainous regions, which may (partly) explain the pattern, given the higher costs of infrastructure and generally lower operational rail speeds in such areas. The peripheral regions may also suffer from suboptimal rail connections towards their countries (i.e. through neighbouring countries).

Regional patterns within Member States

Tables 2.13 and 2.14 summarize some of the main regional patterns for road and rail accessibility within each of the CF15 countries.

Table 2.13 Road accessibility: main regional patterns per country

Poor	
Romania	road accessibility is below the EU average in the whole country and lowest in the border regions in the north east (with Ukraine, Moldova)
Estonia	road accessibility is below the European average in all districts, with lowest accessibility in the two regions near Russian border
Bulgaria	the north-eastern part of the country is strongly disadvantaged, the rest of the country has accessibility just below the European average (except the Chaskovo region)
Below average	
Czech Republic	generally the accessibility is just below the European average in the whole country, with the exception of the Ostrava region, where accessibility problems are larger
Greece	road accessibility is just below the European average in most part of the country, with some favourable exceptions. The islands show low accessibility (see above)
Hungary	road accessibility is just below the European average in the whole country, with the favourable exception of Györ region
Latvia	road accessibility is below the EU average in the whole country
Lithuania	road accessibility is below the EU average in the whole country, with lowest accessibility in two districts near the border with Belarus
Poland	road accessibility decreases from west to east, with severest problems along the border with Ukraine
Slovakia	road accessibility is below the EU level in the whole country, and decreases from west to east
Above average/good	
Portugal	road accessibility is generally good or above average in the central and southern part of Portugal, but below EU average in the northern part, in particular in the border regions with Spain
Slovenia	with one exception (Trabvje), road accessibility of Slovenian regions is good and above the European average
Spain	apart from the Cordoba and Malaga regions, road accessibility in Spain is above the European average

Table 2.14 Rail accessibility: main regional patterns per country

Poor	
Bulgaria	the north-eastern part of the country is strongly disadvantaged, the remainder of the country is also generally below the European average (with exception of the Plovdiv region)
Czech Republic	accessibility problems are seen in various parts of the country, in particular in the eastern and central parts
Estonia	rail accessibility is substantially below the EU average, with Tallinn and Tartu as regions with relatively better accessibility
Greece	although the rail accessibility is generally low in the whole country (including the islands), the regions along the north south corridor in the east show relatively favourable accessibility
Hungary	rail accessibility is low in the whole country, with the exception again of the Györ region, and to a lesser extent Tatabanya region
Latvia	although rail accessibility is below the EU average, the regions are relatively better accessible than those in neighbouring Lithuania and Estonia
Lithuania	rail accessibility is substantially below the EU average, in particular in the regions in the North (Plunge, Panevesys, Utenos; Taurage)
Poland	in contrast to road accessibility, rail accessibility problems generally increase from north to south, with low rail accessibility in the border regions with Czech Republic. Slovakia and Ukraine
Portugal	rail accessibility is poor and below the European average in almost the whole of Portugal
Romania	rail accessibility is poor and below the European average in all regions, with some regions being only slightly less disadvantaged
Slovakia	rail accessibility is strongly below the European average in the whole country and decreases from west to east
Mixed	
Slovenia	Rail accessibility favours from the proximity of Italy, with relatively good accessibility in the western parts of the country and relatively poor accessibility in the eastern parts.
Spain	Rail accessibility in Spain shows a mixed pattern, with well accessible regions (Zaragoza, Leida) and less accessible regions (Cuenca, Almeria, Lugo).

2.9 Conclusions

The review of the present situation in the transport sector shows some interesting results with a view to future transport infrastructure investments. These key findings have been presented per mode of transport.

Road

The motorway network is not very well developed in most CF15 countries (with the exception of Cyprus, Spain, Portugal and Slovenia). Nevertheless, the red flag analysis shows that road accessibility in most new EU member states is not extremely low and generally better than the density data indicate. A main problem in many new Member States is the generation of sufficient funding for proper maintenance of the road network.

This may partly be related to the in some cases still large national networks to be maintained by the road administrations and backlog maintenance issues.

Rail

The rail network in the new member states is quite dense, when compared to the motorway network or the rail network in the old member states. However, as the red flag analysis shows, operational speeds in the railways are generally low due to deficient infrastructure (e.g. single tracks, non-electrified tracks). In some cases such deficiencies are also caused by lack of maintenance. Besides upgrading of infrastructure and services, also rationalisation of the network may be required in some cases. Generally, the EU border and coastal regions suffer most from low road and rail accessibility. This holds in particular for railways, but also for roads.

Inland waterborne transport

Inland water transport services are only carried out in substantial amounts along the Danube. It appears that there are bottlenecks, some of them outside the EU, which prevent reaping the full benefits of river transport potential.

Air transport

Air passenger transport is rising fast in Europe including the CF15 countries and is, or is becoming, vital to economic development, in particular of the tourist sector in the Mediterranean (and Black Sea) countries. The public role in this sector is less dominant than in the past, with many private operators being active. The public role remains important, though, in terms of provision of infrastructure and safety and security measures.

Urban transport

Urban transport is another component of the transport system in the Member States which deserves attention. Increasing car ownership combined with growth patterns which at times appear to be concentrated around the major urban centres, create an increasing pressure on the public urban transport systems in many larger urban settlements.

Transport policy

It appears that many new Member States are following the policy priorities of the EU in terms of separation of infrastructure and operations in rail, application of (road and rail) infrastructure user charges, stimulating public service obligations and sustainable transport, and are taking measures to improve road safety. Such policy objectives are, however, not always sustained by effective measures. In various fields and countries stronger, more effective measures will be needed to realise the objectives.

3 Past experiences with transport investments

3.1 Introduction

This section looks back at the past experiences with transport infrastructure financing. Main purpose of this chapter is to frame an idea on the past trends in transport investments and to give a reflection on the experiences and lessons learnt. The chapter is split in three sections:

- Past trends in transport financing
- Economic impact of past investments.
- Examples of best practices

3.2 Past trends in transport financing

This section looks into patterns of past financing. The focus of attention is on financing patterns and trends in EU financing. EU financing has been channelled though different programmes: ERDF, Cohesion Fund, ISPA and Phare. In addition, EIB has been very active in financing transport infrastructure and to a (much) lesser extent EBRD. In addition to external capital, national governments have also been spending funds on transport infrastructure investments through direct budget allocations. Finally in some countries private funds have been raised through the introduction of PPP (Public-Private Partnerships) schemes.

3.2.1 EU financing: CF/ERDF and ISPA/Phare

The group of countries that are subject to this analysis can be split in three groups:

- The “old” cohesion countries: Spain, Portugal, Greece
- The “new” cohesion countries: Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia, Slovenia, which have joined the EU in May 2004 and since then received support from cohesion and structural funds.
- The “accession” countries: Romania and Bulgaria, who are expected to join the EU in 2007 and will receive funding under the new programming period.

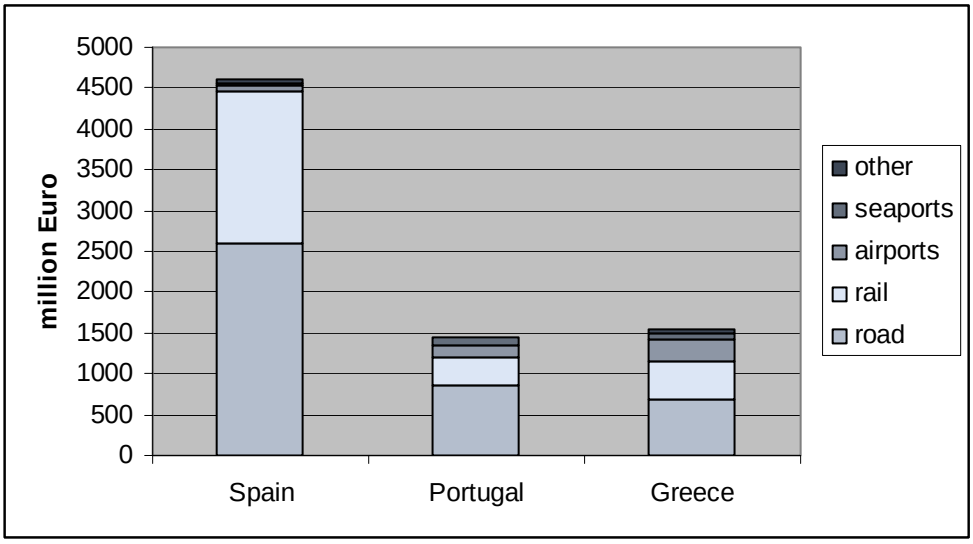
The “old” cohesion countries

Spain, Greece and Portugal have received support from structural funds and the Cohesion Fund for more than a decade. Two programming period are distinguished: the first period from 1993-1999 and the second (current) period which covers the years 2000-2006.

First programming period 1993-1999

In total some € 7.6 billion has been committed to transport investment in these countries through the Cohesion Fund in the first programming period 1993-1999[21]. Spain received the largest amount of support. In this period a clear focus can be noticed on road projects (55%), followed by rail (35%).

Figure 3.1 Cohesion Fund: Commitments 1993-1999 by mode and country



Source: Cohesion Fund Annual Report 1999

Information on transport investments under the structural funds is less straightforward as, other than for the Cohesion Fund, Transport is not always addressed as specific sub-sector in the OPs and is integrated in a stronger overall programming approach. The available information on the first programming period should be treated as indicative information only[22].

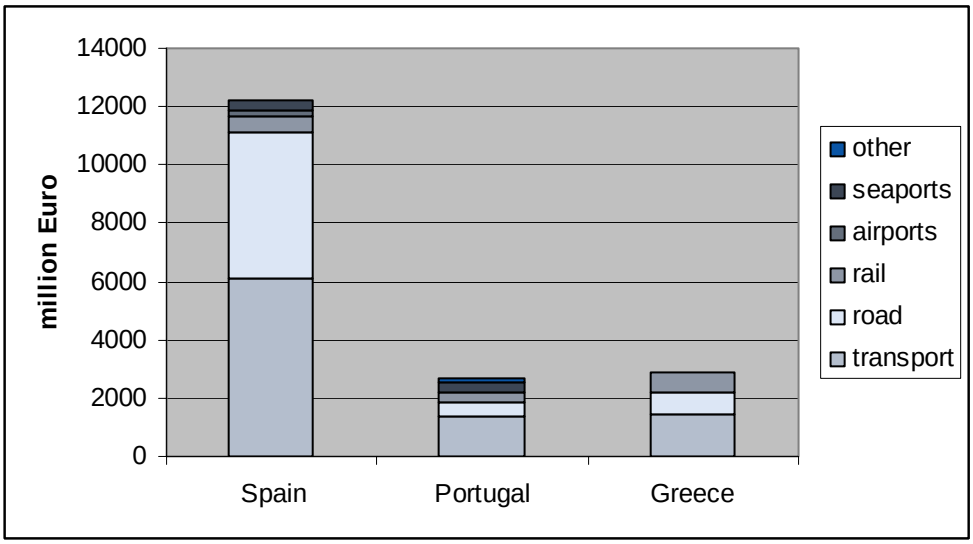
Structural Fund spending & commitments in the first programming period appears to be of a similar order of magnitude as the funds committed under the Cohesion Fund[23]. With respect to the distribution per mode (see figure 3.2), the majority of Structural Fund allocations were directed to road projects (70%), followed by rail (18%).

[21] EC (2001), Annual Report of the Cohesion Fund 1999

[22] The information is mainly base don the report Oscar Faber et.al. (2001) , Thematic Evaluation of the Impact of Structural Funds on Transport Infrastructures.

[23] Planned structural fund allocations to transport in these Member States are some 15% higher (actual spending may have been lower).

Figure 3.2 Structural Fund: Planned allocations 1994-1999 by mode and country



Source: Oscar Faber et.al. (2001)

Second programming period, 2000-2006

In the second programming period the Cohesion Fund shows an increasing focus on rail transport (see Box 3.1)[24]. This is strongly influenced by the political wish to stimulate rail transport in Europe.

Box 3.1 Cohesion Fund: Funding pattern 2000-2004 by country

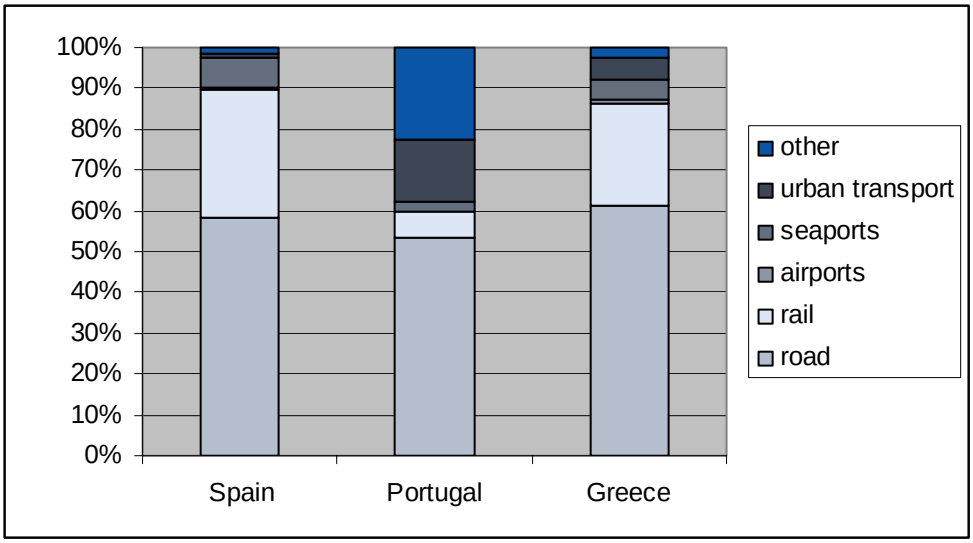
In **Greece, a**s of the 1999 Cohesion Funds, there is an increasing focus on rail transport, and if looking at the 2001 to 2004 Cohesion Funds, it is noteworthy that a balance between rail (EU contribution of 412 m€) and road (EU contribution of 581 m€) is nearly established - especially when considering that an additional 265 m€ is allocated to urban rail transport (Athens Metro).

In **Portugal i**n the second programming period 2000-2006, the focus shifts from road infrastructure to other sectors - especially rail (between 2000 and end 2002, 85% of assistance goes to rail). This is confirmed by looking at Cohesion Fund spending during 2002-2004: 397 m€ are allocated to rail transport, 338 m€ to urban rail (Lisbon Metro), and only 101 m€ to road transport (almost at the same level as maritime transport with 92 m€).

Also in **Spain** 1999 marks an increasing focus on rail as the Strategic Reference Framework for 2000-2006 introduces a focus on high-speed rail, improved road access to France and Portugal and improved port conditions. Looking at Cohesion Fund allocations during 2002-2004, it is noteworthy that EU contributions worth 3333 m€ go to rail, followed by 838 m€ for maritime transport, and only 431 m€ for road transport.

[24] Please note that this information is based on figures related to EU allocations for new decisions adopted in a specific year (not to be confused with annual commitments/payments)

Figure 3.3 Structural Fund: Planned allocations 2000-2006. Distribution by mode and country



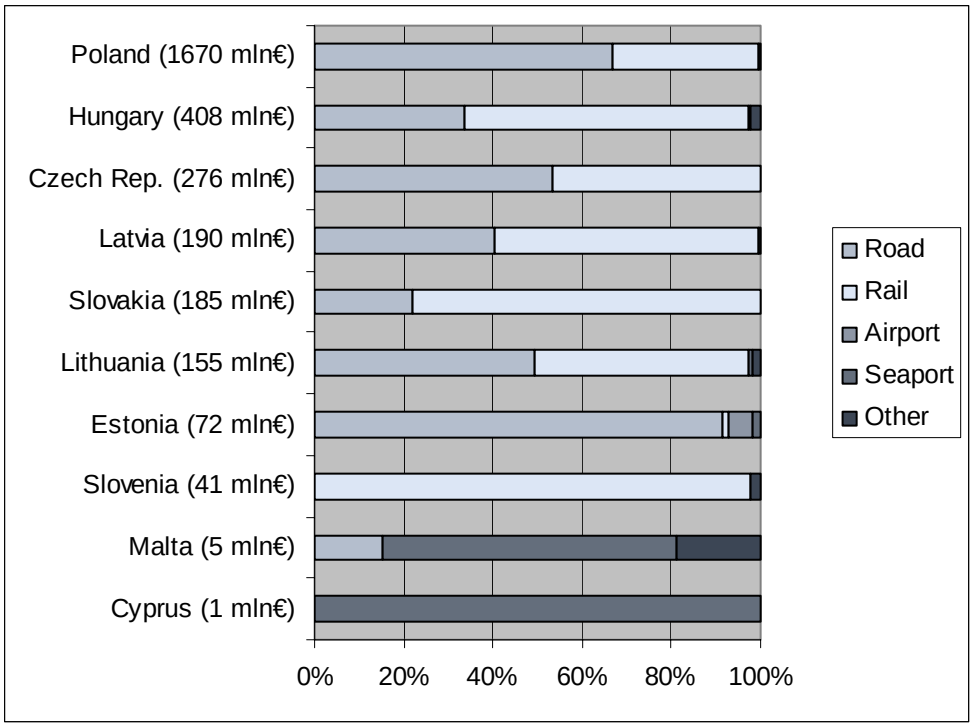
Source: DG REGIO

Whereas the Cohesion Funds shows a clear shift towards rail based projects, an analysis of the programming documents on the financial allocations under the Structural Fund in the second programming period, reveals a continued focus for road projects. Noteworthy is the strong increase in the category other in Portugal which includes strong support for multimodal transport.

The "new" cohesion countries.

As of 2004 these countries became member of the EU and became eligible for Structural Fund and Cohesion Fund support. Before this period the countries benefited from the pre-accession support instruments under the Phare and ISPA programmes.

Figure 3.4 ISPA/Phare: EU contributions per mode based on programming decisions in respective year (1998-2004)

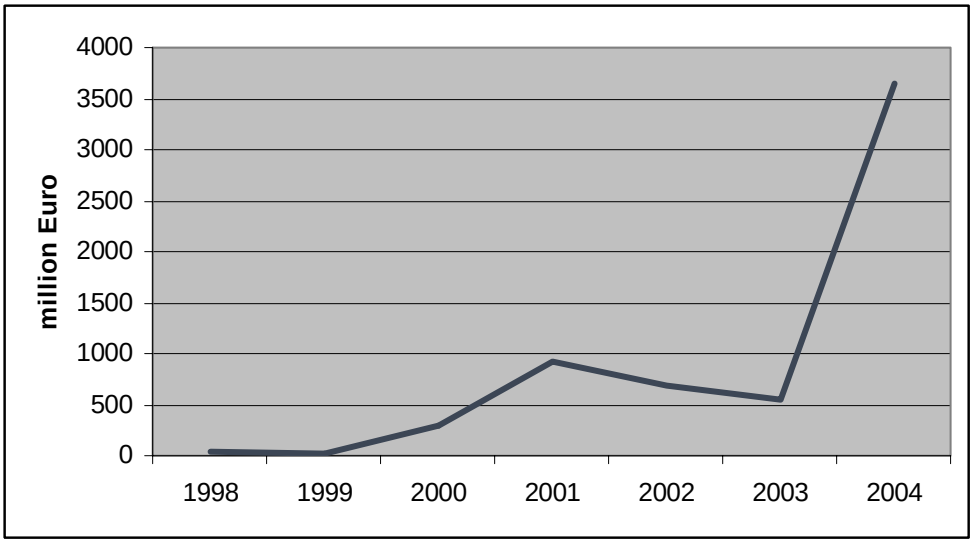


Source: ECORYS, based on ISPA Annual reports 2000-2004; Phare Financing memoranda & project fiches 1998-2004

For all "new" cohesion countries together, the pattern of EU contributions shows a more or less equal pattern of spending on road (55%) and rail (44%). Obviously this pattern is strongly dominated by Poland, which has been the main beneficiary country. Looking at the other countries a stronger representation of rail based projects can be noticed.

From 2004 onwards these countries have become eligible for Cohesion Fund and Structural Fund support. This has led to a substantial increase in funding from the European Union (see figure 3.5).

Figure 3.5 Total EU support (CF, ERDF, ISPA) new CF countries for transport investments per year, 1998-2004[25]



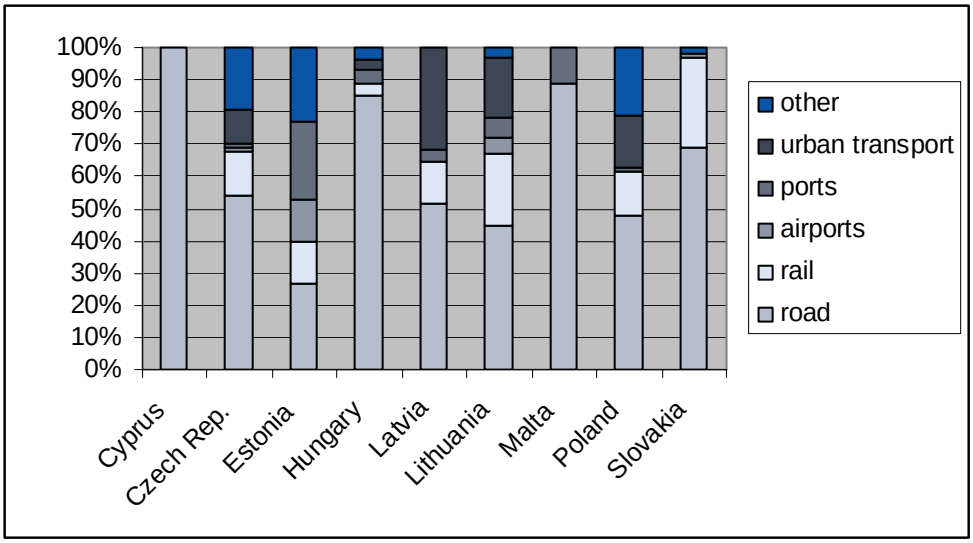
First data on the distribution of the Cohesion fund allocations per mode show a remarkable shift towards road projects. More than 80% of the EU support (related to CF approved decisions) in 2004 is dedicated to this sub-sector. Railway support follows with a share of 19%. This is comparable to the experience in the early days of the Cohesion fund (the "old" cohesion countries), which showed that it is easier to identify and prepare road based projects than rail based projects[26].

An analysis of the planned allocations under the structural funds reveals that the share of Structural Funds which is devoted to transport investments is substantial, although a wide variation between countries exists (typical values range between 20-45% of available EU structural fund support). Looking at the distribution per mode, road related projects clearly become a focal point in most countries. Rail is clearly expected to attract less EU support under the Structural Fund in these countries. A remarkable development is the increased attention to urban transport in a number of these countries (e.g. Poland, Czech Republic and the Baltic States).

[25] ISPA/Phare/CF base don EU contribution related to decisions in respective year; SF funding 2004 based on estimated average annual SF allocation for transport investments in period 2004-2006.

[26] See ECORYS (2005) Ex-post evaluation Cohesion Fund

Figure 3.6 Structural Fund: Planned allocations 2004-2006. Distribution by mode per country

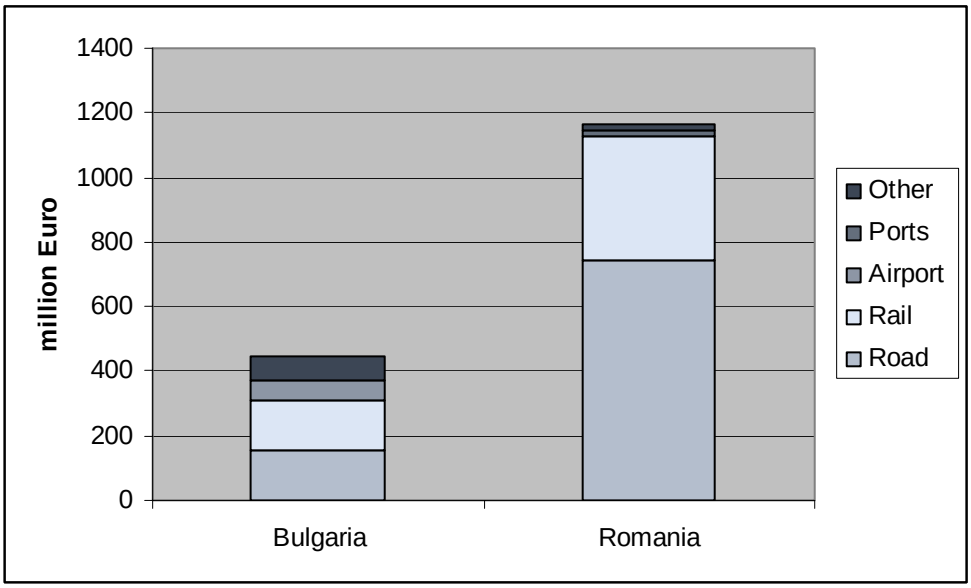


Source: DG REGIO

The "accession" countries

Two new countries are foreseen to become eligible for Cohesion and Structural Fund support in 2007, i.e. Romania and Bulgaria. Until now these countries have been receiving support under the pre-accession instruments ISPA and Phare.

Figure 3.7 ISPA/Phare: EU contributions per mode based on programming decisions in respective year (1998-2004)



Source: ECORYS, based on ISPA Annual reports 2000-2004; Phare Financing memoranda & project fiches 1998-2004

Whereas Bulgaria shows a more or less equal balance between road and rail projects, Romania present a clear emphasis on road development in comparison to rail projects in the period 1998-2004.

3.2.2 EIB and EBRD financing

Next to EU grant financing two IFIs (International Financing Institutions) have been active in the cohesion countries, i.e. EIB and EBRD. The geographical domain of the latter has been limited to central and eastern European countries.

EIB

EIB has been very active in the cohesion countries. Whereas total EU support to these countries (CF/ERDF, ISPA/Phare) in the transport sector in the period 1993-2004 amounted to some 31 bn€, the cumulative funding through EIB loans amounted to almost 50 bn€ in the period 1994-2005. Spain and Portugal have absorbed most EIB loans in this period. In relative terms, also Czech Republic, Hungary, Romania, Slovenia and Bulgaria received substantial EIB funding.

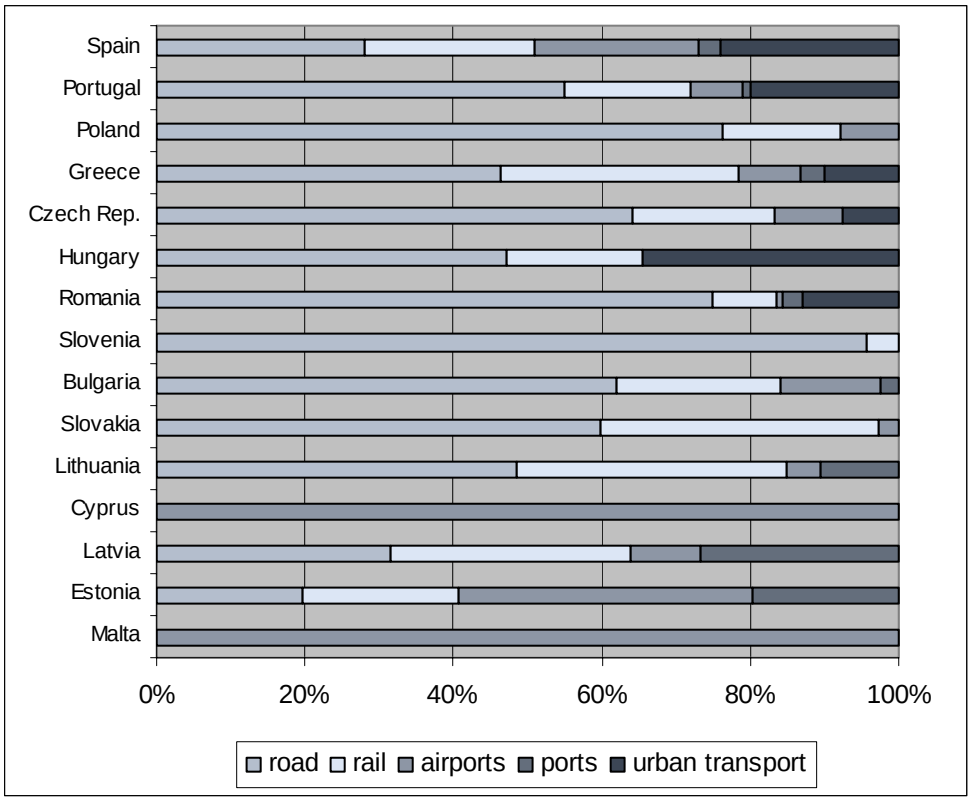
Table 3.1 EIB: Cumulative loans for transport, by country (1994-2005)

country	Cumulative loans (mln €)	In percentage of GDP 2004
Spain	22200	2,7%
Portugal	10200	7,2%
Poland	3600	1,8%
Greece	3081	1,8%
Czech Rep.	2999	3,5%
Hungary	2545	3,1%
Romania	2322	3,9%
Slovenia	1082	4,1%
Bulgaria	677	3,5%
Slovakia	534	1,6%
Lithuania	227	0,9%
Cyprus	190	1,5%
Latvia	105	0,6%
Estonia	76	0,8%
Malta	6	0,1%

Source: ECORYS, based on EIB loans database

Although differences exist per country (see figure 3.8), EIB has been heavily investing in road (46%), followed by rail (20%), urban transport (metro projects) (18%) and airport development (14%).

Figure 3.8 EIB: Cumulative loans for transport, by mode (1994-2005)



Source: ECORYS, based on EIB loans database

EBRD

EBRD has been much less active in the transport sector. Total cumulative lending in transport is approx. 1.5 bn€ in the period 1994-2005. Most activities have taken place in Hungary and Romania (motorway construction and road rehabilitation) and Poland (main railways).

3.2.3 National funding and PPP

National funding

Available information on national funding of transport infrastructure is not available in a consistent manner for the countries that are subject to this study. The data that is available is mostly linked to national budgets that are connected to EU supported projects. Maximum support rates of EU support differ per programme: the Cohesion Fund allows co-financing by the EU up to 85% of project costs, while for ERDF and ISPA maximum support levels are limited to 75%.

In practice support levels are lower, mostly as a result of costs increases during the implementation of the project. Typical EU support rates for Spain are for example 75% for CF projects and 60% for ERDF co-financed projects.

In addition to country allocate budget for transport infrastructure developments for infrastructure which is financed directly from the national (or regional) public budgets. The available evidence[27] indicates that for most countries these investments show a clear emphasis on road investments (see Box 3.2 Hungary). Note that this reflects investment spending in these countries. It should not be forgotten that in many countries rail receives substantial operational subsidies. According to a recent report[28] payments for capital investment is approx 25% of all public budget contributions to railways in the EU15.

Box 3.2 National funding for transport infrastructure: the example of Hungary

"The Ministry of Transport and Economic Affairs announced that it would allocate HUF 352 billion for infrastructure developments in 2004. Of that, motorway development would have received HUF 207 billion, the modernization of urban transport and secondary roads HUF 88 billion, EU-supported road projects HUF 32 billion and preparations for new speedway projects HUF 10 billion." *Source: Business Hungary, 2004*

"Alongside using EU funds, Hungary is planning to spend EUR 5 billion for roads from the national budget in 2007-2013, i.e. more than its whole Cohesion Fund allocation" *Source: Bankwatch Network. 2006*

Note: 1 Euro = 280 HUF (June 2006)

Public Private Partnerships (PPP)

The role of private sector involvement in the development of new infrastructure development is clearly increasing. The use of PPP is strongly promoted by the Commission with the aim to raise additional sources of revenue. Also in its cohesion policy instruments the Commission has introduced its notion on PPP.

The CF regulation 1294/1999 introduced a new paragraph calling on the EC to support beneficiary Member States' efforts to maximize the leverage of Fund resources by encouraging greater use of private sources of funding. The experience with PPP in the different countries is varying. Some actively follow a path to introduce PPP schemes, while other countries have a relative PPP-averse attitude. Table 3.1 presents an overview of PPP-activity in each country.

[27] For example with respect to Spain, Greece, Slovakia, Slovenia, Hungary, Malta

[28] NERA (2004), Study of the financing of and public budget contributions to railways (report for DG TREN)

Table 3.2 PPP: overview of activity per country

	Overall policy	PPP unit/taskforce + need identified ++ in progress +++ established	PPP Law + discussion ++ drafted +++ in place
Spain	Mainly toll motorways. Increasing role in ports		+++
Portugal	Active policy. Focus on motorways, but also light rail, port terminals, part railway network	++[a]	+++
Greece	Active policy: 3 major PPP projects (airport, road, bridge). Intention to use for new motorways	+++	++
Cyprus	PPP constructions in ports and airports		
Czech	Active policy; newly established PPP expert centre in 2004; projects in rail and motorway; new legislation in 2006	+++	++
Estonia	No PPP schemes have been implemented yet.	++	++
Hungary	Legal framework available; mixed experience with PPP in past (M5 motorway construction). New PPP involvement in new motorway construction (M6) M6	++	+++
Latvia	Legal framework present but only limited number of small projects have been implemented	++	+++
Lithuania	No major infrastructure projects. Limited experience with public-private cooperation in ports (Klaipeida).		
Malta	No significant experience, nor specific policy	+	
Poland	Mixed success in 2 motorways projects; new law on PPP due to pass parliament in 2006; no political priority anymore	++	++
Slovakia	No experience yet; first initiatives regarding motorway financing.		
Slovenia	No transport projects. Concession law amended to comply with EU guidelines.		+++
Bulgaria	No transport projects	+	+++
Romania	Exisitng concession law (law 219/1998). Previous initiatives not successful; possible chances in airport development. Little support available.	+	+++

[a] informal taskforce

Sources: Country reports; Dr. Kanakoudis (2005) The progress of the legislative framework ruling PPPs in the EU; ECORYS, Private Infrastructure Finance Opportunities in Continental Europe, Yearbook 2003-2004

Typical examples of PPP projects can be found in the road sector (motorway development), airports (full airport, or terminal development) and to ports (terminal development). In many PPP motorways it refers to tolled motorways[29]. In many of the PPP cases there has been EIB involvement as one of the lending organisations[30]. EIB involvement in PPP projects in the period 1990-2003 was mainly directed at motorway

[29] An exception in this respect is formed by Hungary were physical toll collection was being replaced by a shadow-toll system after mixed experiences with toll on the M5 Motorway.

[30] This often serves as creating leverage to outside investors.

projects (9 bn€ in loans) followed by airports and rail transport (including high speed trains), each representing a contract value of approx. 1 bn€[31]. In general, PPPs are applied for large projects. Because of there size private capital (either in the form of equity financing or commercial loans) is substantial and can amount to several hundreds of millions of Euros[32].

3.3 Economic effects of past investments

In the past decade various studies have been carried out into the impact of the community allocations on economic development. In some cases such reviews have focussed on community allocations in general, in other cases the effects of transport allocations have been studied specifically. A common element in these studies is that the lack of systematic data collection at the project level severely hampers identification of the direct link between (transport) interventions and economic growth. Whilst such data collection has significantly improved, recent mid-term evaluations of 2000-2006 Community funded transport interventions have continued to experience difficulties in establishing a clear causal link between any specific intervention and related impact.

Even with adequate data collection, though, the relationship between transport interventions and socio-economic development might be difficult to ascertain, given that the environment in which transport investments have their impacts are continuously developing and changing and are also being affected by other economic impulses.

Given the lack of data and perhaps even the analytical problem of isolation of the effect of transport investments, various analysts and researchers have turned to a modelling approach:

- London School of Economics used a Vector Auto-Regression model, a Regional Computable General Equilibrium model and a Stochastic Kernel model;
- ECOTEC and ESRI (Bradley & Morgenroth) used the HERMIN model;
- Jorg Beutel used an input-output model. Also in his study there is no separation of the effect of transport infrastructure investments from other investments.

Besides these model studies, Oscar Faber carried out a detailed thematic evaluation study.

The following conclusions have specifically been drawn on transport infrastructure investments:

- LSE finds that transport projects have significant impact on employment. It stimulates private investments. In addition, substantial additional short-term and long term effects on national and regional GDP have been found for specific transport infrastructure projects ranging from 0.05% in the case of Spain (Madrid Ring Road) to around 1% in Ireland (North South Road) and 1.0 tot 2.9% in Greece (Pathe and Egnatia motorways).

[31] See EIB (2005) Evaluation of PPP projects financed by the EIB.

[32] For example, the PPP development of Athens International Airport mobilized almost 500 m€ in equity and commercial loans (22% of total financing) while the recent M6 motorway contract in Hungary shows an amount of over 400 m€ debt financing.

- Oscar Faber carried out the first study exclusively dedicated to transport interventions. Key findings on the relation between transport infrastructure and economic development were:
    - Transport investments have important impacts on internal and international accessibility;
    - there is assumed to be a positive relation between transport investment and regional GDP, although causality is difficult to establish
    - it is estimated that significant average journey time savings are having effects in the labour market by increasing the catchment areas. The total number of project related job opportunities created by the 1994-1999 programme is estimated at over 900,000 personyears in direct employment and 1.4 million person years in indirect employment.
    - The transport infrastructure investment stimulates cross border trade with an increase in exported goods (from 11 to 15%) and services (from 1.5 tot 5.5%) to the rest of the EU.

Compared to the above studies researchers of the Dutch Central Planning Agency (CPB) are more sceptical on the effect of Structural Funds. Their main conclusion is that indeed Structural Funds can be effective in promoting cohesion, but only on the condition that the institutional setting is of high quality (Ederveen et.al, 2002).

Another interesting study on possible effects of investments in transport infrastructure was presented by Izquierdo at the CEMT symposium in Budapest (2003). In his contribution to the symposium Izquierdo distinguishes the short term demand effects of public investments, including the crowing out effects regarding private investments, from the long term effects. He concludes that:

- There indeed is a strong correlation between public investment in infrastructure and productivity. The crowding-in effect of private investments by public investment is higher than the crowding-out effect generated by the increase in aggregate demand. However, the values for the output elasticity of public capital stock are lower (around 0.2) than those that have been used until now.
- Public investment has a high multiplier effect, through demand, on macro economic values, GDP, employment and investment. In contrast, it has unfavourable effects on the public deficit, interest rats and trade balance.
- Infrastructure investment is one of the main instruments which the public sector can use to promote increased income, employment and productivity within a given region.

Box 3.3 Long term impact of future Convergence Policy and Cohesion Fund support

In a recent study of Bradley & Morgenroth (2004) the macro-economic impact of the reform of EU cohesion policy is assessed. In this study the HERMIN model is used to assess, among others, the impact of foreseen finding under the Convergence Policy and Cohesion Fund (CP/CF) during 2007-2013 for 12 countries/regions. For each country a specific HERMIN model is used.

Among these 12 countries/region, 10 countries are subject of the present strategic study. Bradley c.s. conclude that the long term effect of the CP/CF allocations (including national co-financing) is modest. The

maximum increase in GDP/capita is 4.4% (for Czech Republic), the minimum increase found 0.3% only (Greece, Spain). These increases are deemed modest in relation to the huge gap of GDP/capita in these countries as compared to the EU average.

Table: Long term economic effects: Increase in the level of GDP by the year 2020 due to CP/CF investments (% change over baseline) and cumulative multipliers

	% increase in GDP level 2020	Cumulative multipliers
Czech Republic	4.4%	2.8
Estonia	3.7%	2.4
Greece	0.3%	0.9
Hungary	4.1%	1.6
Latvia	1.4%	1.8
Poland	2.7%	2.4
Portugal	1.7%	2.0
Romania	1.7%	1.8
Slovenia	2.1%	2.5
Spain	0.3%	1.8

Source: Bradley & Morgenroth (2004), page 143-144.

However, the cumulative multiplier, which relates the investment to the accumulated long term economic effect, are in the view of Bradley & Morgenroth considerably larger than conventional investment multipliers "*mainly due to the long-tailed output productivity-enhancing effects induced by the higher stocks of physical infrastructure and human capital that are brought about by the CP/CF programmes*"(Bradley & Morgenroth, p. 14-144).

As this study includes the effects of all CP/CF funding, it includes the effects of investments in physical infrastructure and human capital, as well as the impact of direct aid to productive sectors. It is thus not possible to separate out the expected impacts of investments in transport infrastructure only.

Reviewing the evidence of the various studies, it can be concluded that economic modelling geared at capturing the net economic effect of infrastructure investments is still developing. Although positive effects can be noticed, these are partly due to demand increased associated with the investments, while at the same time negative macro economic effects can be noticed.

Nevertheless, invariably positive long term effects are found in the modelling studies, which can be substantial. At the same time, however, it is also clear that the effect of the CP/CF funding should not be overrated. Such funding cannot do more than marginally help to narrow the gap between income levels in CF countries and the EU-average.

3.4 Some examples of best practices

On the basis of the experience with the past funding a number of best practices have been identified, which can function as an example for future investments.

3.4.1 Successful PPPs

PPPs are seen as an important source of possible finance for future transport investments. Estimates of the European Commission[33] indicate that more than 60% of the TEN priority project is expected to be financed by Members States directly or other sources, including private sources.

An ex-post evaluation of the EIB[34] on their experience with PPPs in general have a positive on projects to be completed on-time, on-budget and to specification. This is important since this is frequently noted as one of the main drawbacks of regular publicly financed projects under the cohesion policy instruments of the Commission[35]. Not all PPP projects are per definition positive. An important factor is that governments need sufficient knowledge and capacity to deal with relatively more complex PPP projects. Also the funding costs may be higher due to the explicit valuation of risks (which are also present in publicly undertaken projects). One of the drawbacks identified by the EIB is the case where large scale PPP programme can raise demand for construction services in the short term which can lead to an increase in bid prices at the given level of supply.

One of the example cases in PPP is the motorway developments in Hungary, which is seen as one of the frontrunners in PPP in Central and Eastern Europe. This has resulted in some good and less favourite experiences.

[33] See EC (2005) Trans-European Transport Network, TEN-T priority axes and projects 2005
[34] See EIB (2005) Evaluation of PPP projects financed by the EIB.
[35] See ECORYS (2005) Ex-post evaluation Cohesion Fund

Box 3.4 PPP in motorway financing in Hungary

Hungary has signed its first concession contract for the M5 motorway in 1994 with AKA Rt. The M5 was intended to function as a tolled motorway. When this resulted in toll levels which were set at too high a rate the concession contract was negotiated and the concept of shadow tolls where introduced (instead of physical toll collection in toll booths, a vignette has been introduced from which an availability payment to the concessionaire is derived).

This model has served as a role model for the concession on the M6 motorway. A tender was published in 2004 for a DBFO contract (concession of 22 years). Procurement took place relatively fast for a project with a size of 480 m€. (from tender to financial close in 10.5 months) Construction, finance and operation & maintenance costs are procured at competitive price levels. The M6 is expected to be opened in 2006. Risk allocation has been in line with the original schedule by the Hungarian government.

Several success factors have been identified for the M6:

- Strong political support
- Sensible approach to market
- Standard risk allocation
- Standard contracts
- Availability based payments
- High quality public sector advisors

Sources: D. Asteraki (ING Bank), IFSL PPP seminar Athens 2005; F. Toth, concession director (2005) PPP in the Hungarian Motorway Development

3.4.2 The establishment of separate project organisations

One of the difficulties on the implementation of projects is the relative inexperience of beneficiary organisations to deal with projects the size which are made possible under the Cohesion and Structural Fund. One of these solutions is the establishment of separate projects organisations. If this is combined with the establishment of an investment programme of which is substantial in its size this can create a continuity in knowledge, experience and expertise which clearly aids to efficient implementation of projects. Examples to this purpose can be found in Greece (e.g. EYDE PATHE, Egnatia ODOS, and ERGOSE). But also Slovenia gives a good example through the establishment of a dedicated agency for motorway development.

Box 3.5 Establishment of a separate project organisation in Slovenia

Slovenia is a country which serves and important transit function within Europe. Two TEN corridors are crossing this small country. Slovenia has adopted and ambitious programme for motorway construction in 1998.

To succeed in an effective implementation of the programme the Slovenian government has established a dedicated company DARS (motorway development agency) which sole purpose is the development of the motorway network in Slovenia. Huge amounts have been spent on motorway development in the past 8 years and more than 500 km of new motorway have been implemented.

This development has been financed by a fixed budget allocation (at least 154 m€ per year since 2003) and large sums of EIB financing. In total EIB has concluded some 1 bn€ for motorway development in the country.

One of the other issues which makes this case a best practice example is that the toll revenues can be used for O&M which also secures finance after the investment phase.

Related to the issues of establishing separate project organisations is the outsourcing of programme management to dedicated agencies or secretariats. This has long been the case for Structural Fund management in parts of Belgium, The Netherlands and the UK. Also Germany recently established a Ziel 2 Secretariat, outsourced to a consultancy company, to improve coordination between programming committees, to provide technical assistance and to undertake publicity and communication.

3.4.3 Pre-funding of projects

Several factors can be identified which contribute to delays in projects. One of these factors is the availability of pre-financing. Especially for smaller beneficiaries which have limited own financial resources a lack of pre-funding can create real bottlenecks. Ireland has been one of the countries which introduced a pre-funding mechanisms to speed-up the implementation of projects. Also Portugal introduced a system of pre-funding in which half of the advances from Brussels are put in a central fund to pre-fund projects. The new regulation already foresees in a stronger pre-funding facility built in for the new programming period (art. 81).

Box 3.6 Cohesion Funds pre-financing in Ireland

For most projects in Ireland, total funding was supplied by the Exchequer to the Government Department responsible for implementing the project. The Cohesion Fund aid for these projects is subsequently reimbursed to the Exchequer. This method of pre-funding means that projects are not delayed as a result of cashflow problems.

Source: IPA (2004) The Cohesion Fund in Ireland

3.4.4 Improved programming of projects and creating a pipeline

One of the key factors in creating successful is to enhance the quality of the preparation process. Only mature projects should be selected which fulfil clear quality standards. The recent ex-post evaluation of the Cohesion Fund[36] identifies a number of key recommendations in this respect.

[36] see ECORYS (2005)

Box 3.7 Success factors in creating mature projects

The ex-post evaluation on the Cohesion Fund addresses a number of recommendation to enhance the quality of projects in the preparation phase:

- "Adopt a multi-annual planning approach in which both project preparation and implementation are planned on a multi-annual time frame
- Create a pipeline of projects
- Request active public consultation before submission of application
- Request fully developed technical (design and feasibility) studies before application. This could be improved by creating a special facility for technical feasibility studies.
- Make more use of the CF to finance preparatory studies
- Request appropriate risk assessment before submission
- Apply technical quality assurance on applications for financing. If relevant develop a standard technical checklist in this respect.
- Approve only projects which are close to or have completed tendering (this would require a system of pre-funding at the member states to avoid unnecessary start-up delays)
- Do not allow re-measurement type of contracts"

Source: ECORYS (2005) Ex-post evaluation of a sample of projects financed by the Cohesion Fund (1993-2002)

3.4.5 Integrated approach

Related to the previous best practice is the introduction of a stronger integrated approach. An integrated approach results in a more holistic solution to a problem which addresses the different dimensions of the problem. This can be valid for example in rail development, where it is not only track expansion which plays a role in increasing speed, but also the signalling, the interoperability on international connections, and possible the organisation of the rail services. Solving only one aspect does not give adequate results. Another example is found in the introduction of integrated programming in Structural Funds in Italy.

Box 3.8 Raising project quality through integrated local programmes in Italy

"Among the range of types of integrated projects in Italy *Programmi Integrati per lo Sviluppo Locale* (PSIL) have been introduced in some regions to raise project quality and improve the strategic capacities of regional actors. Each PISL is a meso-level strategy – a coherent set of integrated, inter-sectoral actions (encompassing infrastructure and enterprise aids) providing a coordinated local territorial framework for the design, selection and delivery of projects."

Source: EC (2005) Best practices in regional development. In: Inforegio, May 2005.

Such a holistic, integrated approach could also take due account of the different policy dimensions of potential investments looking not only at the economic and transport aspects, but also to environmental and social dimensions. This has the additional advantage that potential opposition towards projects (and the resulting risk on time delays in the preparation phase) can be decreased.

4 SWOT analysis transport sector

4.1 Introduction

This section presents a SWOT analysis with respect to the current situation and past funding experiences. It draw upon the description of the current transport system in chapter 2 and is supplemented by more detailed specific SWOT analyses which are elaborated in the country reports. In addition it takes account of the experiences with previous funding of transport investments. With respect to this last aspect not only finding from chapter 3 have been incorporated but also a number of finding that have been reflected in earlier ex-post evaluations of transport investment financing programmes[37]. This SWOT analysis synthesizes key strengths, weaknesses opportunities and threats on an aggregate level. Deviations may exist per country.

4.2 SWOT analysis

A SWOT analysis table is presented on the next page.

[37] See e.g. various EIB ex-post evaluations; ECORYS (2005) Ex-post evaluation of a sample of projects co-financed from the Cohesion Fund 1993-2002, and other ex-post evaluations commissioned by the European Commission.

Strengths	Weaknesses
General • Increased harmonisation EU regulation *Roads* • Low density motorway network in many countries *Rail* • High density of rail network • High share in freight transport *Urban Public Transport* • Extensive (rail based) network in many new member states *Ports/IWT* • Increasing demand *Air* • Demand increases	*Roads* • Poor maintenance of non-motorway network • Road safety *Rail* • Poor maintenance quality existing network • Low modernisation level (track, rolling stock) • Institutional setting *Urban Public Transport* • In some cases outdated rolling stock/fleet *Ports/IWT* • Competitive position port management/operators • Hinterland connections (intermodal connections) *Air* • Pressure on airport-city transport links
Funding • Increased availability of funds (both EU programmes and EIB) • Increased built up of expertise/administrative capacity in time • Positive potential role of PPP in creating on-time on budget projects (quality of projects) • Relatively limited public debt in many new member states (positive impact on borrowing capacity) • Positive economic impact of past transport infrastructure investment	*Funding* • Limited pipeline of projects • Projects not always mature enough at start. • Inexperience of many beneficiaries with requirements EU funded programmes; • Time- and cost overruns in implementation • Insufficient attention to operation phase • Administrative capacity bottlenecks • Country focus at times hampers cross border completion of projects at same time (country interest does not always equal EU interest) • Limited application of PPP until this moment • Unclear process of prioritisation of projects in some countries
Opportunities	**Threats**
General • Increased funding levels through CF/ERDF *Roads* • Increased motorisation & demand • Increased possibility for collection of road based income (e.g. road fund, road taxes etc.) *Rail* • Potential increase of quality network & service • Strong traditional position of rail based freight transport *Urban Public Transport*	*General* • Limited funding • Insufficient funds for maintenance • Poor level of service • Limited competition & deregulation • Increased demand for road transport • Lack of pricing policy • Administrative/organisational capacity • Lack of cross-border co-ordination/interoperability *Rail* • Increased motorisation trend and resulting demand for road transport

• Increased road congestion can increase attraction of urban public transport. • Increase in metropolitan and urban demand *Ports/IWT* • More competitive through improvements of port management • Increase in public-private initiatives *Air* • Relatively easy sector for private funding	• Failure to modernise services *Urban Public Transport* • Limited funding capabilities municipalities • Increased car motorisation • Increased commercialisation and price increases *Ports/IWT* • Lack of hinterland connections *Air* • To dispersed investment pattern (regional airports) • Capacity constraints airports • Noise/emission constraints
Funding • Increasing interest (and experience) with PPP; PPP task forces are set up in various countries • Clear opportunities for EIB funding in revenue generating sub-sectors • GDP increases (increased demand, enhanced capacity to pay for transport services; enhanced public revenue)	*Funding* • Poor (administrative & technical) management of projects; • Poor preparation (and subsequent quality of) projects • Lack of cross-border coordination and implementation • Lack of funding in operation phase (a/o for maintenance)

5 Towards future investment priorities

5.1 Introduction

This section provides a synthesis on the direction of future investment priorities for the 15 cohesion countries that are subject of this strategic evaluation. The assessment leads a number of transport investment areas which merit EU funding in the period 2007-2013. In the underlying project report more details are given on specificities of these areas, which may differ per country. In this synthesis report the main guiding principles in defining these strategic priorities are illustrated.

It is important to realise that the analysis that has been carried out at **strategic level**. Although the areas identified are expected to result in high potential projects they should still be subjected to **cost-benefit analysis at a project level** before being finally selected.

Different factors are important in the process of identifying strategic priorities.

Community Strategic Guidelines

The context for identifying strategic investment priorities is set by the Community Strategic guidelines. In accordance with the draft Council Regulation (article 23), the Council establishes Community Strategic Guidelines for cohesion policy to "give effect to the priorities of the Community with a view to promote balanced, harmonious and sustainable development"[38].

These Strategic Guidelines form the basis for identifying investment priorities, which are then elaborated in National Strategic Reference Frameworks at the Member State level. These Frameworks are subsequently further detailed in Operational Programmes (OPs) for thematic areas. A Commission proposal on these Strategic Guidelines was published in July 2005[39]. In parallel, Member States have started preparations for their National Strategic Reference Frameworks and OPs.

Factors influencing investment priorities

As indicated the Strategic Guidelines form the context in which investment priorities for Community financing should be identified. In addition to these strategic guidelines a number of other factors shape the eventual establishment of transport investment priorities. These other factors include:

- Costs and benefits of projects;
- Availability of other sources of funding;

[38] COM(2004)492

[39] COM(2005)299 Cohesion Policy in Support of Growth and Jobs: Community Strategic Guidelines, 2007-2013.

- Appropriateness of transport policy
- Administrative capacity to adequately absorb and manage funds.

An important aspect of assessing the importance of different investment opportunities is the extent to which they impact on different criteria. Three criteria have been identified which correspond with the core objectives set out in the Strategic Guidelines. These are:

- Competitiveness,
- Cohesion
- Sustainability.

To assess these impacts scenarios have been constructed, which are assessed on their merits with respect to each of these core objectives.

In the next section the Strategic Guidelines, the factors and the impact assessment of different scenarios are elaborated in more detail leading to guidelines for further prioritisation of areas for funding from Cohesion and Structural Funds.

5.2 Community Strategic Guidelines

The (draft) Community Strategic Guidelines set the scene for any future transport investment financed as part of the Commission's cohesion policy. According to the communication of the Commission (COM(2005)299) the guidelines with respect to the expansion and improvement of transport infrastructures for the period 2007-2013 determine clear guidelines for action (see text box 5.1)

Box 5.1 Community Strategic Guidelines: Guidelines for action

The Community Strategic Guidelines distinguish the following guidelines for action:

- Member States should give priority to **the 30 projects of European interest**, located in Member States and regions eligible under the Convergence objective[40]. Other TEN projects should be supported where this is a strong case in terms of their contribution to growth and competitiveness. Within this group of projects, cross-border links and those overseen by the specially designated European co-ordinators in the Member States merit special attention. Member States should make use of the co-ordinators as a means of shortening the time that elapses between designation of the planning of the network and the physical construction
- Complementary investment in **secondary connections** will also be important in the context of an integrated regional transport and communications strategy covering urban and rural areas, in order to ensure that the regions benefit from the opportunities created by the major networks.
- Support for **rail infrastructure** should seek to ensure greater access. Track fees should facilitate access for independent operators. They should also enhance the creation of an EU-wide interoperable network. Compliance and applications of the interoperability and the fitting of ERTMS on board and on track should be part of all projects financed.
- Promoting environmentally sustainable **transport networks**. This includes public transport facilities (including park-and-ride infrastructures), mobility plans, ring roads, increasing safety at road junctions, soft traffic (cycle lanes, pedestrian tracks). It also includes actions providing for accessibility to common public transport services for certain target groups (the elderly, disabled persons) and providing distribution networks for alternative vehicle fuels.
- In order to guarantee the optimum efficiency of transport infrastructures for promoting regional

[40] Decision n°. 884/2004/EC of the European Parliament and of the Council, 29 April 2004.

development, attention should be paid to improving the **connectivity** of landlocked territories to the Trans-European network (TEN-T) (…). In this respect, the development of secondary links, with a focus on inter-modality and sustainable transport, should be promoted. In particular, harbours and airports should be connected to their hinterland.

- More attention should be paid to developing the "**motorways of the sea"** and to short-sea shipping as a viable alternative to long-distance road and rail transport.

In addition the Guidelines give specific instructions with respect to the **territorial dimension** of Cohesion policy in stressing that Member States should pay particular attention to prevent uneven regional development and improve territorial integration and cooperation between and within regions.

5.3 Factors influencing the prioritisation of transport investments

As indicated in the introduction a number of other factors determine the eventual prioritisation of transport investment priorities under the Commission's cohesion policy instruments. These will be subsequently elaborated.

5.3.1 Costs-effectiveness

Cost-effectiveness or value for money stands at the core of any sound investment programme. It is also fully embedded in the procedures and structure of the cohesion policy of the Commission in which cost-benefit assessments of proposed projects are standard procedure. Also EIB applies CBA as standard assessment methodology before granting new loans.

The cost-effectiveness criterion is especially important if budget resources are limited. In this case cost-benefit analyses can be used to phase foreseen transport investment in time or to seek alternatives with a similar functionality that offer a higher value for money.

Costs differ strongly per type of investment projects. Table 5.1 gives an overview of average costs per kilometre for different type of projects.

The table shows that costs differ strongly per mode of transport. Rail and motorway costs per kilometre show wide variation, which can be partly attributed to terrain conditions (investment costs being higher in mountainous areas). High speed trains are clearly the most expensive type of investments.

Table 5.1 Unit costs different types of transport projects

Type of project	Country	Section	Unit cost (million Euro/km)
Conventional rail			
New	Portugal/Spain	Sines-Badajoz	€ 3,50
New	Spain	Algeciras-Bobadilla	€ 2,05
New	Romania	Curtici-Brasov	€ 5,58
Rail Baltica axis (upgrade/new)	Poland/Lithuania	Warsaw-Kaunas	€ 0,69
Rail Baltica axis (upgrade/new)	Lithuania/Latvia	Kaunas-Riga	€ 3,00
Rail Baltica axis (upgrade/new)	Latvia/Estonia	Riga-Tallinn	€ 3,19
Upgrade/new	Greece/Bulgaria	Kulata-Sofia-Vidin/Calafat	€ 10,18
High speed rail			
New	Portugal/Spain	Lisbon/Porto-Madrid	€ 16,95
New	Spain	Madrid-Vitoria-Irun/Hendaye	€ 13,16
New	Spain	Madrid-Andalusia	€ 5,02
New	Spain	North-east corridor	€ 5,42
New	Spain	Madrid-Levante and Mediterranean	€ 8,30
New	Portugal/Spain	North/north-west corridor	€ 2,15
Road/motorway			
New	Greece	Pathe	€ 10,49
New	Greece	Via Egnatia	€ 5,40
upgrade	Greece/Bulgaria	Pathe	€ 4,22
Mix	Bulgaria/Romania	Via Egnatia	€ 5,95
New	Portugal/Spain	Lisbon-Valladolid	€ 1,25
New	Portugal/Spain	La Coruna-Lisbon	€ 3,95
New	Portugal/Spain	Seville-Lisbon	€ 1,66
New	Poland	Gdansk-Katowice	€ 5,42
New/upgrade	Poland/Czech Republic	Katowice-Brno/Zilina	€ 10,40

Source: ECORYS, based on EC (2005) Trans-European Transport Network, TEN-T priority axes and projects 2005

However, costs alone do not make the full difference. In the end it is the trade-off between benefits (including environmental) and costs (i.e. efficiency) which determines the ranking of projects. Typically projects generate higher benefits if higher time saving can be realised and/or if the volumes of people and freight which benefit are large. Also the construction of missing links (limited investments which captures benefits on a much wider network or corridor) scores well on this criterion.

Table 5.2 gives an overview of a crude (and incomplete) measure of costs and benefits for different TEN projects. Benefits are expressed in yearly costs savings (passenger &

freight) and annual time savings (passengers) divided by the total investment costs. Data are based on the TEN-STAC study report[41].

Table 5.2 Yearly cost & time savings as a percentage of total investment costs for different TEN projects

Section	Country	Savings as % of investment costs
Conventional rail		
Venezia - Ljubljana - Budapest	Italy/Slovenia/Hungary	4,53%
Gdansk - Warszawa - Katowice	Poland	0,13%
Katowice - Brno - Breclav	Poland/Slovakia	1,84%
Katowice - Zilina - Nove Misto	Poland/Slovakia	2,22%
Ionian/Adriatic	Greece	0,20%
Warsaw - Kaunas	Poland/Estonia	12,83%
Kaunas - Riga	Estonia/Latvia	13,51%
Riga - Talinn	Latvia/Lithuania	0,97%
High speed rail		
Lisboa - Badajoz - Madrid	Portugal/Spain	0,11%
Barcelona - Figueras - Perpignan - Montpellier - Nimes	Spain/France	1,18%
Madrid - Vitoria - Irun/Hendaye - Bordeaux	Spain/France	2,82%
Lisboa - Porto	Portugal	0,01%
Road/motorway		
Athens - Greek/Bulgarian border - Kulata - Sofia	Greece/Bulgaria	0,94%
Gdansk - Katowice	Poland	0,36%
Katowice - Brno/Zilina	Poland/Slovakia	6,71%
Brno - Wien	Slovakia/Austria	16,97%

Source: ECORYS, based on TEN-STAC (including update cost estimates, based on TEN report 2005)

Differences between projects are predominantly caused by differences in costs levels in combination with the size of transport demand volumes (passenger and freight flows).

Box 5.2 The market for high speed rail

Apart from the cost differences for different high speed rail projects, the economic feasibility is strongly determined by the market demand. Main market factors include:

- The size of the market for travel between 200-800km (esp. 300-600 km). Above this distance competition from air becomes too strong;
- Their must be large cities along the line which match this distance (or a chain of larger cities);
- The region that has to be crossed should not be densely populated along the whole alignment as this clearly increase capital costs;
- Good conventional rail reduces the incremental economic case for high speed rail

Source: Steer Davies Gleave (2004) High Speed Rail: International comparisons

[41] It should be noted that these CBA ratio indicators are based on national and international transport flows and not regional/local ones.

5.3.2 Availability of other sources of financing

A can be observed from the previous investment programmes other sources of finance should not be overlooked with respect to future transport investments Apart from public financing by the country itself important potential sources are as follows.

TEN-T budget

The Commission recently reached an agreement with the EP on future TEN-T financing. Total budget available is 7 bn€ for the coming programming period. Financing can be up to 20%. It should be noted however that this financing is only a fraction of total cohesion financing (e.g. Cohesion Fund financing for transport approximates 30 bn€), while TEN-T funds are available for all EU members (and not only the CF15 countries). According to the recent mid-term review of the White Paper the Commission has indicated that TEN-T funds will be focused on cross-border TEN-T projects[42].

EIB

EIB financing is another source of financing available for transport investment. Past involvement of EIB in the fifteen countries has been substantial. In the period 1994-2004 some 50 bn€ has been lend to these countries for investments in transport (as compared to approx 35 bn€ through EU grant support in the same period).

Which could hamper future involvement of EIB is the level of public debt and the public deficit levels.

EIB and EC have initiated a number of actions to strengthen the co-operation and synergy between the two organisations in the field of cohesion policy. Three initiatives are started:

- JASPERS (Joint Assistance in Supporting Projects in European Regions),
- JEREMIE (Joint European Resources for Micro-to-Medium Enterprises) and
- JESSICA (Joint European Support for Sustainable Investment in City Areas).

PPPs

PPPs are explicitly mentioned in the Community Strategic Guidelines as a potentially appropriate method of financing investment in cases in which there is significant scope for involving the private sector. Apart from the financial leverage (attracting private funds by providing public funds), positive impacts are expected on implementation and management of projects. Section 3.2.3 gives an overview of the current state of PPP in the different countries.

In summary, other financing sources are expected to be relevant for the following areas

Table 5.3 Potential financing sources and expected destination of funding

Source	Destination
TEN-T	TEN projects, especially cross border sections
EIB	Motorways, airports and (to a lesser extent) railways
PPP & private capital	Income generating transport investments: ports, airports, logistic centres, toll roads (and bridges)

[42] COM(2006)xxx Keep Eiurope moving – sustainable mobility for our continent. Mid-term review of the European Commission's Transport White Paper

5.3.3 Administrative capacity

This section assesses the technical and administrative capacity of CF countries in relation to EU-funded transport interventions. The reason for this assessment is that whilst over the last years all the countries covered by this study have made substantial progress with either the establishment of the required structures in relation to EU-funded transport interventions or their continuous improvement, as in the case of the old Member States Greece, Portugal and Spain, there are still some serious bottlenecks with regard to technical and administrative capacity. These deficiencies prevent the beneficiary countries from fully exploiting their absorption potential, both with regard to ongoing and future EU support in the area of transport infrastructure.

The assessment is based on country-level research on the existing structures and processes established for the programming, implementation and evaluation of EU-funded transport interventions. The assessment also includes a judgement on the likely future absorption capacity in the countries concerned.

The separate country analyses have identified deficiencies at all levels of programme and project design and implementation. Different levels can be distinguished:

- Deficiencies at the level of the central and regional authorities involved in programming and implementation (for example, Managing Authorities or Intermediate Bodies)
- Deficiencies at the level of the final beneficiary or end user (for example, a local authority, which has applied for Cohesion Fund support)
- Inadequate institutional and legal arrangements affecting all levels having an impact on the design and implementation of EU-funded transport interventions.

The assessment of these deficiencies has fed a reflection on the absorption capacity, including both ongoing programmes, as well as with a view to the 2007-2013 Programming Period

Deficiencies at the level of the central and regional authorities involved in programming and implementation

Country evaluators have assessed the capacities of staff working in the different central and regional authorities involved in the programming, management and monitoring /evaluation of EU-funded transport interventions. This includes Managing and Paying Authorities, as well as Intermediate Bodies and other relevant structures (for example the different Monitoring Committees).

An overall observation which covers nearly all old and new Member States as well as the acceding countries is that staff numbers bear no relation to the workload involved in EU-funded transport interventions. Indeed, most Country Reports have reported on insufficient staff numbers, and this is most pronounced in the new Member States and acceding countries (however, Portugal also reports on how limited staff numbers are affecting pre-approval technical review and monitoring). Existing staff are heavily burdened as they are often not exclusively dedicated to EU-funded transport interventions but also have to deal with other responsibilities (this is for example the case in Latvia).

The staff shortage is caused by both limited availability of suitable staff in the concerned countries as well as the public authorities' financial constraints on recruiting additional staff. The limited human resources budget implies low salaries. This in turn has led to a phenomenon observed in most new Member States, i.e. the high staff turn-over (specifically problematic, for example, in the Czech Republic, Latvia and Lithuania). This has resulted from low salaries, and limited career prospects within public administration, especially when comparing this with improving prospects in the private sector.

Across most of the new Member States and the acceding countries, country evaluators have found that staff has limited relevant skills. This is largely due to the fact that the employing authorities can only afford to recruit young and relatively inexperienced staff. There is therefore an observed gap with regard to project preparation, management (including the management of public procurement and disbursement procedures), and monitoring skills (weaknesses in this area are also noted, for example, for Greece and Spain), leading often to significant implementation and disbursement delays. This problem is exacerbated by the lack of technical expertise (for example, engineering or architecture), as staff have either limited or no previous professional experience. For example, in the Czech Ministry of Transport, only five experts have more than three years' relevant experience. Moreover, in some countries, there is simply a lack of available technical expertise as relevant engineering skills have been largely absorbed by the private sector (for example in Latvia).

Deficiencies at the level of the final beneficiary or end user

With regard to staff capacity limitations, the above comments are also valid at the level of the beneficiaries and end users (i.e. applicants for EU support which are directly involved in the implementation of transport interventions such as construction works).

A key weakness at beneficiary / end user-level which has serious effects at all levels is the limited project preparation capability. Poor quality project design and weak applications generate significant work at the central level as much time is wasted over the review and improvement of inadequate documentation. Moreover, weak project design often undermines project impact and sustainability as key issues relating to the relevance and viability of the proposed project might have been overlooked. This is exacerbated by weak implementation skills at the beneficiary level with the consequence that after a project has been approved it is often too late to improve on weak project design, as local management staff lacks the vision to detect such deficiencies.

Some of the new Member States, especially Poland, but also some of the old Member States have experienced considerable difficulties with the identification of available land for transport interventions at municipal level.

Finally, country evaluator feedback also indicates that local works and service providers are often unable to cope with the increasing demand arising from the rapidly increasing level of EU-funded activity. This has often led to significant delays as well as increased the cost of infrastructure works and services as providers can now increase prices and decide to prioritise more lucrative assignments.

Inadequate institutional and legal arrangements

Further important constraints with an effect on overall absorption capacity include weak institutional arrangements as well as an inadequate legal framework for project implementation. Institutional weaknesses include, for example, overlapping responsibilities between different involved ministries, or between institutions at different territorial levels. The latter has complicated implementation in Spain where the national and the regional level share responsibilities in the implementation of EU-funded transport interventions without sufficiently clearly defined coordination and communication channels. Moreover, in some countries the development of staff capacity for the implementation of EU-funded interventions has suffered from institutional instability, for example, frequent changes in the organisation of a ministry following a change in government. Country evaluators have reported on such constraints for Greece (overlapping responsibilities between three ministries) and Poland. Bulgaria has also reported on changing political priorities influencing decision-taking on EU-funded interventions.

In addition to institutional weaknesses, weaknesses are reported in relation to inadequate legal provisions, especially with respect to public procurement, expropriation of land for construction purposes, and the issuing of permits for construction. In the new Member States and the acceding countries this legislation has often been established only recently in the context of harmonising national legislation with the Acquis Communautaire. Staff at the different central-, regional- and local-level institutions lacks experience with new legal requirements, and legal requirements often require further fine-tuning in the light of concrete experience with the application of specific provisions. In a number of countries this type of problems has been explicitly indicated. For example, in Greece, there have been significant problems with costly expropriation procedures. In Latvia, the national tendering procedures have caused difficulties with the consequence that none of the tenders for the 2004 Cohesion Fund programme could be completed in 2005. Finally, in Poland, the legal provisions on land ownership and expropriation as well as construction permits are reportedly a major barrier to the implementation of new road projects.

Absorption capacity

The above noted deficiencies have seriously undermined absorption capacities with regard to the ongoing programmes, and this is most pronounced in the new Member States and in the acceding countries Bulgaria and Romania.

At the level of the concerned central and regional authorities, inadequate staff capacities in all relevant areas are posing a threat to absorption capacity as the staff of Managing Authorities, Intermediate Bodies and other concerned institutions find it increasingly difficult to cope with the required programme design and implementation tasks whilst ensuring a minimum quality standard. There is anecdotal evidence that pressure to comply with procedures and deadlines has often led to an exaggerated focus on procedures and diverted attention from content. This has serious consequences for the impact and sustainability of EU-funded interventions as the responsible institutions can not guarantee that only the most relevant and well prepared project applications are approved.

Similarly, at the beneficiary / end user-level, deficiencies have undermined absorption capacity. Indeed, despite the clearly identified significant needs for EU-funded transport interventions, project preparation and implementation deficiencies at the beneficiary / end-user-level do not allow for an efficient use of available resources, and beneficiaries therefore have more reduced project portfolios than actual needs would support. This has been exacerbated by difficulties over identifying the required land for transport interventions as well as by the rapidly increasing costs of local infrastructure works and service providers. It is noteworthy that besides a series of new Member States, Greece and Portugal also experience absorption constraints despite existing needs. Absorption constraints are also reported for Spain, however, in this case, the increasing difficulty to identify suitable projects is caused by the fact that the more urgent needs have largely been addressed.

Finally, besides these serious capacity deficiencies, a series of other problems have also contributed to undermining absorption capacity. These include inadequate institutional arrangements and lack of coordination between different institutional or territorial levels. Moreover, existing legal provisions concerning public procurement, expropriation of lands and construction permits have often put additional obstacles in the way of efficient implementation with resulting delays adding to the low absorption capacity.

Conclusions

Country evaluators have provided serious indications on capacity deficiencies reducing absorption capacity with regard to ongoing EU-funded transport interventions. Moreover, there are only few indications that the responsible authorities are satisfactorily addressing these issues. In many new Member States as well as the acceding countries capacity deficiencies are addressed by a systematic recourse to external Technical Assistance (with Technical Assistance teams often led by experts from the old EU Member States). However, this results in short-term solutions, with limited genuine transfer of expertise. In the new Member States, internal capacity increases in terms of new recruitments have not developed in parallel to the leap in funding from pre-accession to Structural and Cohesion Funds: in the Czech Republic, Hungary, Lithuania, Poland, Slovakia and Slovenia, the EU allocation for the Cohesion Fund in 2004 alone, is higher than the combined ISPA allocations over the four preceding years, with the highest increase for Hungary where the combined four years of ISPA support amount to 177 m€ in comparison to 710 m€ decided under the 2004 Cohesion Fund.

In the countries where the capacity constraints are addressed, the effort to amend existing capacity deficiencies is not proportional to the volume of expected funding for 2007-2013, and the related steeply increasing workload. Important capacity building initiatives are for example under way in Poland, however, the increase in available funding is not mirrored by proportionate staff increases (annual allocations have increased from 17 m€ for ISPA in 2000 to over 1026 m€ for the Cohesion Fund in 2004).

However, the experience from the old Member States shows a gradually increasing ability to cope with absorption problems, and some of the new Member States have also demonstrated how satisfactory capacities can be established in a relatively short period of time (for example, the Country Reports for Cyprus, Estonia and Hungary confirm that, in general terms, sufficient capacities are in place).

Moreover, it is probable that there will be some learning from the experience with the pre-accession and the 2004-2006 programmes, and this is likely to contribute to more adequate institutional arrangements. For example, feedback from the Czech Republic indicates that there has been significant learning from the pre-accession experience. Finally, implementation experience is also likely to contribute to an improved legal framework, especially with regard to public procurement and expropriation issues, as there has now been sufficient time to experiment with, in most cases, new legislation.

In this context it is worthwhile to highlight that a series of capacity building initiatives are already underway in order to address existing constraints and maximise absorption capacity. For example, in the Czech Republic, the Phare-funded initiative "Finalisation of Structures and Measures for the Enhancement of the Absorption Capacity on the National and Regional Level", Phare, 2003-2004, included an analysis of infrastructure project preparation in order to improve absorption capacity. In Latvia, the "Human Resources Development Plan 2004-2008" foresees specific payment provisions as well as training and coaching support for public administration staff involved in the implementation of EU-funded projects. Moreover, capacity building measures have been integrated into the Latvian Structural Funds' allocations for Technical Assistance. Finally, in Poland, the "TDS 2007-2013" includes two specific goals with a view to improve capacities and increase absorption, i.e. (a) the creation of a consulting company providing services for the Ministry of Infrastructure and other relevant institutions (advice on the preparation of investment plans, feasibility studies, environmental impact assessments etc.); and (b) enhancement and improving effectiveness of investment departments in relevant institutions (focus on improving road investments).

In summary

Many countries face serious capacity constraints with respect to their administrative capacity. Technical assistance which is used to overcome these problems but this can only be seen as a short term solution.

Different capacity building initiatives are already underway. In addition their will be learning experience as the programme evolves. It can therefore be concluded that the implementation of the 2007-2013 programmes will still meet significant problems over limited absorption capacity, however, in the medium and long-term, the increasing capacity building effort is likely to bear fruits, and facilitate an improved absorption of EU funding towards the middle / end of the next programming period.

5.4 Building scenarios

5.4.1 Introduction

One of the key factors in determining transport investment priorities is to assess the impacts of different options. Impacts have been assessed on three different (EU) policy objectives:

- Economic competitiveness

- Territorial cohesion
- Environmental sustainability

In addition the impacts are assessed on the Accessibility Problem Index (see 2.8). The impacts have been assessed with the use of the SASI model (see 4.5).

Impacts have been assessed for different scenarios to be able to compare the outcomes and draw conclusions on the different impacts. Although the study aims to identify strategic areas for investment priorities, these areas need to be "translated" into projects to enable the SASI model to assess impacts. As a result assumptions have been made on projects within the scenarios. These projects have not been listed separately as this would distract the discussion from strategic priorities to projects. Where possible, these projects are based on existing planned projects and related cost estimates[43]. Where no existing data existed, estimates are based on existing unit parameters in EU wide infrastructure needs assessments[44]. In all scenarios, after 2016 no further transport projects are implemented. However, it is assumed that European integration proceeds as in the Reference Scenario.

5.4.2 Scenarios

The reference scenario

To assess the impacts of new transport investments a reference scenario has been prepared. This mainly implies an adjustment of the transport network in the SASI model[45]. The dynamic network database of SASI is based on highly detailed pan-European transport networks with respect to:

- Roads (including short-sea shipping)
- Rail (including ferries)
- Air (including regional airports).

Network calculations are based on travel times or generalised costs including border waiting times and (political, economic cultural and language) barriers.

The reference network has been updated based on the most recent information from the countries on implementation schedules and alignment with respect to TEN and national transport projects (also information on toll is included). The reference network includes all projects that are already under construction and will be operational in at latest 2007.

In addition the reference scenario assumes the further development of the European integration with the accession of Bulgaria and Romania to the European Union in 2007. Further European integration results in reductions in waiting times and lower barriers between countries.

In addition to the Reference scenario, two major scenarios have been distinguished:

[43] This can be national studies or information, information on TEN priority projects 2005 (EU 2005), or recent studies on the Pan-European corridors (VTT 2006).

[44] E.g. TINA, TEN-Invest, TEN-STAC

[45] Which relies on the trans-European transport network database developed by IRPUD (2003) and now maintained and further developed by RRG (2005)

- The **Maximum** Scenario, which comprises a listing of possible projects[46] that have been identified in the respective countries;
- The **Balanced** Scenario, which applies a budget restriction (with in parallel an assessment of additional financing opportunities). Projects are prioritised on the basis of their benefit-cost ratio and their contribution to specific objectives and needs (sustainability, regional disparity, and contribution to accessibility[47]).

On the basis of the maximum scenario, two sub-sets are determined: the **Maximum Road** Scenario and the **Maximum Rail** Scenario which illustrate the differential impact of rail versus road projects.

The Maximum Scenario

The Maximum Scenario is based on an extensive listing of possible investment projects that have been identified by the national project partners in the project. Where relevant these projects lists have been extended with projects that have been identified on the basis of existing network analyses and studies[48], projects identified on the basis of interviews that have been carried out in the countries, or projects that were additionally identified on the basis of the needs assessment (including the "red flag" analysis).

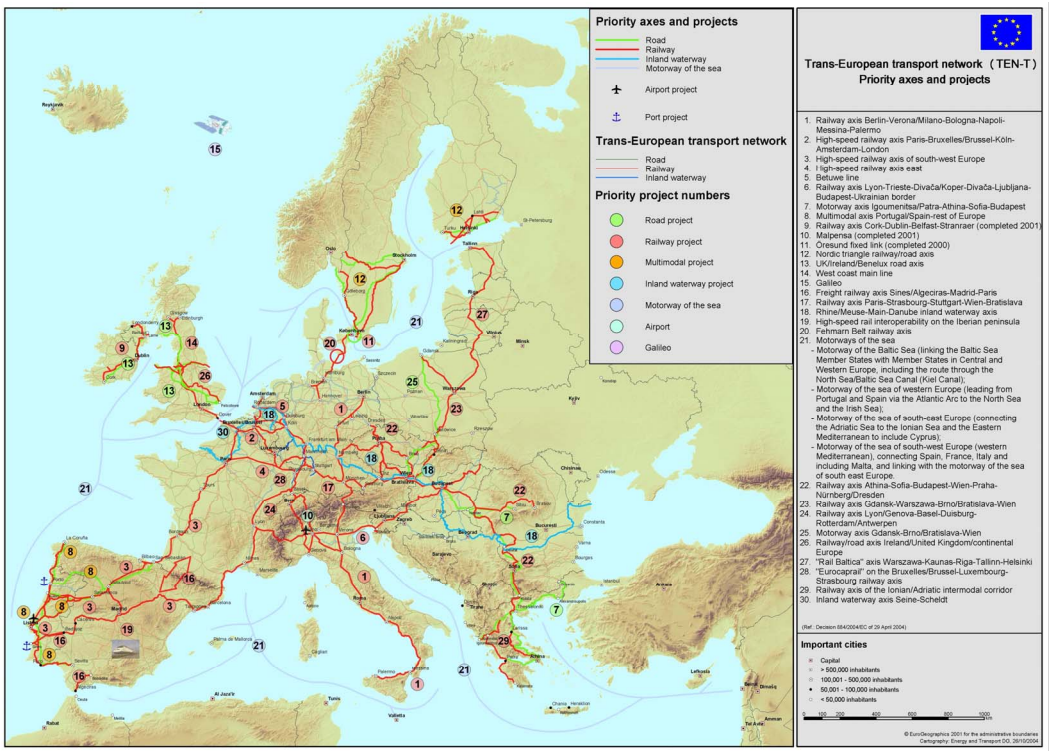
This results in a scenario of all TEN priority projects (see figure 5.1) and additional national projects that are planned to be constructed (or start construction) in the period 2007-2013 and which are operational by 2016. An important notion with respect to the maximum scenario is that no budget restriction is applied.

[46] The impact assessment in SASI has only been done on a selected set of road and rail projects. This is done because these sub-sectors in general will receive the majority of funding and an assessment of their impacts can be done without having to go into too much project detail. It is assessed that this approach gives sufficient feedback on the potential impacts.

[47] Are projects solving "missing links" in the network.

[48] For example the recent study carried out by VTT on the Pan-European corridors (VTT 2006).

Figure 5.1 The 30 TEN-T priority projects



Within the Maximum Scenario two specific sub-sector scenarios are distinguished:

- The **Maximum Road Scenario** assumes the implementation of all proposed road projects including cross-border transport corridors.
- The **Maximum Rail Scenario** assumes the implementation of all proposed rail projects including cross-border transport corridors.

The Balanced Scenario

The Balanced Scenario starts from the Maximum Scenario. First, an assessment is made of the available EU funding in comparison to the total budget requirements of the projects (see text box 5.3). If a budget restriction applies projects are selected and prioritised[49] on the basis of a number of criteria:

- **Cost -benefit ratio.** Are projects in this field expected to deliver value for money (socio-economic rate of return[50])?
- **Accessibility.** Are they contributing to a clear improvement in accessibility both on a European and national scale (missing links in networks, main transport corridors, secondary connections to backbone network)?
- **Sustainability.** Do interventions facilitate modal shift to more environmentally friendly transport modes?
- **Territorial cohesion.** Is there a contribution to improving the accessibility of more backward regions?
- **Safety.** Do measures contribute to improved transport safety?

[49] In the calculations in certain countries this leads to the elaboration of an interim scenario, which is called the Restricted scenario (strict application of the budget restriction, i.e. no other sources of finance).

[50] Based on TEN-STAC

Finally, an assessment is made to which extent that other financing sources could play a role. In this respect especially the potential of EIB involvement and PPP is included:

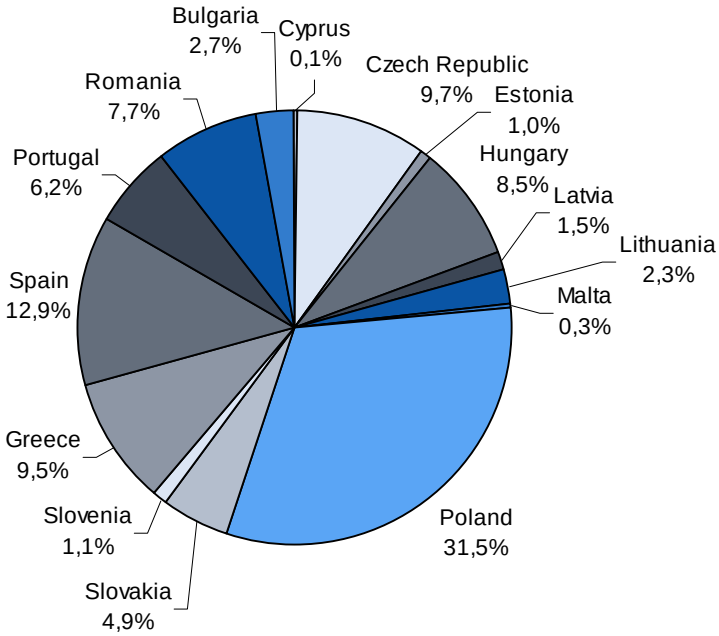
- **Other sources of finance.** Are projects able or likely to attract other sources of finance? In those cases application for EU financing might not be necessary.

In addition, the possible impact of limitations in the administrative capacity and changes in the pricing policy (if large distortions exist in this respect) are taken into account.

Box 5.3 Estimated EU CF/SF budget for the period 2007-2013

The CF15 countries will receive funding from the Cohesion Fund and the Structural Fund for transport investments. At the time of drafting this report only preliminary financial allocations were available. Moreover, whereas for the Cohesion Fund 50% of the funds are allocated to the transport sector, for the Structural Fund there is no preset share which goes to transport investments. The part which countries use for transport differs strongly from one country to another (typical range 15-45%). For the purpose of this study we have assumed that the share of the Structural Fund which is going to be directed at transport investments is comparable to the pattern that can be noticed for 2000-2006.

This results in total available funding for transport in CF15 of approximately 90 bn€ for the period 2007-2013. The estimated distribution over the different countries is depicted in the pie



5.5 Impact assessment of the scenarios

5.5.1 Introduction

The scenarios as defined in the previous sections are assessed with the SASI model. First the methodological approach is described, including the SASI model. Then the impacts of the scenarios are presented. This section only contains the highlight of the impact assessment. More detail can be found in Annex

5.5.2 The SASI model

The impacts are assessed with the SASI model. The SASI model is a recursive-dynamic simulation model of socio-economic development of 1330 regions in Europe. The model was developed to assess socio-economic and spatial impacts of transport infrastructure investment and transport system improvements. It has been applied and validated in several large EU projects including the IASON and ESPON projects.

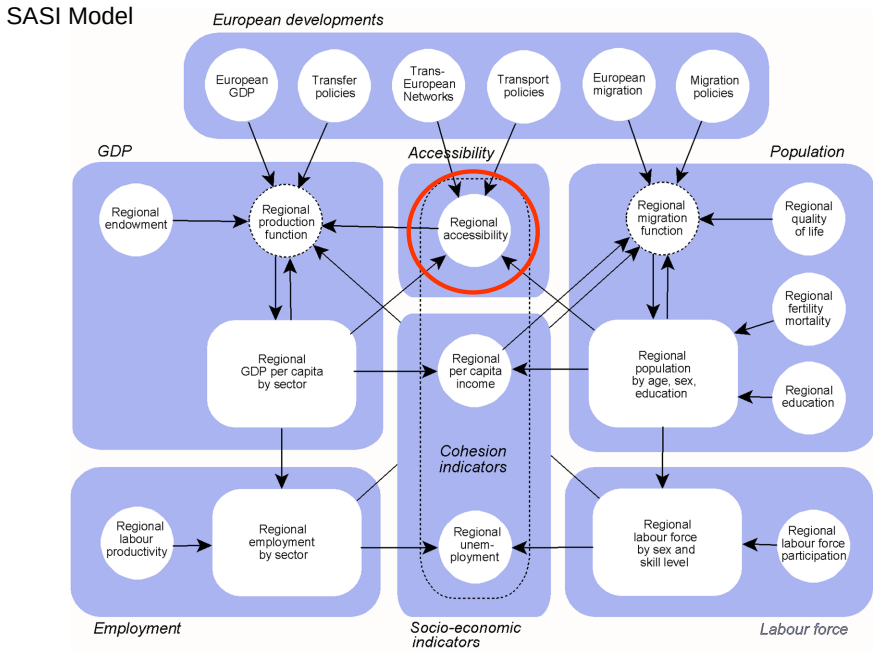
The SASI model differs from other forecasting models of regional development by modelling not only production (the demand side of labour markets) but also population (the supply side of labour markets). Regional production by industry is forecast by regional production functions containing production factors capital, labour, regional endowment and accessibility. Regional population is forecast by a demographic model including fertility, mortality and migration. Figure 5.2 presents the main submodels of the SASI model and their interactions

Many of the spatial impacts modelled in SASI are long term effects: location decision of firms result in changes in economic activity and employment only after some time , and secondary effects of economic activity, such as the attraction of other firms, take even longer. This is accounted for in the SASI model by time delays of one to five years. In order to take account of the long-term impact of transport infrastructure investments in the period 2007-2013, the target year for the model simulations is set at 2031.

The SASI model is specifically relevant for projects that serve a function on a European level (e.g. the TEN projects). Such projects cannot be adequately evaluated using traditional cost-benefit analysis on a national scale, since they are less able to capture the international effect and the indirect effects occurring in non-transport sectors[51].

[51] See e.g. Rothengatter, The relevance of Transeuropean Transport Networks for Integration and Growth in the Extended European Union.

Figure 5.2 Main structure of the SASI model



5.5.3 Impacts by country

The SASI model has been used to assess the impacts of the various investment scenarios on the objectives of cohesion policy. Various indicators have been used to assess these impacts, of which the following will be used in the next sections:

- *Competitiveness*: GDP per capita, average speeds of interregional road or rail trips
- *Territorial cohesion*: Gini-coefficient of distribution of accessibility and GDP per capita among the countries regions.
- *Sustainability*: the share of rail in interregional passenger

Table 5.6 Strategic objectives and related indicators

Objective	Indicator	Level
Economic competitiveness	Average speed of interregional road trips (kph)	National, regional average
	Average speed of interregional rail trips (kph)	National, regional average
	GDP per capita (Euro)	National, regional average
Territorial cohesion	Primacy rate population (%)	National
	Primacy rate GDP (%)	National
	Gini coefficient[52] of accessibility (0-100)	National
	Gini coefficient of GDP per capita (0-100)	National
Environmental sustainability	Share of interregional rail trips (%)	National, regional average

Economic competitiveness

SASI has primarily modelled the improvements of road and rail accessibility. Average road speeds increase in general between 1-10%, while rail speed increases are higher related to the current low quality of rail accessibility in most countries. The improvements in accessibility lead to effects on GDP per capita (table 5.7). Table 5.7 shows only the effects in the particular country, including the effects of connecting cross-border projects in neighbouring countries.

As GDP will grow substantially between 2006 and 2031, the 2031 levels are quite different from present day levels. In this growth perspective the impact of the infrastructure improvements on GDP per capita is generally modest. Although the impact differs by country and scenario, typically the investments foreseen result in an increase in GDP per capita of between 0.2 and 0.6 percent compared to the Reference Scenario in the same year. In a number of countries impacts even exceed this percentage. In the small countries of Lithuania and Latvia impacts are highest.

Table 4.7 Impact on GDP per capita

		Scenarios				
		Reference	Maximum Road	Maximum Rail	Maximum	Balanced
	2006	2031	2031	2031	2031	2031
High impact						
Lithuania	2,390	4,361	4,362 *+0.2%*	4,442 *+1.9%*	4,443 *+1.9%*	4,440 *+1.8%*
Latvia	3,108	6,490	6,491 *+0.0%*	6,603 *+1.7%*	6,604 *+1.8%*	6,595 *+1.6%*
Romania	1,693	3,528	3,570 *+1.2%*	3,548 *+0.6%*	3,589 *+1.7%*	3,570 *+1.2%*

[52] The Gini coefficient is a measure which represents the deviation from a fully egalitarian distribution of indicator values between regions (i.e. equal indicator values in all regions).

Czech Republic	6,525	15,180	15,228 *+0.3%*	15,234 *+0.4%*	15,281 *+0.7%*	15,287 *+0.7%*
Poland	5,158	14,003	14,086 *+0.6%*	14,055 *+0.4%*	14,136 *+0.9%*	14,121 *+0.8%*
Portugal	13,814	28,075	28,113 *+0.1%*	28,475 *+1.4%*	28,512 *+1.5%*	28,284 *+0.7%*
Hungary	6,263	14,906	14,947 *+0.3%*	14,951 *+0.3%*	14,992 *+0.6%*	14,992 *+0.6%*
Moderate impact						
Greece	13,739	21,548	21,590 *+0.2%*	21,594 *+0.2%*	21,635 *+0.4%*	21,625 *+0.4%*
Malta	10,677	21,657	n.a.	n.a.	21,751 *+0.4%*	21,749 *+0.4%*
Spain	18,660	30,914	30,947 *+0.1%*	31,050 *+0.4%*	31,083 *+0.5%*	31,021 *+0.3%*
Slovakia	4,909	11,952	11,970 *+0.2%*	11,960 *+0.1%*	11,978 *+0.2%*	11,981 *+0.3%*
Slovenia	14,309	27,276	27,310 *+0.1%*	27,278 *+0.0%*	27,312 *+0.1%*	27,307 *+0.1%*
Bulgaria	2,012	5.344	5,364 *+0.4%*	5,360 *+0.3%*	5,379 *+0.6%*	5,350 *+0.1%*
Estonia	4,543	9,002	9,015 *+0.1%*	9.144 *+1.6%*	9,156 *+1.7%*	9,015 *+0.1%*
Cyprus	18,192	33,670	n.a.	n.a.	33,680 *+0.0%*	33,677 *+0.0%*

The European impact of investments is much larger: creating synergies

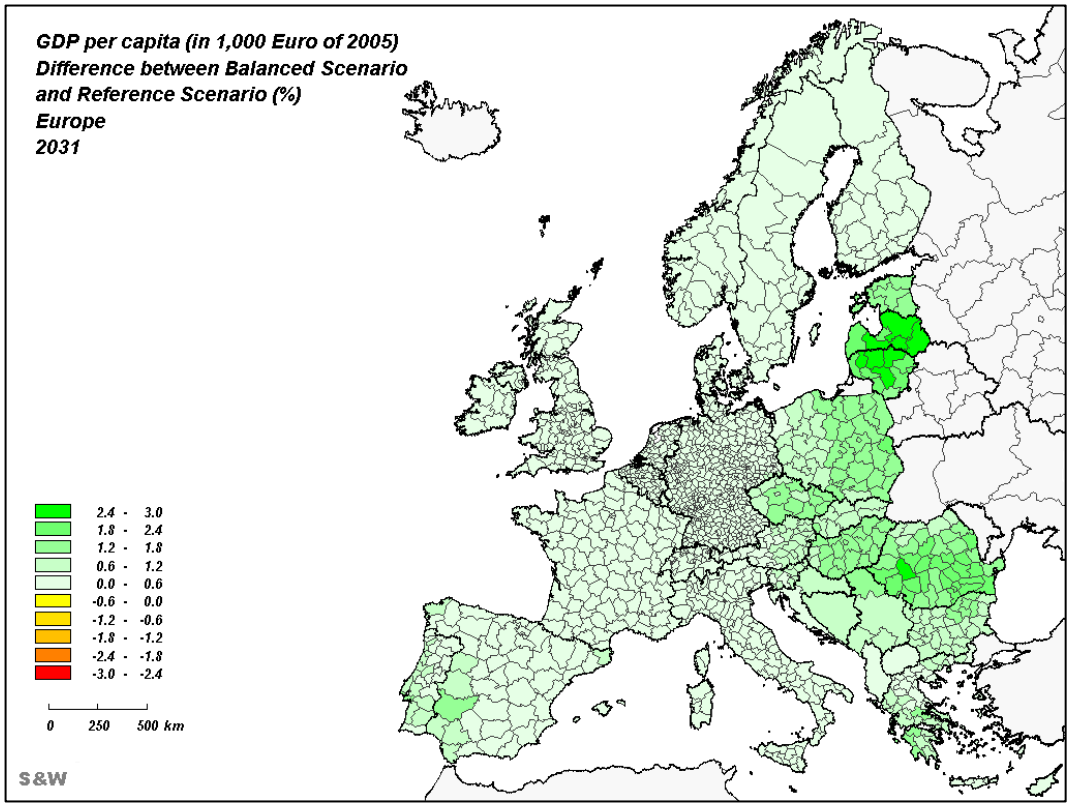
The impacts of the transport investment are wider than just the impacts in the countries themselves. Countries also experience impact of investments that have been made outside their national borders. This is especially through if the investment forms part of a corridor which directly affect the country itself. In other words the total effect of all projects combined is much larger than the sum of individual projects. If *all* projects in *all* CF15 countries are considered (and selected cross-border connections to other countries) the effects are larger. This is shown in table 5.8 where the European scenarios depict all projects in all countries and the national scenarios only indicate the national projects (plus connecting cross-border sections).

Table 5.8 European synergies: GDP per capita

	National Scenarios		European Scenarios	
	Maximum	Balanced	Maximum	Balanced
	2031	2031	2031	2031
High impact				
Lithuania	*+1.9%*	*+1.8%*	*+2.7%*	*+2.5%*
Latvia	*+1.8%*	*+1.6%*	*+2.7%*	*+2.1%*
Romania	*+1.7%*	*+1.2%*	*+2.6%*	*+1.8%*
Czech Republic	*0.7%*	*+0.7%*	*+1.2%*	*+1.2%*
Poland	*+0.9%*	*+0.8%*	*+1.4%*	*+1.2%*
Portugal	*+1.5%*	*+0.7%*	*+2.0%*	*+1.0%*
Hungary	*+0.6%*	*+0.6%*	*+1.6%*	*+1.4%*
Moderate impact				
Greece	*+0.4%*	*+0.4%*	*+1.0%*	*+0.7%*
Malta	*0.3%*	*+0.3%*	*+0.4%*	*+0.4%*
Spain	*+0.5%*	*+0.3%*	*+0.6%*	*+0.4%*
Slovakia	*+0.2%*	*+0.3%*	*+1.2%*	*+1.0%*
Slovenia	*0.1%*	*+0.1%*	*+0.8%*	*+0.7%*
Bulgaria	*+0.6%*	*+0.1%*	*+1.6%*	*+0.9%*
Estonia	*+1.7%*	*+0.1%*	*+2.2%*	*+1.4%*
Cyprus	*0.0%*	*+0.0%*	*+0.0%*	*+0.0%*

For all countries the effects in the European scenarios are much larger than those of the national scenarios. This comparison clearly affirms the synergy hypothesis. The European impacts in Slovakia, Bulgaria and Estonia even makes it possible to rank them under the high impact countries. Figure 5.3 shows the geographical distribution of the impact on GDP under the Balanced scenario.

Figure 5.3 Impact on GDP per capita, Balanced Scenario, 2031



Territorial cohesion

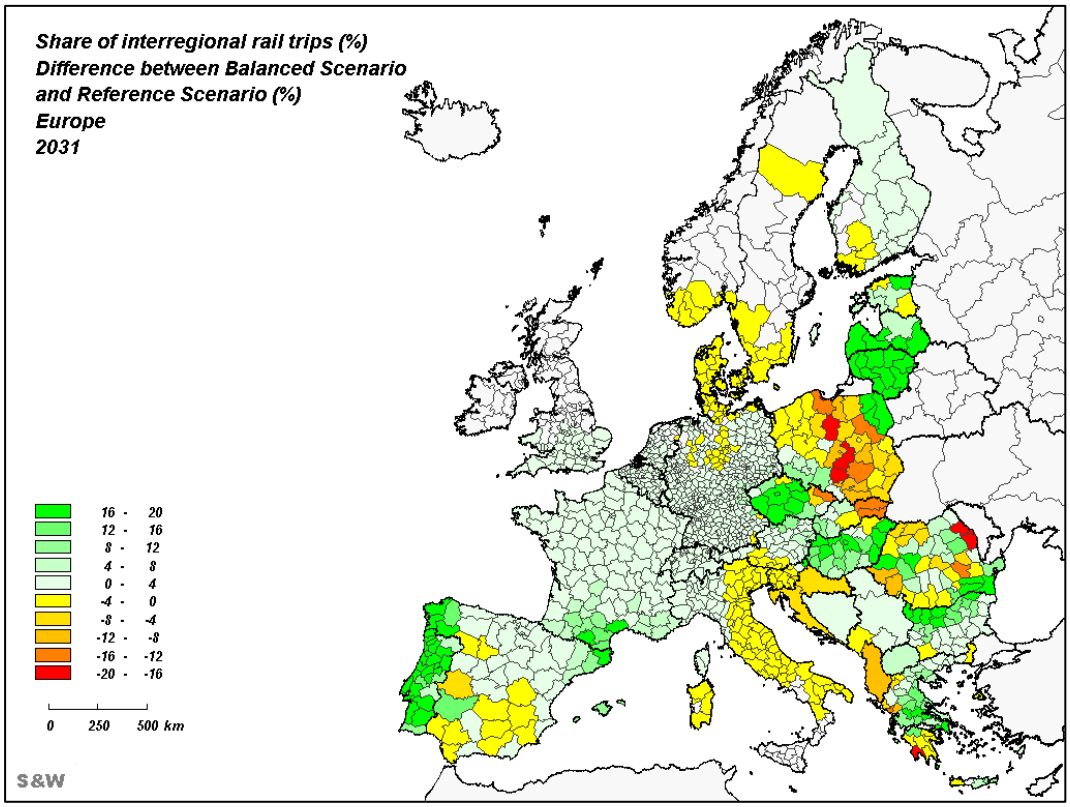
The investments in the various scenarios have limited impact on the income distribution as measured by the Gini-coefficient of GDP per capita of the various regions. In almost all countries the Gini-coefficient shows a reduction (improved territorial equality), however changes are very small (typically between -0 and -0.2%). It thus appears that all regions within a country profit from the increased accessibility and the ensuing economic growth.

Sustainability

Lastly, the future share of rail trips of all interregional trips (excluding air) has been assessed as a (limited) indicator of sustainability. The results (see figures 4.3 for an example of the impacts of the Balanced scenarios) show the substantial impact that rail improvements can have on this indicator. In various cases the Maximum Rail scenario improves the share of the railways by 20 to 40 percent (even doubling the share of rail transport in Lithuania)[53]. The impacts are moderated in those cases where also roads attract substantial investments as this directly influences the competitive position of rail transport.

[53] See for details per country Annex C

Figure 5.4 Impact on sustainability of transport (share of interregional rail trips), Balanced Scenario, 2031



In conclusion

Table 5.9 summarizes the overall impacts for the group of 12 new members states and accession countries (NMAC) out of the CF15.

Table 5.9 Strategic objectives and related European indicators, NMAC countries

Objective	Indicator		Scenario				
			Refer-Ence	Maxi-mum Road	Maxi-mum Rail	Maxi-mum	Bal-anced
		2006	2031	2031	2031	2031	2031
Economic competitive-ness	Average speed of inter-regional road trips (kph)	35.3	36.6	41.0 *+11.9%*	36.6 *0.0%*	41.0 *+11.9%*	39.9 *+8.9%*
	Average speed of inter-regional rail trips (kph)	22.6	22.7	22.7 *0.0%*	25.5 *+12.4%*	25.5 *+12.4%*	24.6 *+8.4%*
	GDP per capita (Euro)	4,551	11,078	11,164 *+0.8%*	11,155 *+0.7%*	11,239 *+1.5%*	11,215 *+1.2%*
Territorial cohesion	Gini coefficient of accessibility (0-1)	15.7	13.9	13.2 *-5.5%*	13.6 *-2.4%*	12.9 *-7.6%*	13.6 *-2.6%*
	Gini coefficient of GDP per capita (0-100)	36.2	36.0	35.9 *-0.3%*	35.9 *-0.3%*	35.8 *-0.5%*	35.9 *-0.3%*
Environmental sustainability	Share of interregional rail trips (%)	26.1	24.8	20.7 *-16.6%*	31.9 *+28.7%*	27.1 *+9.5%*	25.8 *+4.2%*

The results of the investment scenarios as assessed with the SASI model show that the investments in transport infrastructure do have an impact on accessibility (road and rail speeds), and thereby on economic growth. If all European (CF/ERDF) co-financed projects are considered, they increase per capita income in the long run typically by up to 1.5 percent; maximum increases of 2.5% are found. In addition, if infrastructures are improved, the whole country (and regions across borders) tends to profit; the income distribution between regions does not change significantly.

Perhaps the largest impact of the investment scenarios is on sustainability is shown in the modal split. The model simulations show that rail shares in interregional travel can be safeguarded and even improved by rail investments, even if at the same time investments are made in road infrastructure.

5.5.4 European impacts

Table 5.10 presents the impacts of the proposed priority transport investments on the above indicators for EU25+2, i.e. for the present European Union and the two accession countries Bulgaria and Romania.

For each indicator the table shows the value of the indicator in 2006 and the indicator values of the six European scenarios in 2031. The numbers in italics are the differences between the indicator values of the policy scenarios compared with those of the Reference Scenario in 2031 in percent.

Table 5.10 Strategic objectives and related European indicators, EU25+2

Objective	Indicator		Scenario				
			Refer-ence	Maxi-mum Road	Maxi-mum Rail	Maxi-mum	Bal-anced
		2006	2031	2031	2031	2031	2031
Economic competitive-ness	Average speed of inter-regional road trips (kph)	42.9	43.7	45.2 *+3.4%*	43.7 *0.0%*	45.2 *+3.4%*	44.9 *+2.6%*
	Average speed of inter-regional rail trips (kph)	27.8	28.1	28.1 *0.0%*	29.6 *+5.4%*	29.6 *+5.4%*	29.1 *+3.6%*
	GDP per capita (Euro)	22,965	38,733	38,787 *+0.1%*	38,801 *+0.2%*	38,854 *+0.3%*	38,831 *+0.3%*
Territorial cohesion	Gini coefficient of accessibility (0-1)	22.0	21.3	21.1 *-1.1%*	21.1 *-1.0%*	20.9 *-2.0%*	21.1 *-1.0%*
	Gini coefficient of GDP per capita (0-100)	35.0	32.2	32.1 *-0.1%*	32.1 *-0.1%*	32.1 *-0.3%*	32.1 *-0.2%*
Environmental sustainability	Share of interregional rail trips (%)	29.9	29.9	28.9 *-3.1%*	32.2 *+7.6%*	31.1 *+4.0%*	30.6 *+2.3%*

As was to be expected, the results for the whole of Europe show less variation between the scenarios than the country results presented in the previous section as the fifteen CF15 countries are only a relative small part of Europe. Table 5.10 indicates that the economic

impacts of the scenarios on the whole of Europe are nevertheless significant. The transport improvements of the policy scenarios increase the average income in Europe by up to 120 Euro per capita per year in the year 2030 (0.3 percent) in the Maximum and Balanced scenarios. This effect is due to both road investments (45% increase in the Maximum scenario) and rail (55%) investments. The improvements in rail speed are larger than those of road speed. Average interregional road speed increases by up to 3.4 percent, while average rail speed increases by 5.4 percent

The impacts on the cohesion indicators, which reflect the impact on the spatial structure of Europe, are small. Both the Gini coefficient of accessibility and of GDP per capita show a slight convergence effect (equally due to road and rail projects). Although convergence occurs, the accelerated growth effect on GDP per capita in the CF15 countries in relation to the other EU countries is modest. Apparently transport investments alone are not sufficient to overcome the income gap.

The environmental effects of the policy scenarios in terms of increased rail share are significant. If only rail projects were implemented as in the Maximum Rail Scenario, rail use would increase by almost eight percent. If also the planned road projects are implemented as in the Maximum and Balanced Scenarios, this effect is reduced by the growth in road travel. However, in all scenarios (except of course the Maximum Road Scenario) rail use increases – a challenge for the rail companies in these countries because also the total volume of travel is certain to increase.

Despite this reservation the improvements in both the road and the rail systems of the new member states and accession countries are impressive. Average interregional road and rail speeds increase by up to twelve percent in the Maximum Scenario and still by eight percent in the Balanced Scenario. This results in substantial equalisation of the existing disparities in accessibility, as the significant reductions in the Gini coefficient for accessibility shows. As to be expected, this translates in much smaller reductions in the Gini coefficient for GDP per capita, though the convergence effect is still significant.

5.6 Effects of pricing and transport cost increases

5.6.1 Introduction

This study is concerned with the strategic evaluation of transport investment priorities, i.e. with transport infrastructure. However, there are many other fields in transport policy besides transport infrastructure investment. Interoperability and intermodality policies promote the integration of networks across countries and between modes. Regulation policies aim at opening transport markets and creating equal playing fields for operators and service providers. Demand management policies try to influence transport demand by taxation or other forms of transport pricing.

Transport pricing

Regulation and pricing have in common that they both affect the cost of transport. The EU *White Paper* on European transport proposes to make transport users aware of the true costs of transport including the cost of environmental damage, accidents and time losses inflicted on others (through congestion). By marginal social cost pricing transport

users are charged the full internal and external costs of each additional km travelled. Various forms of transport pricing, in particular of road transport, have been introduced in recent years in many European countries, such as tolls, fixed-fee subscriptions or distance-depending satellite charging systems on motorways and cordon charges in cities.

Transport costs increases: fuel price rises

However, the costs of transport may also increase through exogenous developments that cannot be influenced by policy. Between 1970 and 2006 the price of crude oil on the world market has grown by a factor of seven in real terms. In the last two years it has almost doubled. In North America, this has resulted in petrol prices growing by 30 percent per year, in Germany, because of its high fuel tax, of about 4 percent per year. And many experts believe that, because of the ultimate depletion of oil resources, political instability in the Middle East and growing energy demand by fast developing countries like China and India, energy will continue to become more expensive.

5.6.2 Impacts of pricing and transport price increases

Higher transport costs mean reduced access to suppliers and markets, more expensive products and less consumption and production and hence lower economic growth. As not all regions depend on transport in the same way, accessibility of some regions will decline less than in others, and this will induce shifts in location advantages and hence changed location decisions of firms and households. These changes may reduce or increase existing economic disparities between regions, i.e. affect territorial cohesion and polycentricity of individual countries or Europe as a whole. This is why transport pricing policies and energy prices are of potential interest for European regional policy.

As a complement to the analysis of transport infrastructure investments, the potential spatial impacts of transport pricing policies and fuel price increases has been assessed[54]. It should be noted that the pricing scenarios used in this evaluation do not fully reflect social marginal cost pricing on a European scale[55] and only some, but not all possible uses of revenues have been taken into account. In additional not the full welfare impact is considered as for example external impacts are not accounted for. As such it cannot be seen as an evaluation of a social marginal cost pricing policy. Nevertheless, a number of conclusions can be drawn:

- Transport cost increases, whether they are caused by transport pricing or higher fuel prices, have a strong negative impacts on accessibility in all scenarios. The magnitude of the negative impact depends on the rate of cost increase. The resulting levels of accessibility are not only lower than in the moderate Reference Scenario but even lower than today.
- The accessibility effect of pricing scenarios depends on their direction: scenarios which make transport less expensive have a positive, scenarios which make transport more expensive, a negative economic effect. However this result might need to be qualified if the subsidies or revenues associated with the policies were taken into account.

[54] This analysis is based on two other EU-funded projects, i.e. project ESPON 2.1.1 "Territorial Impacts of EU Transport and TEN Policies" (Bröcker et al., 2005) and the 6th RTD Framework project STEPs "Scenarios for the Transport System and Energy Supply and their Potential Effects" (Mónzon and Nuijten, 2006). See Annex C for more details.

[55] To include this in a proper way would require further differentiation of charges for example with regard to occurring congestions levels etc.. For more information on the impacts of charging reference is made to the ESPON 2.1.1 project.

- The transport cost increases have significant impacts on the economic development of Europe and its regions. In all scenarios there is a clear reduction of economic performance in Europe compared with the Reference Scenario. The reduction is higher if transport cost increases are larger. However, seen against the steady growth in GDP in the Reference Scenario, the reductions are not a loss compared with today, but slight reductions in growth. That means that even in the worst scenarios, the level of GDP per capita in real terms in 2031 is much higher than today.
- The fuel cost and policy scenarios have also strong impacts on the spatial organisation of Europe. Important territorial policy goals of the European Union such as cohesion and polycentricity are affected. However, at least in terms of cohesion, the predicted development might be considered not so negative because in absolute terms the economically stronger regions lose more than the poorer regions.

In summary, the SASI model predicts that growing transport costs will lead to a reduction in accessibility and economic growth in Europe.

6 Conclusions and recommendations

On the basis of the assessment a number of guiding principles and recommendations can be defined in prioritising transport investments for the period 2007-2013 which have clear relevance for all different countries involved. Apart from advice on the prioritisation of projects, a number of recommendations are formulated which should aid the implementation of these projects in practice and contribute to the success of the cohesion policy in the European Union.

Guiding principles and recommendations

Address missing (European) links

A key notion in prioritising transport investments is to address missing links in the networks. The benefits of constructing of a missing link are much wider that the user benefits on the section alone, as network and spill-over effects will be substantial. This is comparable to putting the last bolt in a machine which makes it working. A relatively small additional investment may generate large benefits.

With respect to the completion of network the analysis shows that the projects generate substantial cross-border impacts: the European impact of projects is generally double the national impact. These cross border effect is stronger for projects that clearly address a substantial European dimension. In this light it is recommended:

- To concentrate CF investments on roads with a substantial European dimension. This implies focussing on European corridors (including cross border sections) and less on roads that are primarily of national importance. In order to set such priorities, it is recommended that DG REGIO identifies the main priority axes in each of the CF countries and concentrates a large part of the funding on these. Clear reference in this respect is made to the 30 TEN-T priority projects that have already been identified by the Commission.
- With respect to rail transport especially rail freight has a clear European dimension (important role in longer distance freight transport). Passenger transport is mainly important from shorter distance nationally oriented inter-urban transport. Investments in rail networks for freight movements can only be effective if an integrated corridor approach is taken, in which the investments are a part of comprehensive plan to develop the corridor, including operational, safety and service improvements. As the CEE CF countries still have a relatively large rail share in freight movements, while rail passenger services are already limited, the rail network might be divided into freight corridors and passenger sections, each deserving different forms of attention. It is recommended that rail master plans are developed by member states, in which integrated plans are

formulated and prioritised. Such plans could form the basis for projects to be financed from CF. Again in this respect also reference is made to TEN-T prioritiy projects.

Enhance cross-border co-ordination between projects

Strongly related to this issue is the need to enhance cross-border co-operation. If the timing of connecting parts of infrastructure in different countries deviates strongly, benefits of earlier investments can only be partly realised. Examples of this issue can be found at many places, for example in motorway development in border regions of Czech and Poland and Slovenia-Croatia. The Commission has already clearly realised the importance of this co-ordination and has, for example, established TEN-corridor coordinators, although these only partly address the corridor investments relevant in the CF15 countries.

Nevertheless the characteristics of the programming system in which countries individually define to a large extent their own programming priorities will automatically lead to these failures in cross-border co-ordination. Not only because different bottom-up programming in different countries leads to differences in timing, but also because the importance of completing corridors differs between countries. In general, a country will be more inclined to invest in a connection to the core of Europe than in a missing link toward more peripheral neighbouring countries.

With respect to cross-border co-ordination between projects a number of practical recommendations are made:

- Create more favourable financing conditions for projects that have been identified as serving a clear European interest (especially in those cases where benefits are not fully realised in the country itself). Examples could be TEN-T budget mark-ups for joint cross-border projects, or further differentiation in support rates;
- Tie EU financial support to the condition to develop less attractive parts of the network (adopt a more holistic approach and not an approach per section);
- Establish truly cross-border project organisations which develop a joint planning, and possible tendering. Examples of this type of organisations are the secretariats that are formed for certain European projects (e.g. corridors, Via Baltica, Danube). Essential is that these secretariats have sufficient mandate, financing and political commitment in the countries that are supporting the secretariat. The possibility created by the Commission to establish a European Grouping of Territorial Cooperation (EGTC)[56] also suits this purpose.
- One step further would be to establish an EU organisation for projects which are hard to realise from a national perspective but are of clear European interest. Such an organisation would also need to have a clear mandate and access to funding;
- Draft best practices which serve as examples to be followed

[56] See Regulation (EC) No 1082/2006 of 5 July 2006.

Also the organisational setting of DG REGIO itself, by being organised in different geo-units contributes to this. Further internal co-ordination within DG REGIO on border-crossing projects is advisable. For example:

- Identify a list of EU important multi-country projects. The TEN-T priority list serves as a good starting point. Oblige countries to indicate how cross-border co-ordination is realised;
- Establish co-ordinating points within DG REGIO for projects that match with corridors for which no TEN-T coordinators have been appointed;
- From each geo-unit: identify projects which are cross-border relevant and liaise with relevant geo-unit involved in connecting country at programming stage;
- At the project definition phase apply additional check, possibly assisted by external technical assistance, on cross-border co-ordination (process but also technical);

Connect networks to improve intermodality

Often it is thought that investment in more environmentally friendly modes, by adding additional sections to the network is a stimulus in creating more demand for multimodal transport. To the extent that this is alleviating bottlenecks this is most definitely true. However, an often undervalued aspect of intermodality is the lack of interconnections between different modal networks. Typical examples are a lack of (or badly connected) intermodal freight terminals, or bad connections between the rail network and ports.

Concrete recommendations in this respect are:

- To commission studies per country to identify the most relevant bottlenecks or to require specific attention to this aspect in country specific strategic planning documents (e.g. OP related support documents).
- Related to this would be the idea to give further guidance on specific issues (content-wise) which need to be addressed in each programming documents (give format and prescribe indicators to be presented). This would enhance the comparability and quality level of the different countries, which obviously always will show a certain level of differentiation.

Invest in smart sustainable transport

With economic growth and improved accessibility, transport demand will continue to grow rapidly. This will put an increased burden on society as emissions and other negative impacts, such as noise and congestion, will increase. There is a clear need to stimulate sustainable transport and promote environmentally friendly transport modes. In the past this has for example led to specific requirements by the European Parliament in the Cohesion Fund that rail projects should receive half of the funds (and roads the other half). This does not per definition always lead to the best projects for a country.

It is advised to identify projects in this field which generate the highest impacts. This do not always have to be rail projects, but can also be port projects (motorways of the sea) or urban transport projects. Typical high impacts projects are:

- Projects which address a bottleneck in the transport chain. This can be missing links, but also access points to existing networks (e.g. river ports, multimodal logistics centres), or sub-optimal performing nodes (e.g. ports with insufficient capacity);

- Projects which increase the utilisation of infrastructure. This includes improvements in the access to existing networks, increased quality and competitiveness of both the physical infrastructure and the services which are offered, the introduction of traffic management systems and traveller information systems.

For rail transport it is suggested to invest in international freight corridors. With respect to passenger rail sections, a rational approach is recommended. This means that alternative measures for providing public transport should be scrutinized. Assistance to passenger rail services and network sections should be tied to a well functioning PSO system

The role of IWT and short sea transport should not be neglected. Although less involvement of the government is needed in this sector than in the rail sector, the CF may concentrate on financing those parts which are less attractive for private financing, i.e. river infrastructure works, access roads/railways to ports etc

Urban transport projects can alleviate serious congestion (and environmental) problems in urban environments. Urban transport projects involving the extension of metro, tram or urban bus/rail services, could be made more effective by applying congestion charging schemes or stricter parking policies. It is recommended that financing of such investments is made dependent on such policies or citywide plans to combat urban congestion. An integrated approach addressing transport, energy and environmental issues at the same time is thought to be effective in this respect. Not only investments in physical infrastructure are suggested to be considered, but also investments in rolling stock to replace ageing fleets.

Examine new technologies to utilise existing infrastructure

Investments which improve the utilisation of infrastructure have been indicated as potential high impact investments. These include the use of Intelligent Transport Systems (ITS) and improved traffic management. Especially in congested urban areas the opportunities for investments in this area are promising as the space for physical expansions of infrastructure is scarcer and more expensive. It can also be used in modernising the transport system and hence enhance its attractiveness (e.g. improved traveller information in rail and urban transport).

Focus investments

In general, a large fragmentation of investments is expected to be less effective than a focused approach. Make a clear distinction in which parts of the network has to offer which functionality. For roads and rail this is related to a clear distinction between the trunk network and the secondary network. It is not necessary to turn every road into a motorway. Focus the backbone network on connections between main population centres and international corridors and led the secondary network function as a feeder and distribution network. A similar principle holds for nodal networks of ports and airports. Not all ports and airports are equally important and not all regions need to possess an airport with offers the same functionality.

This may even lead to the recognition that parts of the current network where are lowly utilised have to be closed down since these put a heavy financial burden on the existing

organisations blocking further progress. This is for example valid for some of the new Member States which have inherited dense rail networks.

Focused investment can also have positive impacts on the administrative capacity (on the condition that an adequate project organisation is being set up) to manage and prepare projects, since it is easier to investment in project management for large projects which show some level of continuation over a longer period.

A pragmatic approach to stimulate a focused approach is the introduction of a minimum project size.

One of the counter-effects of focusing on large project alone is that is the risk that these projects absorb all capital available in a country which may lead to crowding out effects for smaller projects. In this context it is recommended to reserve part of the total budget for smaller scale projects. One of the ideas in this respect could even be to set up a specific funding facility/window in the beneficiary countries for smaller projects, for which part of the funding is reserved.

The absorption capacity of the national engineering/civil works market is another point of attention. In those cases where the national market is still restricted adequate phasing of different investment should be considered. However also sufficient opening of the market (e.g. by real open international tendering) is a clear point for attention. Examples in other countries (e.g. Hungary) have shown that this can lead to significant cost reductions.

Address regional disparities within countries in a rational manner

The analysis reveals that the economic (cohesion) benefits of including links to sparsely populated remote areas is relatively low and significant effects on improving territorial cohesion are lacking. When investing in links to these regions, it is recommended to set up a set of social criteria which such investments needs to satisfy.

Apply an integrated project approach where possible

To optimise the impacts of projects as much as possible an integrated approach should be followed. To a certain extent this has already been addressed through the introduction of a programming approach, but this is in general at a relatively high level. Also on a project level it is strongly recommended to follow an integrated approach.

For example the impact of a railway project can be much larger if at the same time signalling and interoperability aspects (such as safety systems) are addressed. Or a motorway project is more effective if also the most important sources of traffic are connected (e.g. ports, logistics terminals, urban centres, main tourist areas etc.). A problem is not always due to a single cause but is quite often multi-faceted.

Fit projects in an appropriate institutional setting

Strongly related to the previous remark is that sufficient attention should be paid to the institutional and organisational surrounding of a project. Various analyses show that the impact of the EU funds can be optimised by ensuring that investments are made in an optimal institutional setting. If a project is completed but the institutional and

organisational setting hampers the provision of adequate services or blocks the optimal use of the infrastructure, the effects of the investment will be strongly reduced.

This deserves sufficient attention in developing plans for investment. Investing in capacity expansion is also not always the answer. Modernisation and rationalisation of transport (including institutional reorganisations, deregulation and market access) can be equally or even more important, depending on the current state of the market and the country. Especially for rail and ports this is essential.

- In certain cases it is most definitely advisable to tie further reorganisations or market opening to giving support (make it conditional). For example, it is recommended that CF financing for rail freight corridor projects is tied to the opening of the network/corridors to foreign rail freight operators.
- In certain specific cases it may even be considered to use Structural Fund support to enable these reorganisation processes (e.g. fund redundancy schemes). This would require a careful consideration of the current eligibility rules.
- It is therefore recommended that the OPs include a progress report on the institutional setting, e.g. in light of the EU Rail Packages.

Involve private sector participation

The investment needs in most countries are significantly higher than the available funding. As a result not all growth potential can be realised. Involving the private sector can lead to an additional source of finance. Another advantage is that involving the private sector through PPP projects can increase the efficiency of projects if projects are put on the market in an adequate manner. PPP projects have traditionally a good record ob projects to be completed on-time, on-budget and to specification. When not only the investment but also the maintenance phase is included in the concession the post-investment phase is better secured.

Private sector involvement is expected to show clear opportunities for port, air and road investments. With respect to road investments there may be ample scope for private involvement in terms of toll road concessions or PPP as road use may increase fast in the near future.

Such potential should be shown in the OPs. It there are bottlenecks in allowing such (financing) constructions in CF countries it is recommended that the OPs show how they will be solved in the programming period.

Another recommendation would be to gather sufficient knowledge in each Member States. Setting up specific PPP task forces or PPP centres clearly aids in this respect.

Finally JASPERS could be used. JASPERS is a joint initiative of the Commission, EIB and EBRD which aims at preparing major project. It allows project sponsors make use of the vast experience and expertise of the EIB and EBRD. Both organisation have gained ample knowledge and experience with PPP projects in the past (on the do's and don'ts, but also on contract forms, concessions contracts etc.). Advice on structuring PPPs is explicitly mentioned as one of the activities of JASPERS.

Look beyond the investment phase

A typical risk attached to any investment programme is that it focuses on the investment phase alone and does overlook the operation & maintenance phase after the construction has been completed. Risks attached to this are insufficient attention to the transport services which are offered, factors which influence the demand level (e.g. the price level), but also the financial (and institutional) sustainability. If insufficient guarantees or revenue streams are built in the risk exists that benefits of the project can only partly attained or the continuity of the investment on the medium term is endangered.

A specific recommendation in this respect is that a maintenance financing plan should be part of the investment. For road transport this may for example involve the incomes from road pricing in the form of a vignette system. All plans for upgrading of infrastructure should include a financial plan for future maintenance needs.

This aspect should be more explicitly built in the assessment of projects (as part of the quality assurance).

Apply CBA and use it in prioritisation of projects

Integrated in the assessment methodology of investment projects that are funded by the Commission is the application of a cost-benefit analysis for large projects. Often these CBA measures are used to assess whether a projects passes a certain threshold level. To prioritise a programme on a project level it is advised to compare (high level) CBA outcomes between different projects. Selected projects can than be subjected to a more elaborate CBA.

Improve the quality assurance of proposed projects

This recommendation is not new. Also in the ex-post evaluation of the Cohesion Fund a strong call was made to improve this aspect in order to improve the quality of projects. The reason why it is repeated here, is that the first experiences with the increased influx of funding generates similar problems for new receivers as where identified in the early days for the “old” CF Members States. Since this may greatly endanger the quality of the projects and implementation this recommendation is repeated.

Specific points for attention are:

- Adopt a multi-annual planning approach in which both project preparation and implementation are planned on a multi-annual time frame;
- Create a pipeline of projects;
- Request active public consultation before submission of application;
- Request fully developed technical (design and feasibility) studies before application. This also includes sufficient attention to the environmental aspects of a project. This could be improved by creating a special facility for technical feasibility studies;
- Apply more rigorous traffic forecasting, as this is a major weakness in many project assessments;
- Request good quality CBAs. Too often standard (non project specific) are used or the assessment of impacts is poor and external effects (including environmental effect) are not included. Possibly further assistance can be

supplied in this respect (also aiming at further harmonisation across countries);
- Request appropriate risk assessment before submission;
- Apply technical quality assurance on applications for financing. If relevant develop a standard technical checklist in this respect;
- Approve only projects which are close to or have completed tendering (this would require a system of pre-funding at the member states to avoid unnecessary start-up delays);
- Offer beneficiaries methodological support (SF/CF manuals, CBA, impact & performance indicators, technical advice).

A specific point of attention is the use that can be made of JASPERS. This initiative has been specifically set up to enhance the maturity of projects and improve the quality of proposed projects. Use of JASPERS could even be made obligatory for projects above a certain size.

Enhance the administrative capacity

The analysis of the administrative capacity reveals that many CF15 countries are confronted with apparent deficiencies.

Specific issues are the quality and quantity of the staffing and continuity. A number of recommendations can be made:

- Establish separate project or programme organisations or agencies for major projects (or a series of projects in a specific field). This would not only allow additional flexibility with respect to recruitment and labour conditions for staff, but also allows to build sufficient expertise and knowledge, without being subtracted by other (policy) duties or tasks.
- The Commission should consider the option to directly co-finance outsourced management as part of the total costs of a project;
- Require HR development plans to be made for the administrative bodies involved, concurrent with the OPs. These HR plans should outline how the organisations will keep their staff at the required level (both in numbers and knowledge and what (financial) measures will be taken to ensure this.
- If outsourced management or own sufficient staff experience is not available make use of technical assistance either through an own framework contract for TA or by the Commission's framework contract. Again JASPERS could also be used as a source of expertise.

Other recommendations with respect to the institutional/management capacity include:

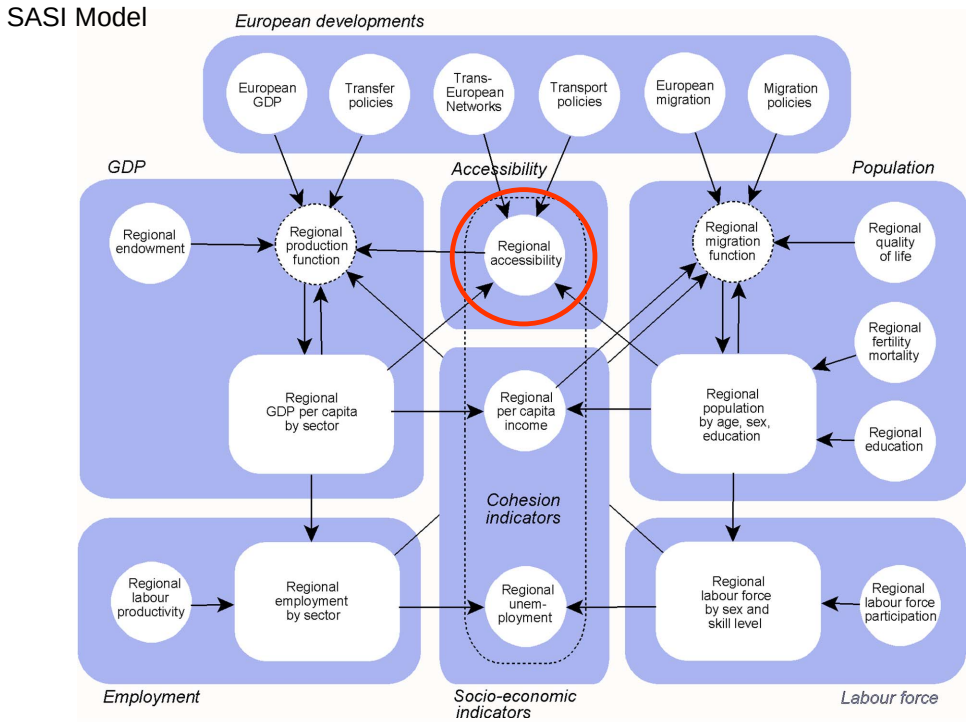
- Require a clear delineation of responsibilities (avoid overlaps) between administrative bodies. Establish a transparent and straightforward organisational model with limited layers and sufficient access to technical know-how. Also in this case the outsourcing of (part of) the management to separate bodies/organisations should be considered. This could even go as far as to outsource the management of programmes as is being done for the Structural Fund in various countries.

- Put additional efforts in solving any remaining inadequate legal provisions, e.g. with respect to public procurement, expropriation of land for construction purposes and the issuing of permits for construction.
- Connected to this, establish training of local, regional and central institutions to overcome a lack of experience with new legislation in this respect and offer assistance at a central level.

Annex A: Accessibility “red flag” analysis

To determine the need for transport investments, the SASI model was used to assess the present and future situation of the road and rail systems in each country without the national transport projects to be examined later. For this the accessibility provided by the road and rail systems in each country was evaluated from both a national and a European perspective in order to identify regions with serious accessibility deficits that should be addressed by European transport policy taking account of the stated EU goals competitiveness and territorial cohesion. In the SASI model accessibility, which is directly influenced by transport policy and investments, is judged to play a crucial role in promoting the realisation of the cohesion objectives.

Figure A.1 Main structure of the SASI model



To determine the appropriate assessment of transport investment need from the cohesion policy perspective an agreement on the indicator of accessibility to be used is required. Traditional accessibility indicators are not useful for this. They measure the total effect of both geographical location (periphery v. core) and quality of transport provided by the transport system and so always show a steep gradation in accessibility from the core to

the periphery. However, public policy cannot change the fact that some regions are central and some are peripheral, i.e. provide the same level of accessibility to all regions. Public policy can only alleviate disadvantages through unequal transport provision.

This distinction is relevant for European transport policy. To invest only in transport in the most peripheral regions with the lowest accessibility according to such an indicator would benefit only the relatively few people living there and would ignore the needs of the densely populated central regions to combat traffic congestion and so endanger the competitiveness goal of the Lisbon Strategy of the European Union. On the other hand, to invest only in transport in the most densely populated central regions with the greatest congestion problems would not only lead to ever more traffic but also widen the existing gap in accessibility between the central and peripheral regions and would so run counter to the territorial cohesion goal of the European Union.

To avoid this dilemma, a new accessibility indicator was defined which distinguishes between geographical location and quality of transport. This indicator assumes that people in the peripheral regions cannot expect to enjoy the same level of accessibility (measured in traditional terms) as the central regions but that they can demand to be able to reach relevant destinations with the same travel speed ("as the crow flies") as the people in the central regions. In addition the indicator recognises the utilitarian principle of the happiness of the greatest number, i.e. that the transport needs of densely populated regions should be given more weight than those of regions with only few inhabitants. And finally, the indicator recognises that economically lagging regions with severe deficits in accessibility may offer greater potential for stimulating economic effects by transport investments than regions which enjoy already high accessibility.

These three principles avoid the pitfalls of both an extreme egalitarian view, which postulates that all regions in Europe enjoy the same level of accessibility and a purely efficiency-oriented view which postulates that accessibility in the already highly accessibly central metropolitan areas should be further strengthened because they bring the largest economic benefits. In other words, the three principles aim at a rational trade-off between the stated EU goals of competitiveness and territorial cohesion.

The Accessibility Problem Index

The indicator to be developed should have a number of properties to make it easy to understand and communicate to policy makers and stakeholders:

- It should be a "problem indicator", i.e. high values should indicate large deficiencies in regional accessibility, whereas low values of the indicator indicate above-average levels of accessibility.
- It should be standardised in order to be comparable between regions and countries, i.e. should not reflect the size or affluence of regions or countries.
- It should be independent of the arbitrary or historically subdivision of the territory into regions, i.e. its magnitude should not change if a region is subdivided into two or more regions or if two or more regions are consolidated to one region.
- It should be scalable, i.e. it should be possible to vary the impact of the weighting by population and inverse GDP to reflect different political priorities.

- It should allow to measure the development of accessibility over time.

Based on these requirements, an indicator called Accessibility Problem Index was developed. The calculation of the Accessibility Problem Indicator proceeds in three steps:

Average regional airline speed

The first step in the development of the Accessibility Problem Index is the calculation of average regional airline speed. Average airline speed v_{rm} of all trips f_{rsm} from a region r to all other regions s in Europe by mode m in year t is defined as

$$v_{rm}(t) = \frac{\sum_s P_s(t) \exp\left[-\beta f_{rsm}(t)\right] d_{rs}}{\sum_s P_s(t) \exp\left[-\beta f_{rsm}(t)\right] c_{rsm}(t)/60} \quad (1)$$

where $P_s(t)$ is regional population in year t, $c_{rsm}(t)$ is travel time in minutes between regions r and s by mode m in year t, β is the impedance parameter and d_{rs} is airline distance in km between the central cities in regions r and s calculated from their geographical coordinates x_r, y_r and x_s, y_s by

$$d_{rs} = \sqrt{(x_s - x_r)^2 + (y_s - y_r)^2} \quad (2)$$

Standardisation

Next average regional airline speed, regional population and regional GDP are standardised as fractions of the average of all regions in the country (national perspective) or the average of all regions in Europe (European perspective). To neutralise the effect of region size, population is replaced by population density and GDP is replaced by GDP per capita. The benchmark for the standardisation of average regional airline speed is always the average of the base year t_0 = 2006 to show changes in accessibility:

$$v'_{rm}(t) = \frac{v_{rm}(t) \sum_r P_r(t_0)}{\sum_r v_{rm}(t_0) P_r(t_0)} \quad (3)$$

$$p'_r(t) = \frac{P_r(t) \sum_r A_r}{A_r \sum_r P_r(t)} \quad (4)$$

$$g'_r(t) = \frac{G_r(t) \sum_r P_r(t)}{P_r(t) \sum_r G_r(t)} \quad (5)$$

where A_r is the area of region r and $G_r(t)$ is the GDP of region r. The $v'_{rm}(t)$, $p'_r(t)$ and $g'_r(t)$ then are the relative airline speed, relative population density and relative GDP per capita of region r in year t, respectively. Values below one indicate below-average airline

speed, population density and GDP per capita and values above one indicate above-average airline speed, population density and GDP per capita of the region.

Index

With these relative indicators, the Accessibility Problem Index $q_{rm}(t)$ of region r by mode m in year t can be formulated:

$$q_{rm}(t) = \left[v'_{rm}(t)\right]^{-1} \left[p'_r(t)\right]^{\alpha} \left[g'_r(t)\right]^{-\gamma} \quad (6)$$

where α and γ are weights indicating the relative importance of population density and GDP per capita, respectively. Note that average regional airline speed and GDP per capita have negative weights, i.e. the Accessibility Problem Index expresses deficits in average regional airline speed relative to the national or European average weighted by population and economic weakness. The index has the following properties:

- The higher the index the more severe is the deficiency in accessibility.
- The influence of weights of population density and GDP per capita can be changed by changing α and β: values below one imply less influence, zero no weighting.
- Regions with average airline speed, population density and GDP per capita have an index value of one.
- Index values are independent of region size and are therefore comparable between regions and countries.
- The index shows improvements in airline speed over time (and not only relative shifts between regions).

Sensitivity tests with different values of α and γ showed that $\alpha = \gamma = 0.05$ gave the most plausible results and a reasonable level of responsiveness of the Accessibility Problem Index to changes of accessibility due to European integration and European transport projects over time.

The application of the Accessibility Problem Index for the evaluation of accessibility deficits in the country policy briefs use these values of α and γ throughout. The regions analysed were the NUTS-3 regions or equivalent regions in the 25 countries of the European Union plus the accession countries Bulgaria and Romania. The overseas regions of France and the island regions of the Azores and Madeira of Portugal and the Canary Islands of Spain were excluded from the analysis.

The spatial distribution of the resulting values of the Accessibility Problem Index are presented in maps using a colour scale resembling that of a traffic light: green shades indicate average regional travel speeds above the national or European average, yellow values indicate speeds slightly above the national or European average and red shades indicate speeds significantly lower than the national or European average. Regions shaded in red are the targets of the "red-flag" analysis.

For each country first for road and then for rail the national and the European perspective are presented for the current situation (2006) and for 2016. The situation in 2016 is based

on a base scenario of the SASI model without the national projects, i.e. only with the TEN priority road and rail projects and selected transport projects in Switzerland. The assumed opening times of the individual projects are those of the 2004 TEN guidelines (European Union, 2004) which in a few cases differ from the dates notified by the individual countries (European Commission, 2005).

References:

European Union (2004): Decision No 884/2004/EC of the European Parliament and of the Council of 29 April 2004 amending Decision No 1692/EC on Community guidelines for the development of the trans-European transport network. *Official Journal of the European Union* L 201 (Corrigendum to L 167), 1-55.

European Commission (2005): *Trans-European Transport Networks. TEN-T Priority Axes and Projects 2005*. Luxembourg: Office for Official Publications of the European Communities.

Annex B: Project maps

The following pages contain maps of the road and rail projects considered in each CF15 country except Cyprus and Malta.

Figure B.1 Road network in Reference, Maximum and Balanced Scenarios, Bulgaria

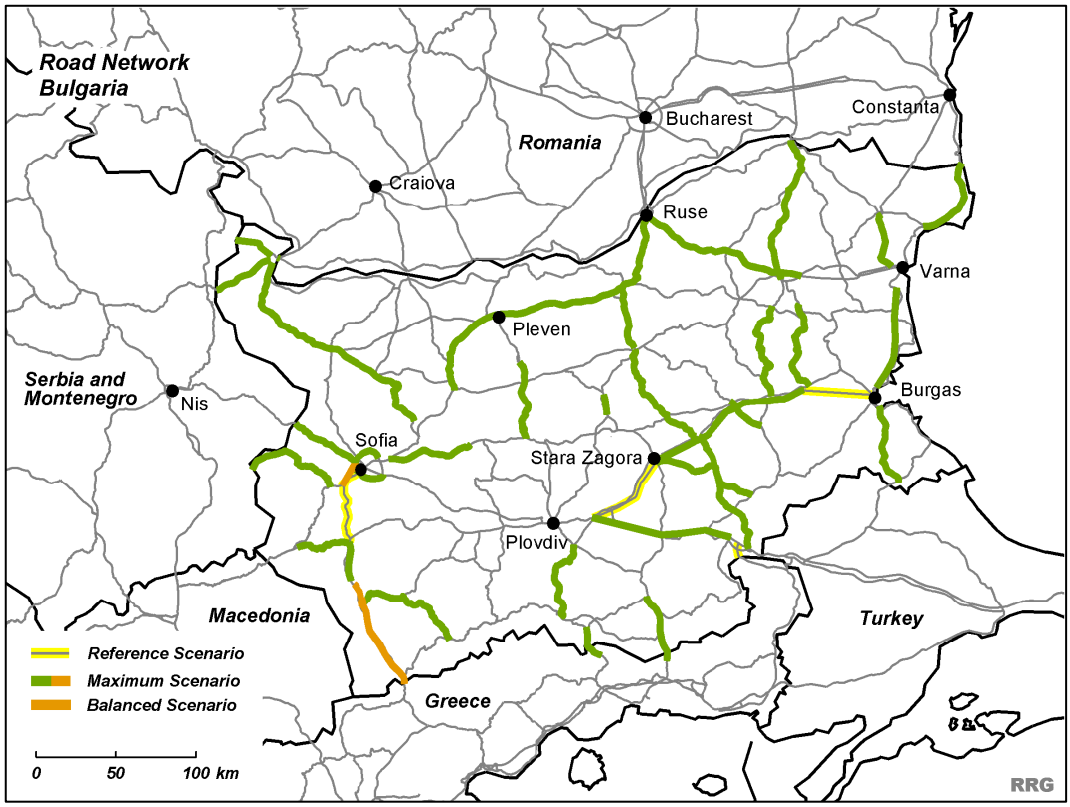


Figure B.2 Rail network in Reference, Maximum and Balanced Scenarios, Bulgaria

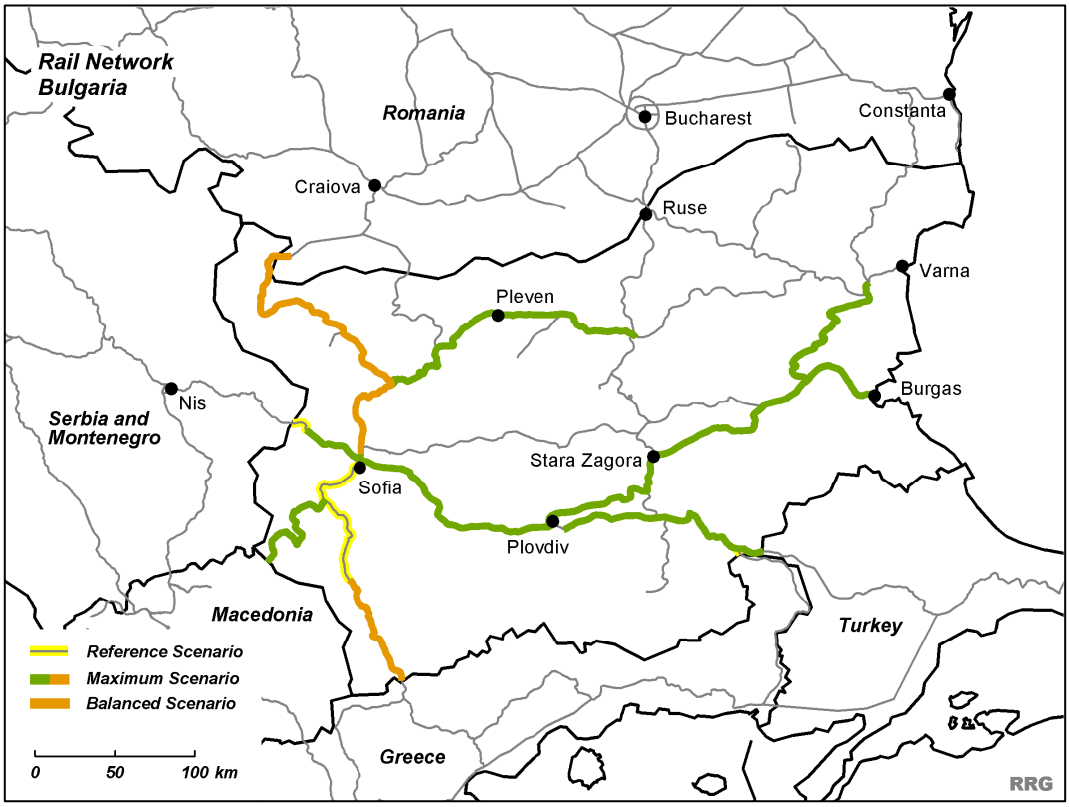


Figure B.3 Road network in Reference, Maximum Road and Balanced Scenarios; Czech Republic

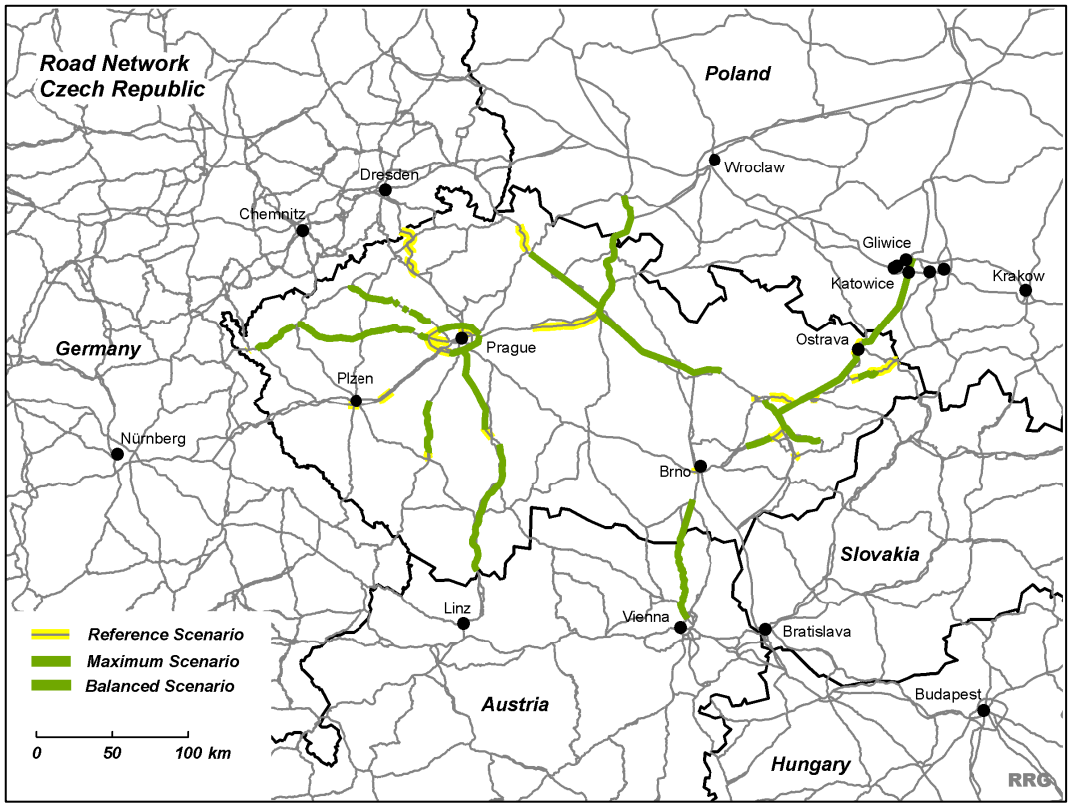


Figure B.4 Rail network in Reference, Maximum Rail and Balanced Scenarios, Czech Republic

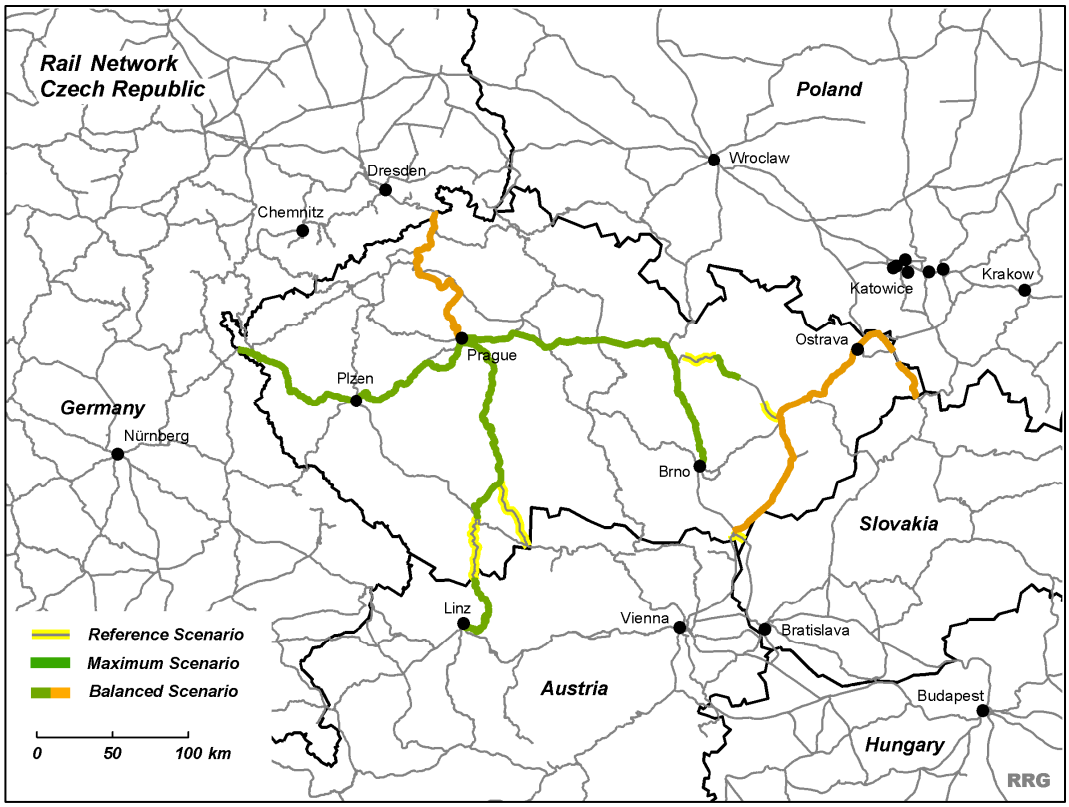


Figure B.5 Road network in Reference, Maximum and Balanced Scenarios, Estonia

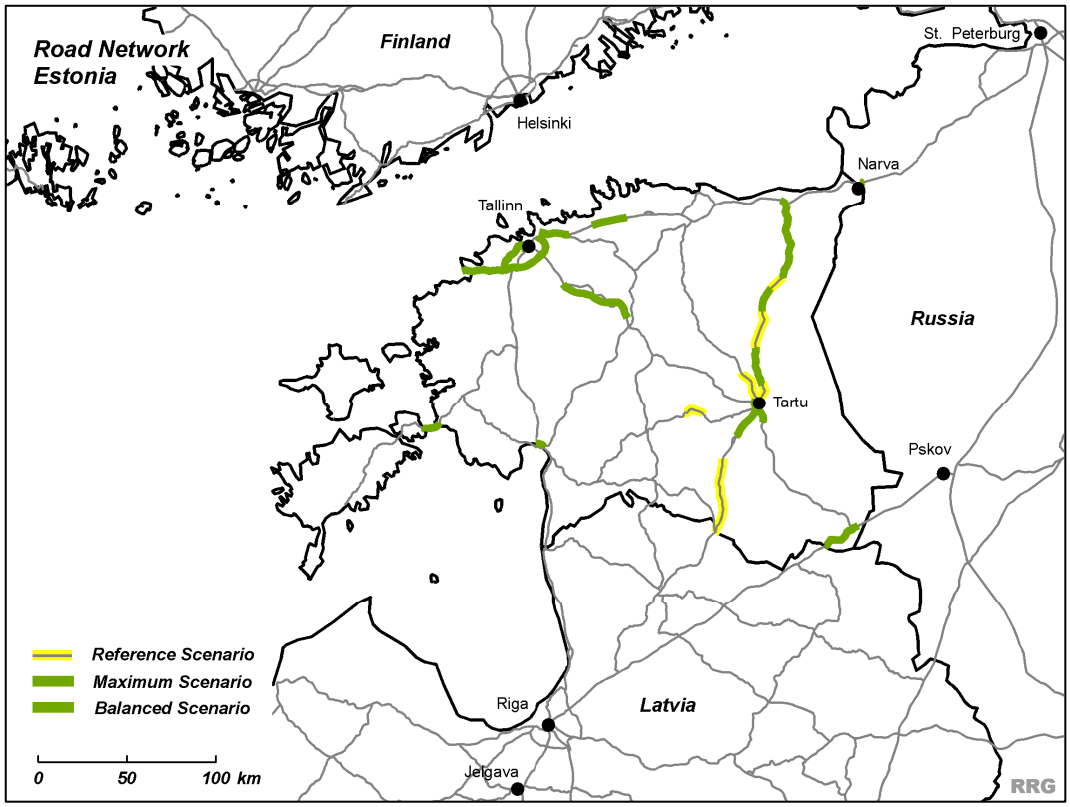


Figure B.6 Rail network in Reference, Maximum Scenario, Estonia

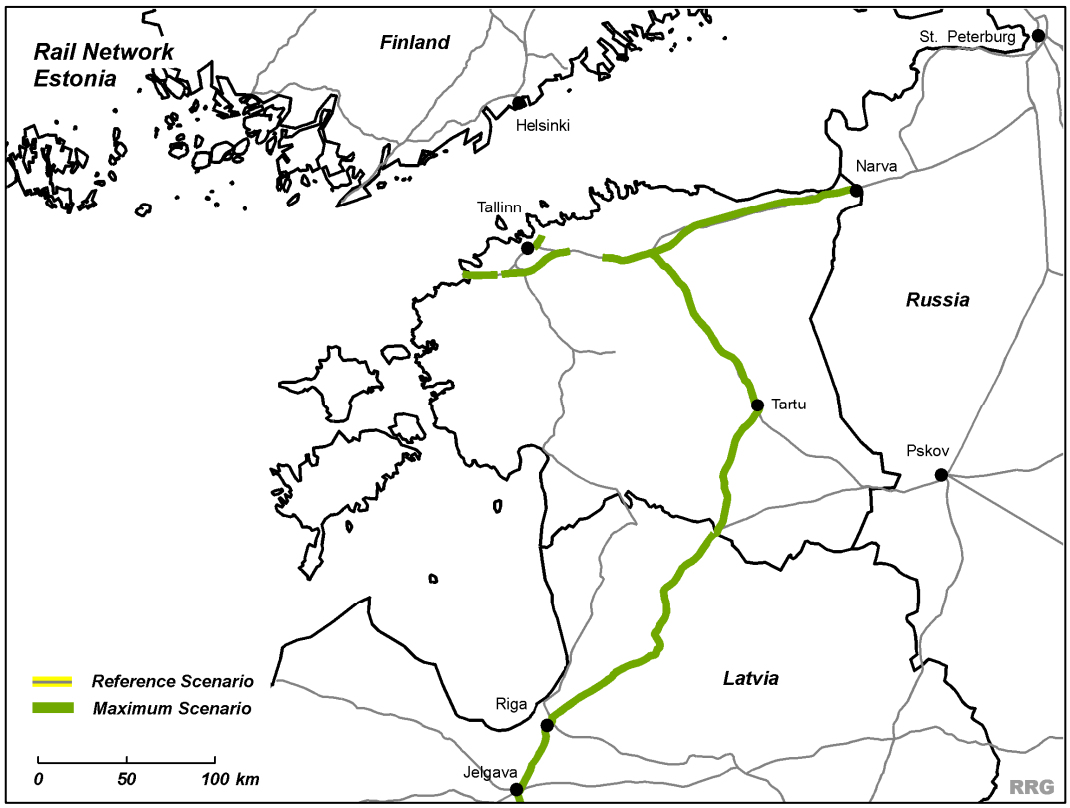


Figure B.7 Road network in Reference, Maximum and Balanced Scenarios, Greece

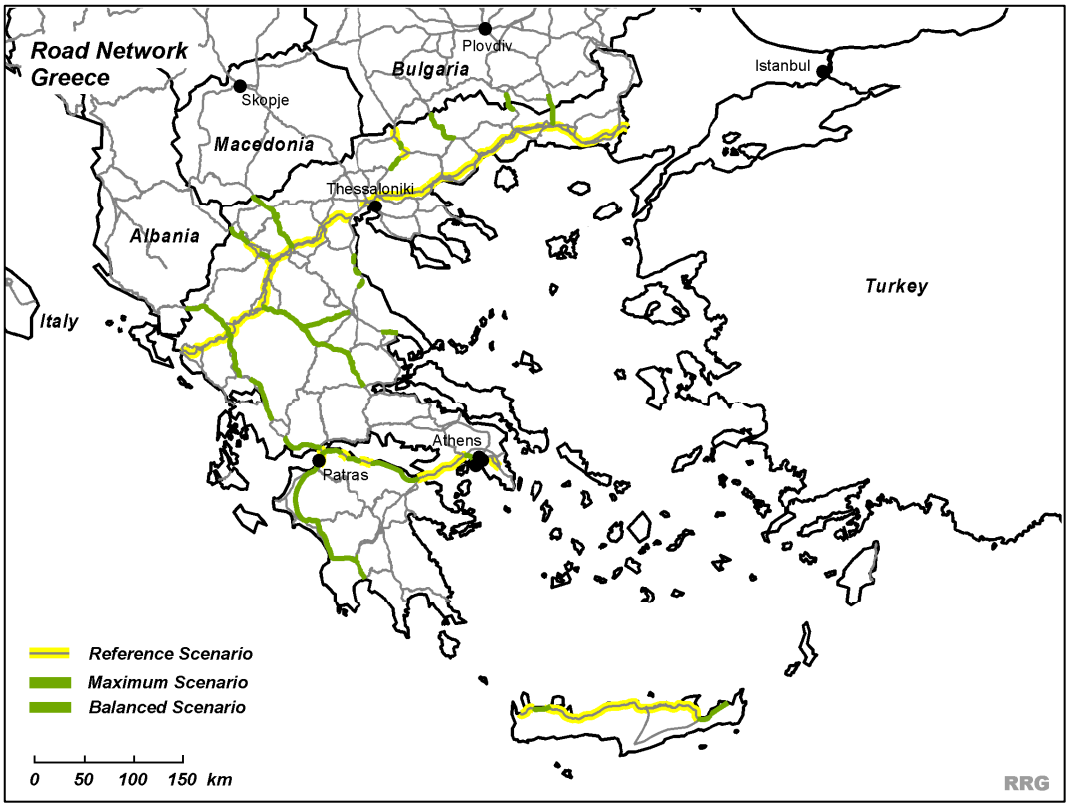


Figure B.8 Rail network in Reference, Maximum and Balanced Scenarios, Greece

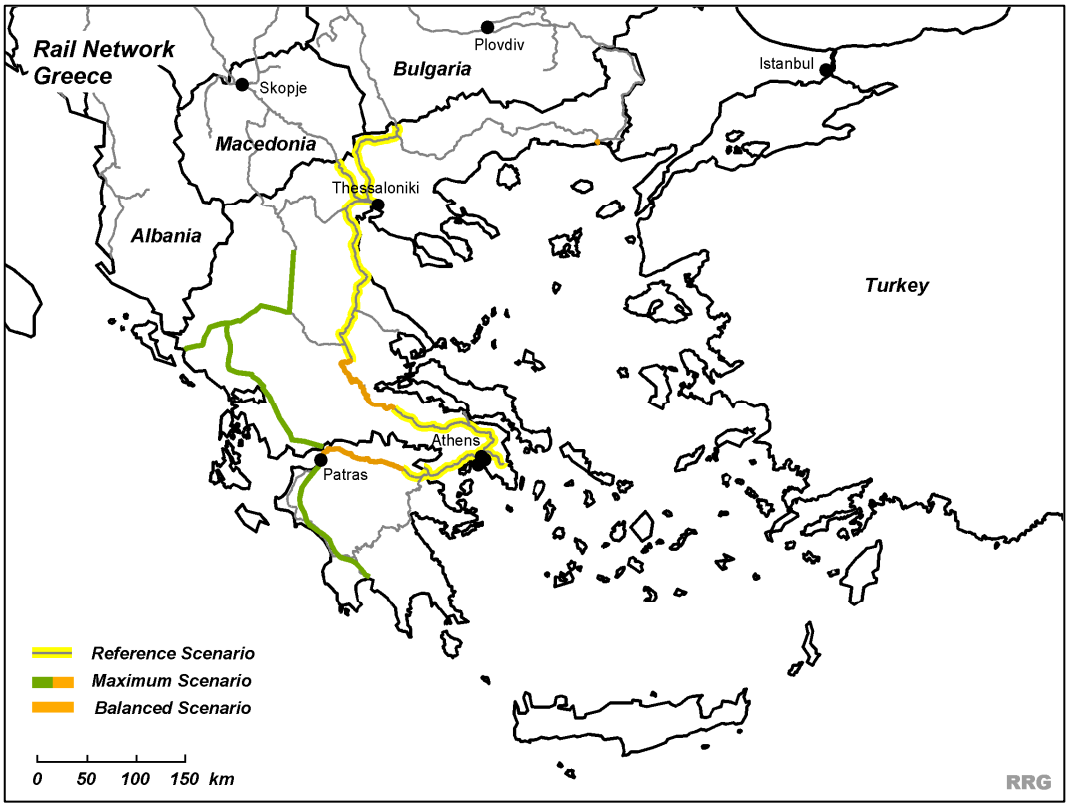


Figure B.9 Road network in Reference, Maximum and Balanced Scenarios, Hungary

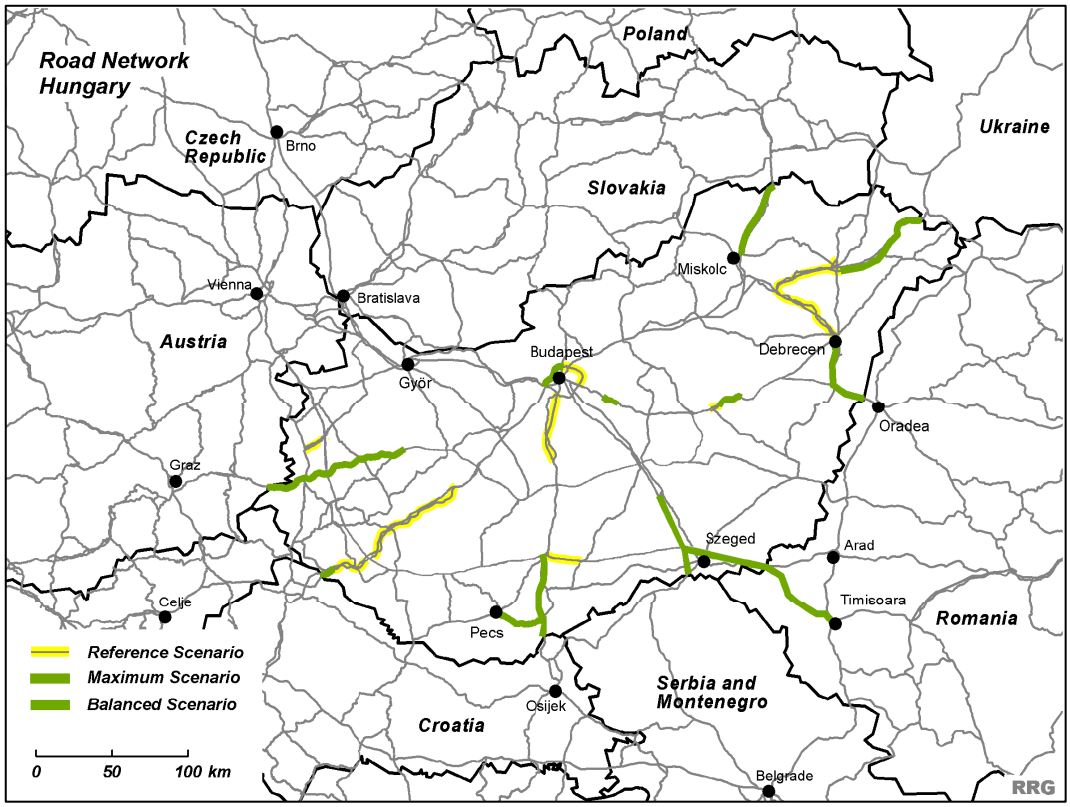
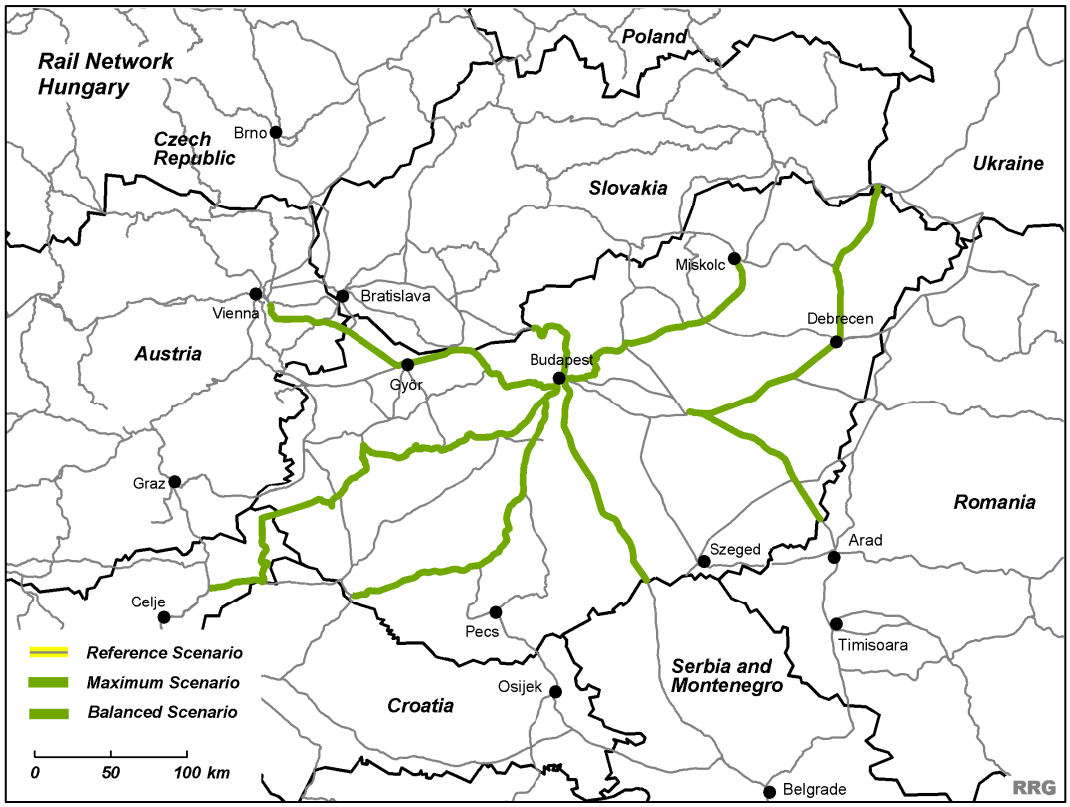


Figure B.10 Rail network in Reference, Maximum and Balanced Scenarios, Hungary



ECORYS

Figure B.11 Road network in Reference, Maximum and Balanced Scenarios, Latvia

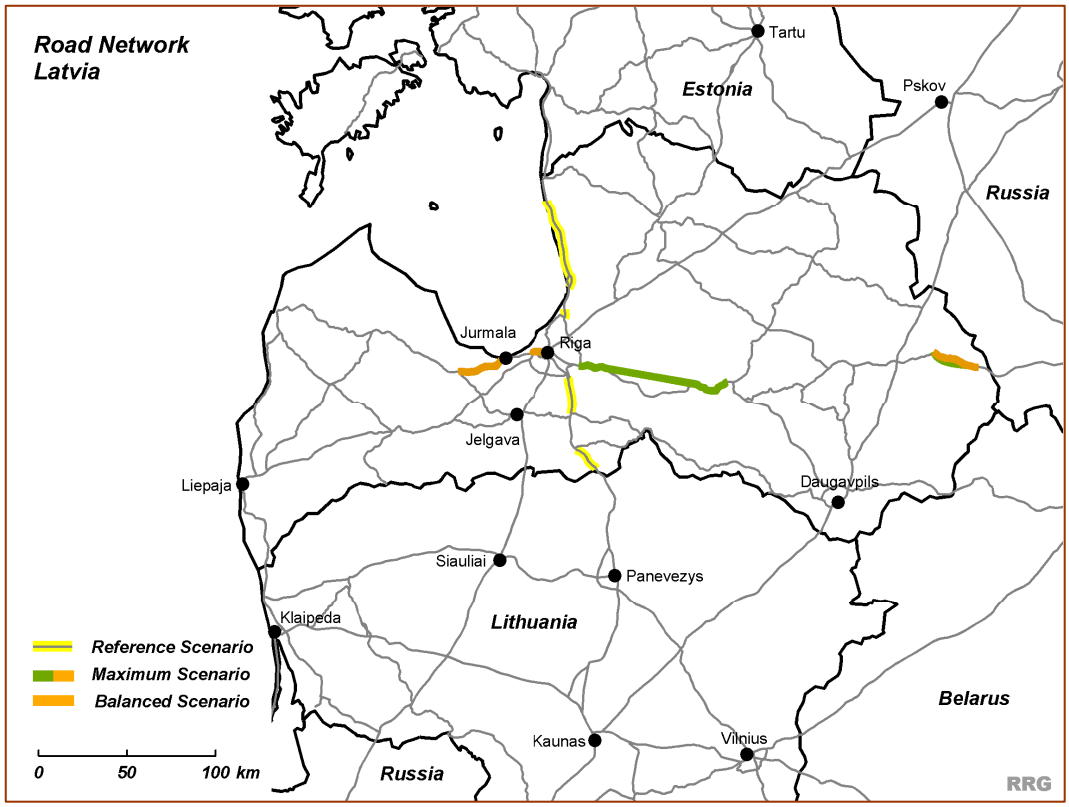


Figure B.12 Rail network in Reference, Maximum and Balanced Scenarios, Latvia

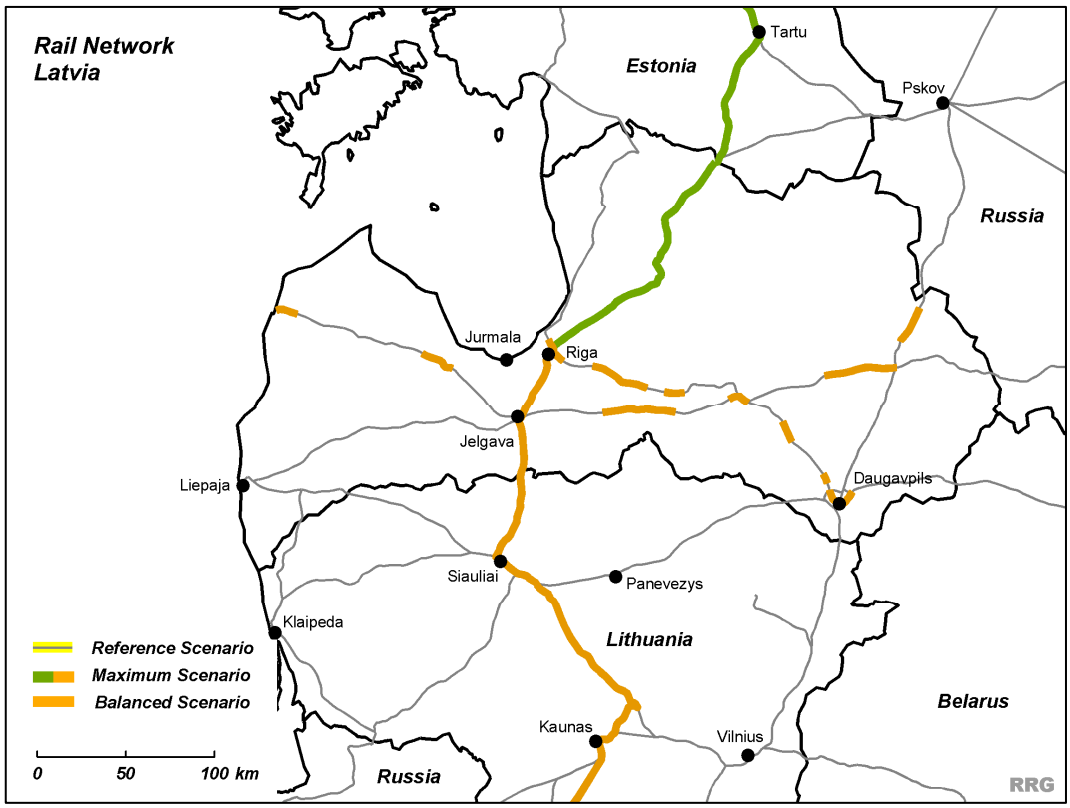


Figure B.13 Road network in Reference, Maximum and Balanced Scenarios, Lithuania

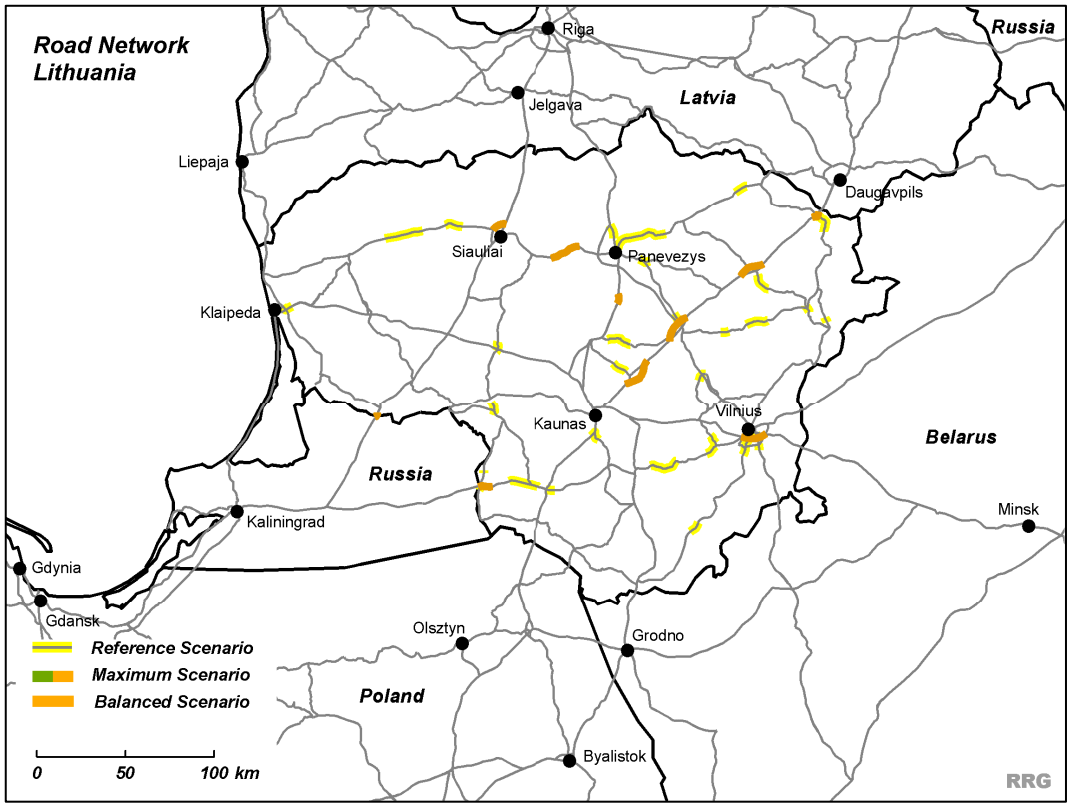
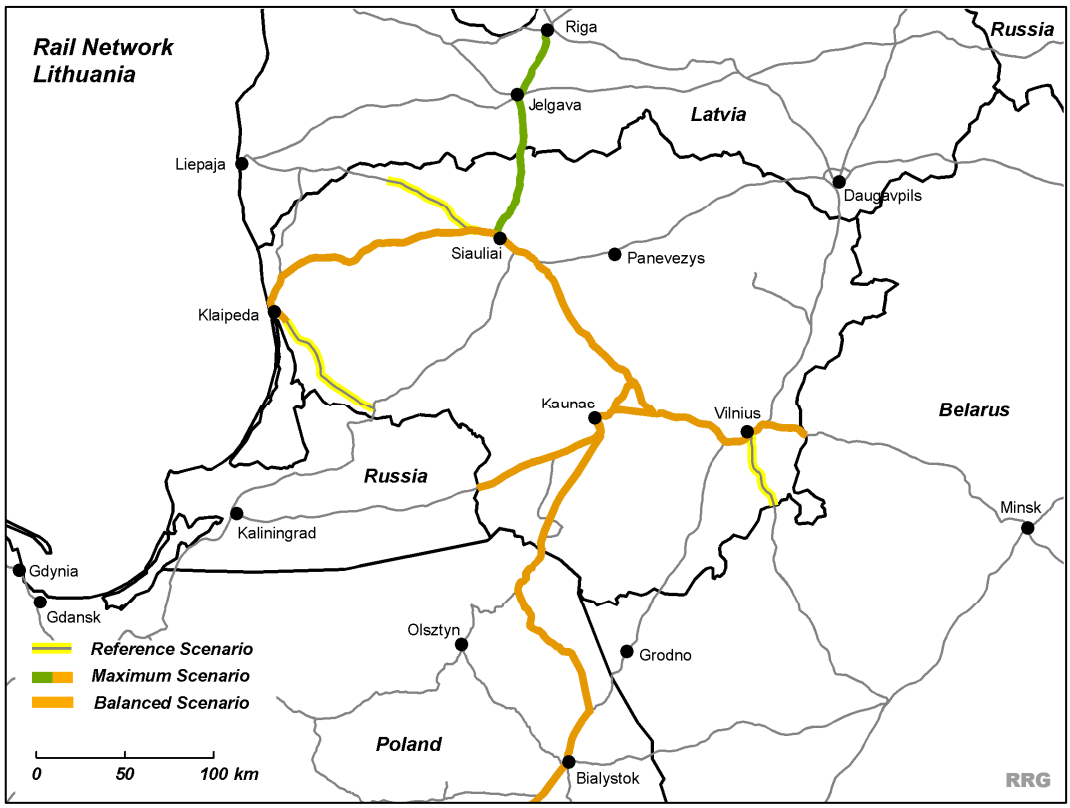


Figure B.14 Rail network in Reference, Maximum and Balanced Scenarios, Lithuania



ECORYS

Figure B.15 Road network in Reference, Maximum (Road) and Balanced scenario, Poland

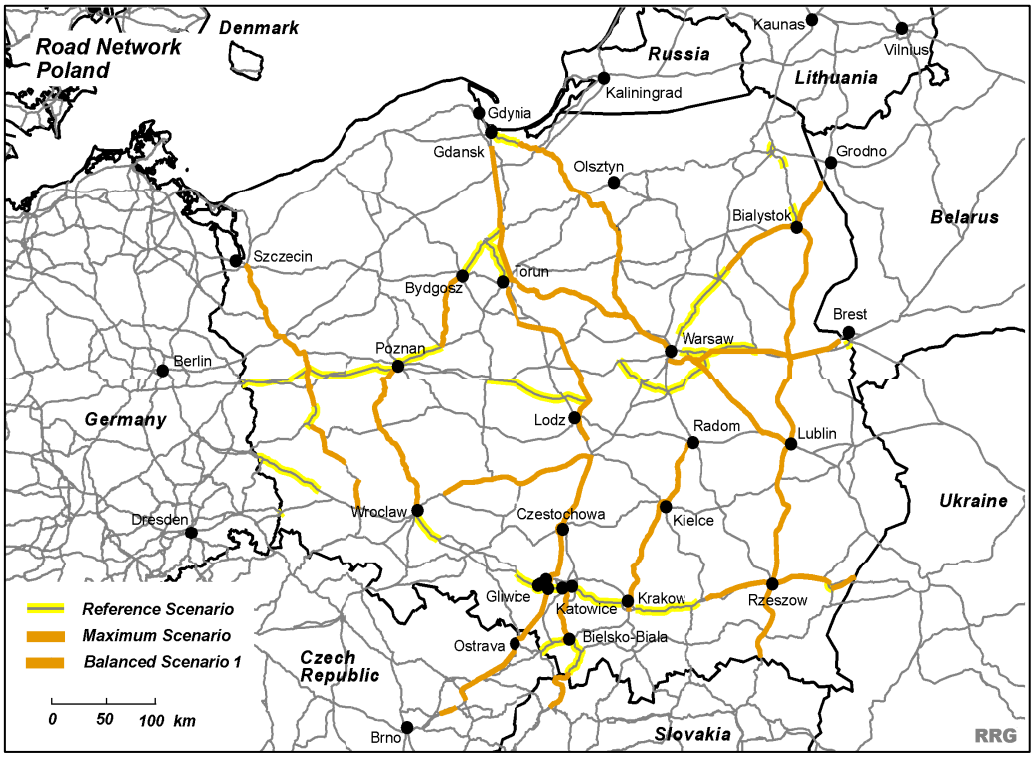


Figure B.16 Rail network in Reference, Maximum Rail and Balanced Scenarios, Poland

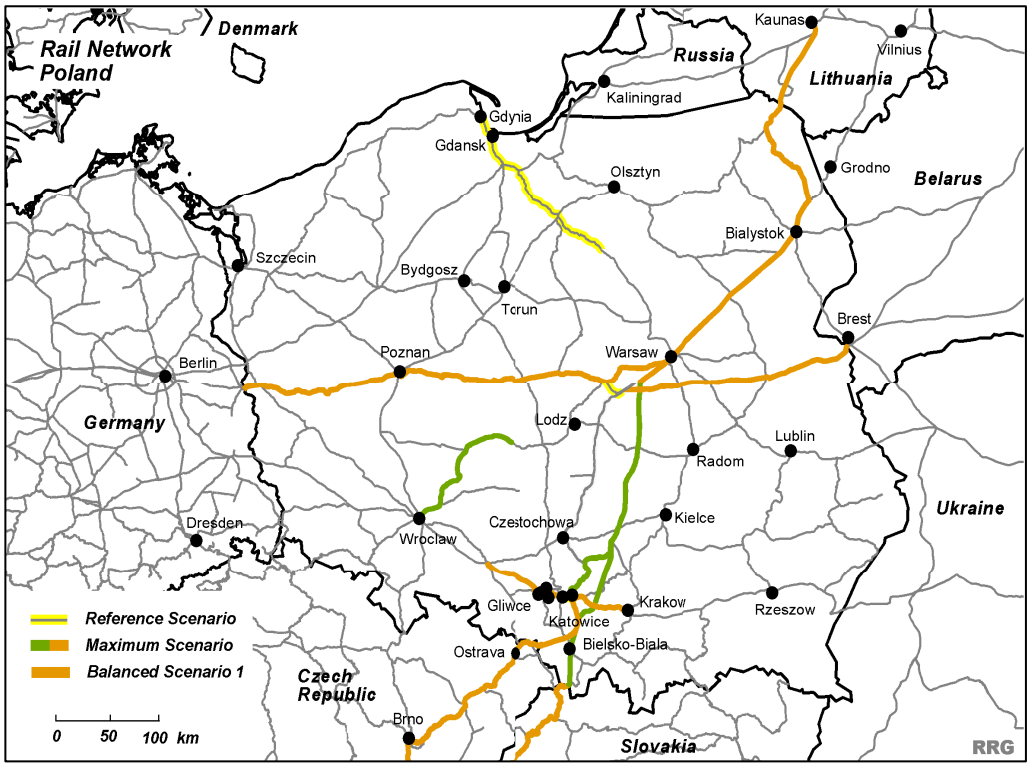


Figure B.17 Road network in Reference, Maximum and Balanced Scenarios, Portugal

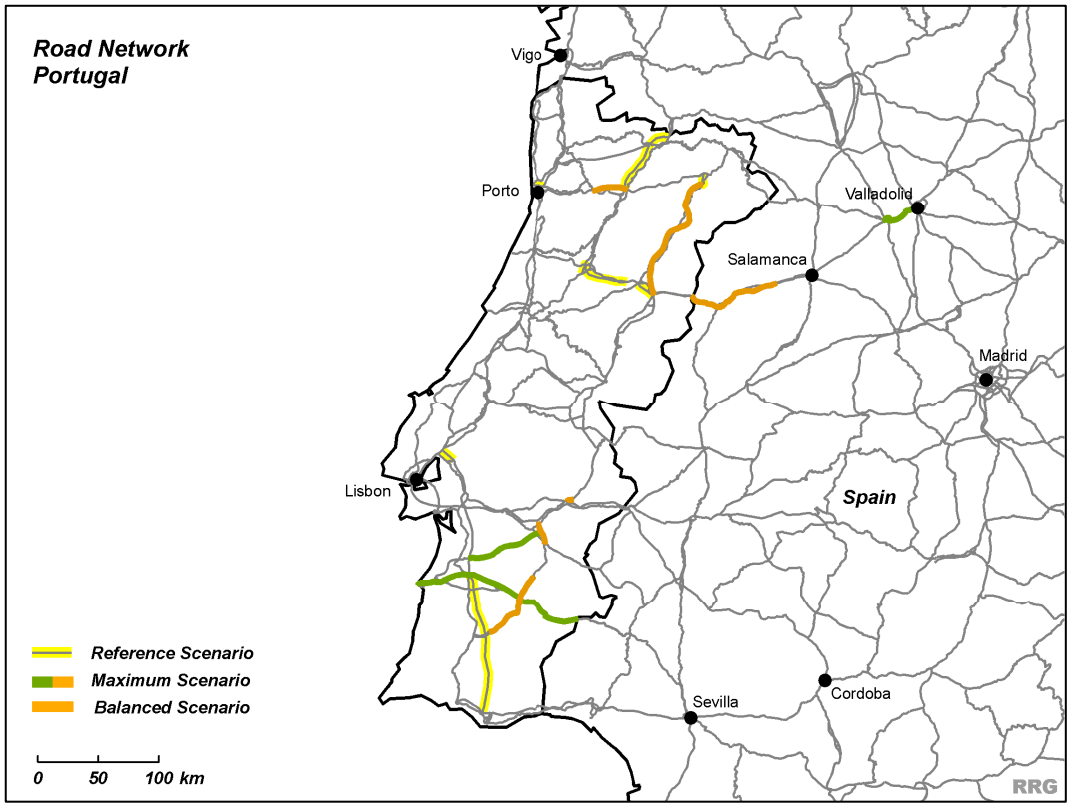


Figure B.18 Rail network in Reference, Maximum and Balanced Scenarios, Portugal

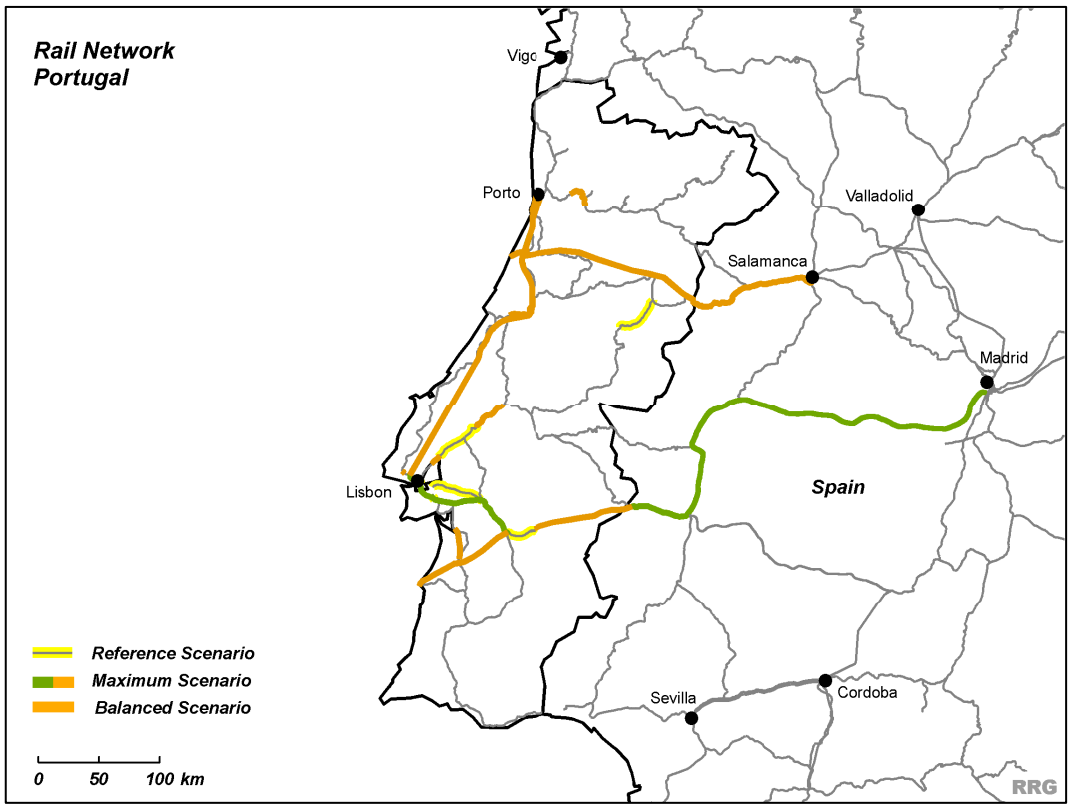


Figure B.19 Road network in Reference, Maximum Road and Balanced Scenarios, Romania

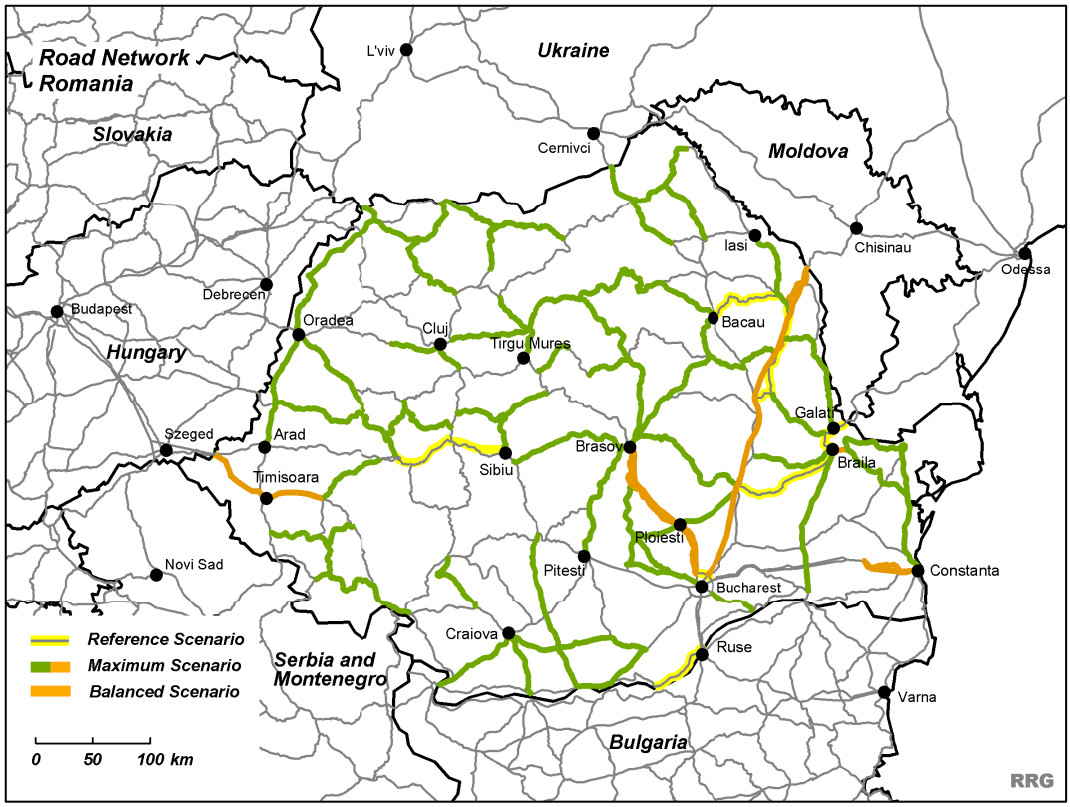


Figure B.20 Rail network in Reference, Maximum Rail and Balanced Scenarios, Romania

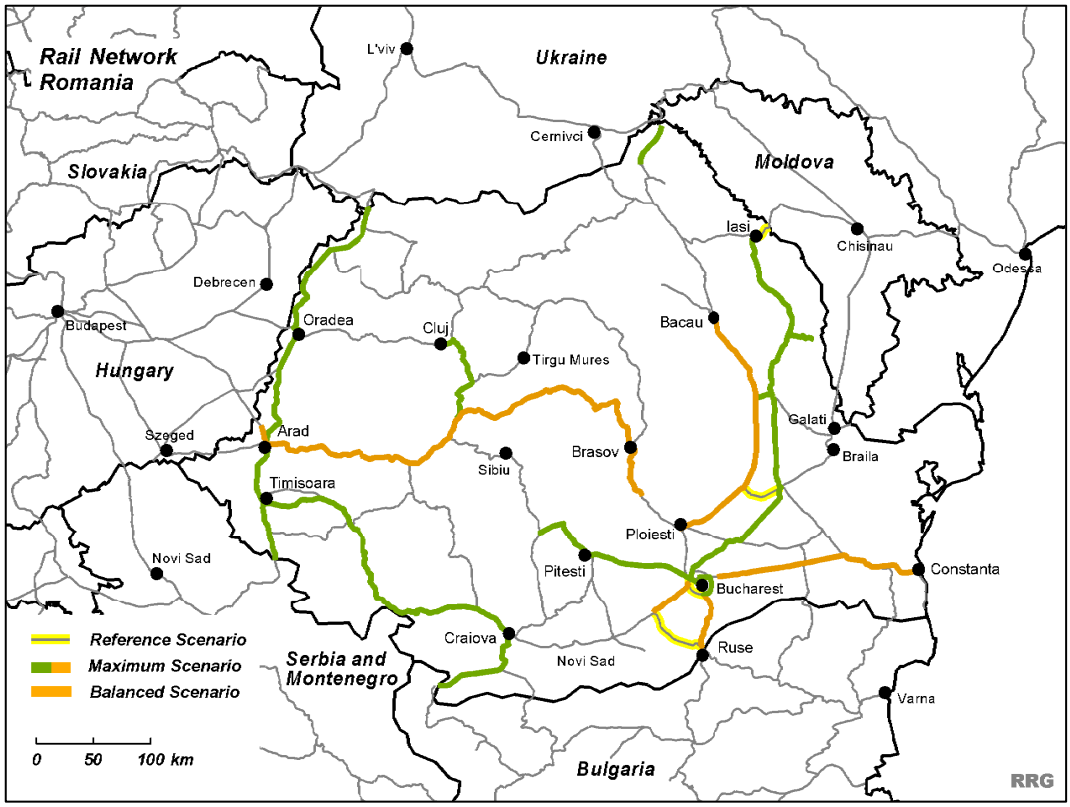


Figure B.21 Road network in Reference, Maximum Road and Balanced Scenario, Slovakia

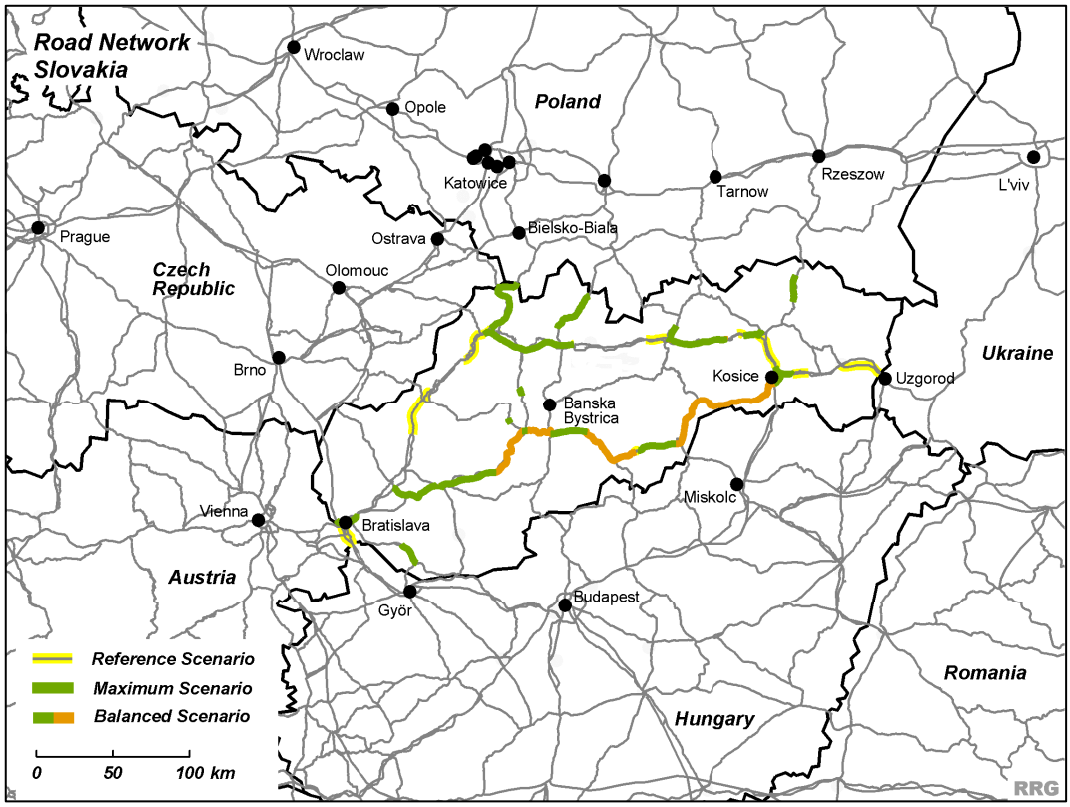
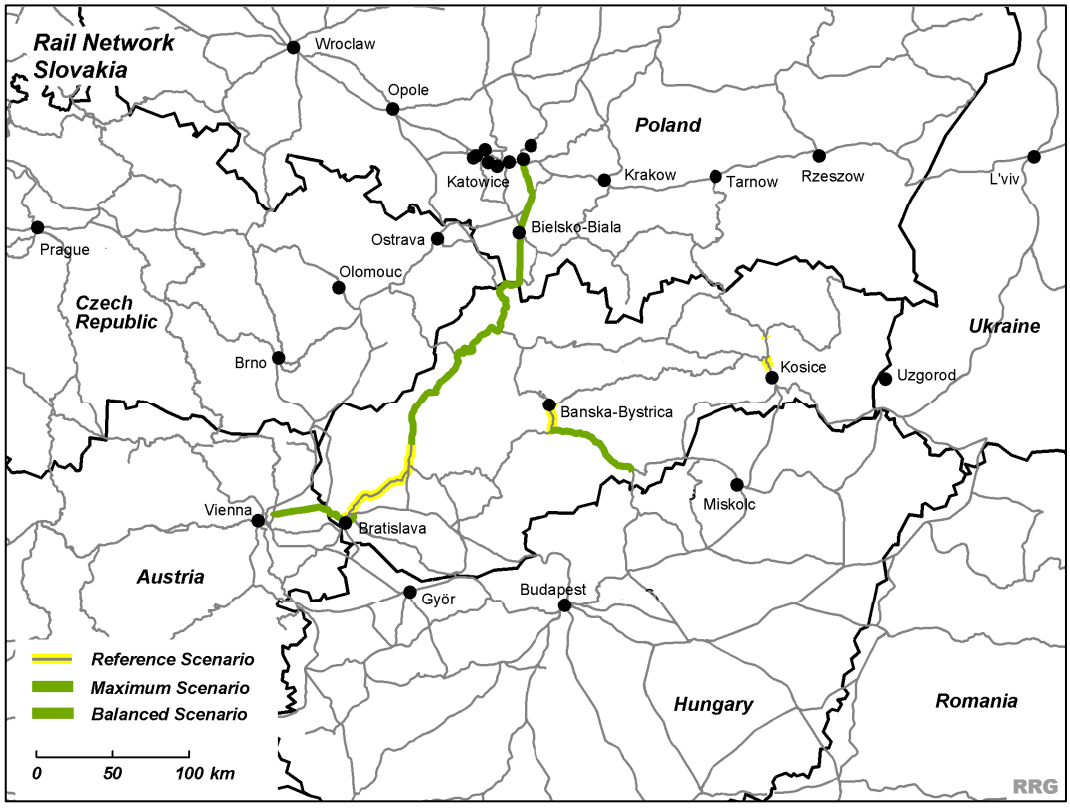


Figure B.22 Rail network in Reference, Maximum (Rail) and Balanced scenario, Slovakia



ECORYS

Figure B.23 Road network in Reference, Maximum and Balanced Scenarios, Slovenia

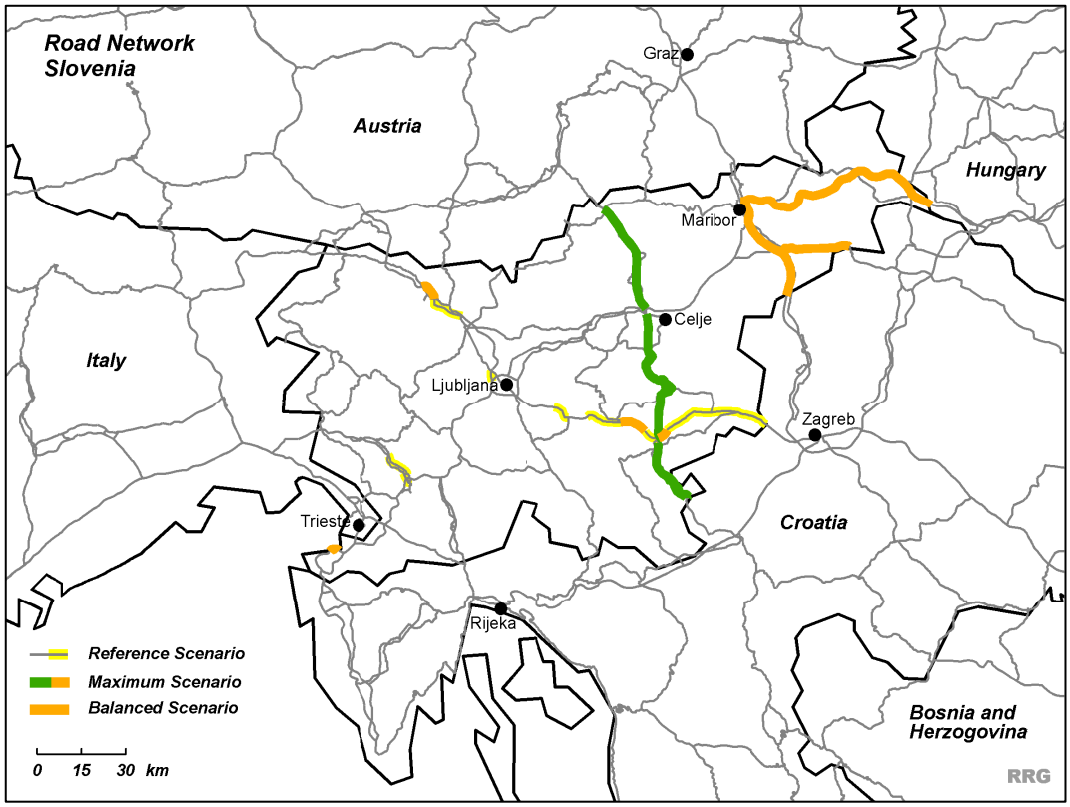


Figure B.24 Rail network in Reference, Maximum and Balanced Scenarios, Slovenia

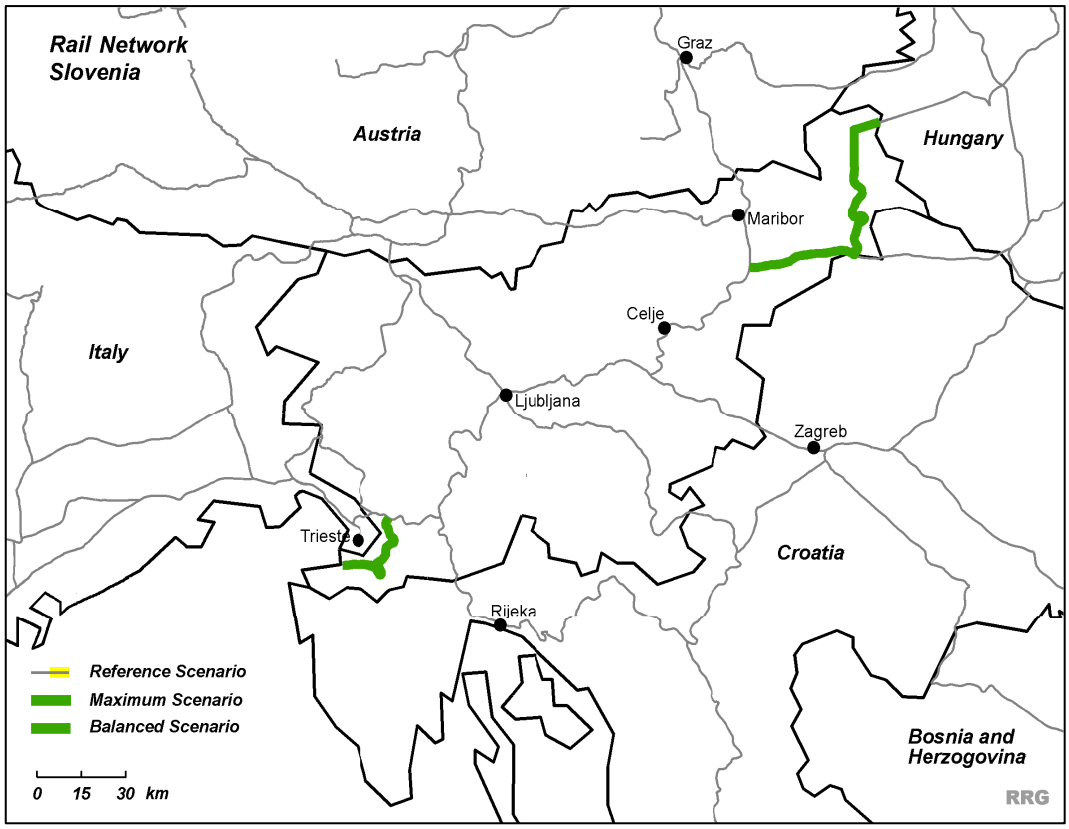


Figure B.25 Road network in Reference, Maximum Road and Balanced Scenarios, Spain

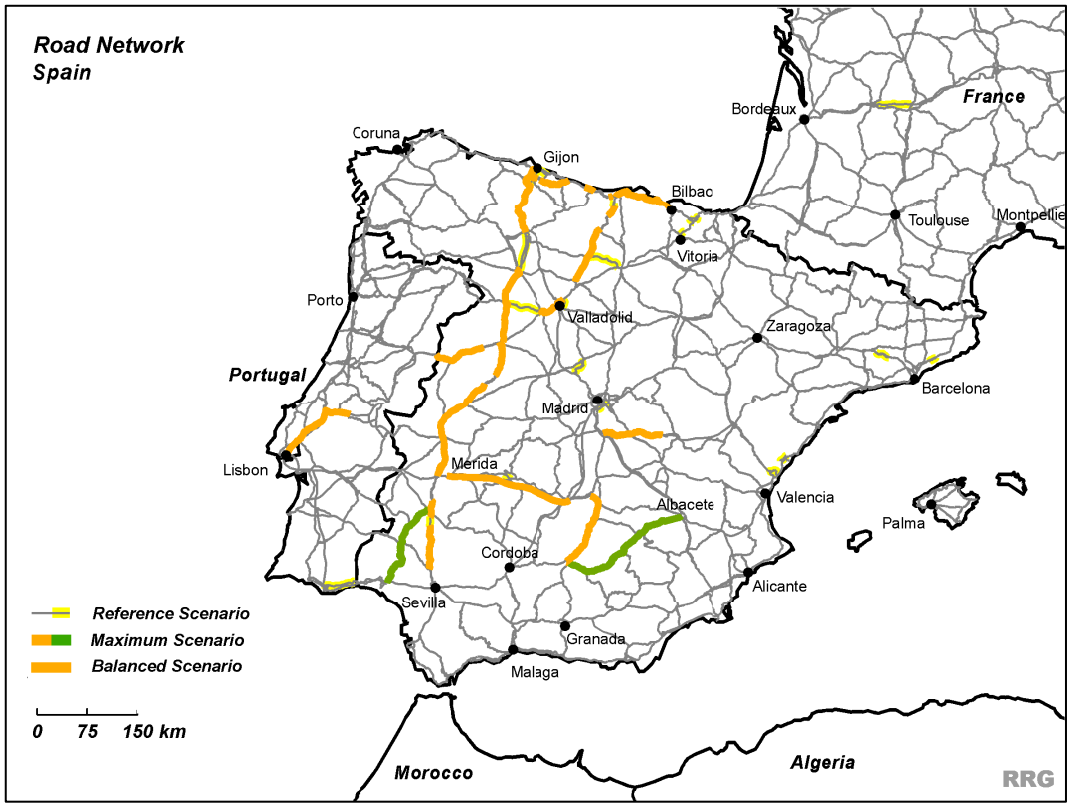
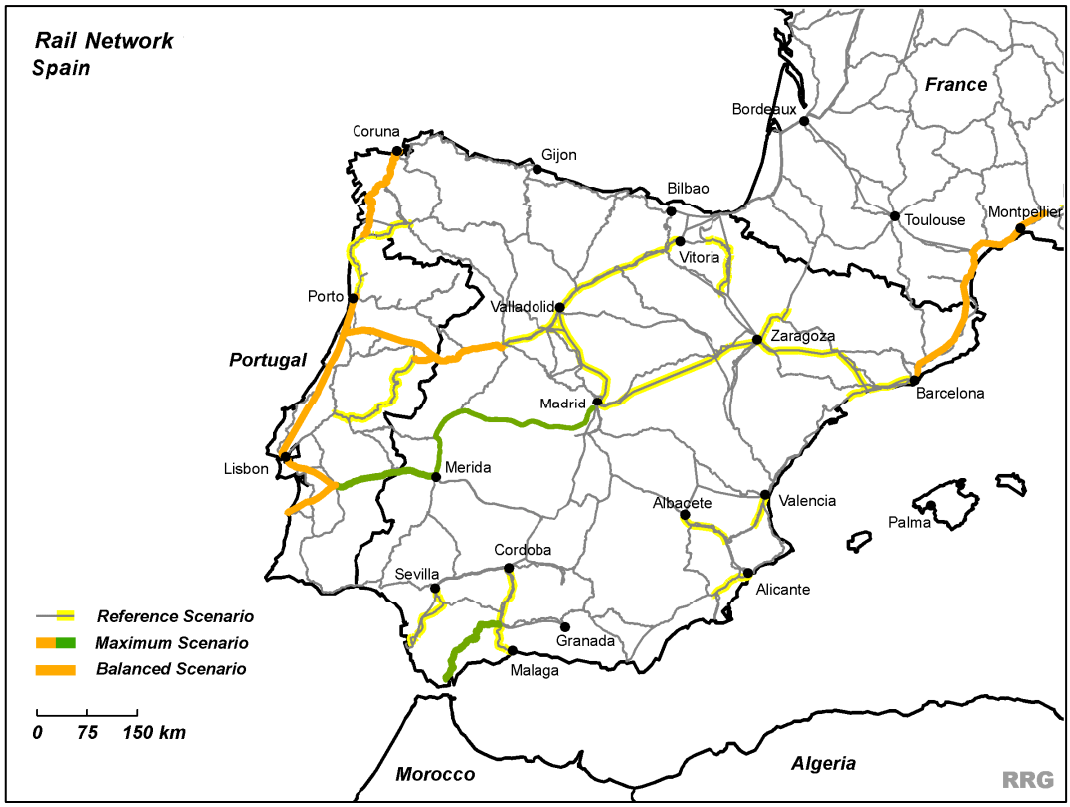


Figure B.26 Rail network in Reference, Maximum Rail and Balanced Scenarios, Spain



Annex C: Elaborated Impact Assessment

This Annex presents a more elaborate impact assessment. It first presents the results of the impact assessment on an individual country basis, followed by the results on a European scale.

Impacts by country

The SASI model has been used to assess the impacts of the various investment scenarios on the objectives of cohesion policy. Various indicators have been used to assess these impacts, of which the following will be used in the next sections:

- *Competitiveness*: GDP per capita, average speeds of interregional road or rail trips
- *Territorial cohesion*: Gini-coefficient of distribution of accessibility and GDP per capita among the countries regions.
- *Sustainability*: the share of rail in interregional passenger

Table C.1 Strategic objectives and related indicators

Objective	Indicator	Level
Economic competitiveness	Average speed of interregional road trips (kph)	National, regional average
	Average speed of interregional rail trips (kph)	National, regional average
	GDP per capita (Euro)	National, regional average
Territorial cohesion	Primacy rate population (%)	National
	Primacy rate GDP (%)	National
	Gini coefficient[57] of accessibility (0-100)	National
	Gini coefficient of GDP per capita (0-100)	National
Environmental sustainability	Share of interregional rail trips (%)	National, regional average

Tables C.2 to C.7 show the results of national investment scenarios by country. The numbers in the tables show only the effects in the particular country, including the effects of connecting cross-border projects in neighbouring countries.

[57] The Gini coefficient is a measure which represents the deviation from a fully egalitarian distribution of indicator values between regions (i.e. equal indicator values in all regions).

Economic competitiveness

Table C.2 shows the effects on GDP per capita. As GDP will grow substantially between 2006 and 2031, the 2031 levels are quite different from present day levels. In this growth perspective the impact of the infrastructure improvements on GDP per capita is generally modest. Although the impact differs by country and scenario, typically the investments foreseen result in an increase in GDP per capita of between 0.2 and 0.6 percent compared to the Reference Scenario in the same year.

Table C.2 Impact on GDP per capita

		Scenarios				
		Scenarios				
		Reference	Maximum Road	Maximum Rail	Maximum	Balanced
	2006	2031	2031	2031	2031	2031
Bulgaria	2,012	5.344	5,364 *+0.4%*	5,360 *+0.3%*	5,379 *+0.6%*	5,350 *+0.1%*
Cyprus	18,192	33,670	n.a.	n.a.	33,680 *+0.0%*	33,677 *+0.0%*
Czech Republic	6,525	15,180	15,228 *+0.3%*	15,234 *+0.4%*	15,281 *+0.7%*	15,287 *+0.7%*
Estonia	4,543	9,002	9,015 *+0.1%*	9.144 *+1.6%*	9,156 *+1.7%*	9,015 *+0.1%*
Greece	13,739	21,548	21,590 *+0.2%*	21,594 *+0.2%*	21,635 *+0.4%*	21,625 *+0.4%*
Hungary	6,263	14,906	14,947 *+0.3%*	14,951 *+0.3%*	14,992 *+0.6%*	14,992 *+0.6%*
Latvia	3,108	6,490	6,491 *+0.0%*	6,603 *+1.7%*	6,604 *+1.8%*	6,595 *+1.6%*
Lithuania	2,390	4,361	4,362 *+0.2%*	4,442 *+1.9%*	4,443 *+1.9%*	4,440 *+1.8%*
Malta	10,677	21,657	n.a.	n.a.	21,751 *+0.4%*	21,749 *+0.4%*
Poland	5,158	14,003	14,086 *+0.6%*	14,055 *+0.4%*	14,136 *+0.9%*	14,121 *+0.8%*
Portugal	13,814	28,075	28,113 *+0.1%*	28,475 *+1.4%*	28,512 *+1.5%*	28,284 *+0.7%*
Romania	1,693	3,528	3,570 *+1.2%*	3,548 *+0.6%*	3,589 *+1.7%*	3,570 *+1.2%*
Slovakia	4,909	11,952	11,970 *+0.2%*	11,960 *+0.1%*	11,978 *+0.2%*	11,981 *+0.3%*
Slovenia	14,309	27,276	27,310 *+0.1%*	27,278 *+0.0%*	27,312 *+0.1%*	27,307 *+0.1%*
Spain	18,660	30,914	30,947 *+0.1%*	31,050 *+0.4%*	31,083 *+0.5%*	31,021 *+0.3%*

The impact of the investment scenarios on average interregional road speeds is larger (see Table C.3): in many countries the investments in the Maximum Road scenarios increase road speeds by 5-10 percent. Somewhat lower impacts are found in those countries where average road speeds are already relatively high (Spain, Portugal, Slovenia). Highest potential impacts are expected in Bulgaria, Czech Republic, Romania and Poland.

Table C.3 Impact on interregional road speeds

		Scenarios				
		Reference	Maximum Road	Maximum Rail	Maximum	Balanced
	2006	2031	2031	2031	2031	2031
Bulgaria	37.1	38.7	42.3 *+9.2%*	38.7 *0.0%*	42.3 *+9.2%*	39.0 *+0.7%*
Czech Republic	43.4	45.4	49.8 *+9.8%*	45.4 *0.0%*	49.8 *+9.8%*	49.8 *+9.8%*
Estonia	35.4	36.5	37.4 *+2.5%*	36.5 *-0.0%*	37.4 *+2.5%*	37.4 *+2.5%*
Greece	35.2	36.3	37.8 *+4.1%*	36.3 *0.0%*	37.8 *+4.1%*	37.8 *+4.1%*
Hungary	39.6	41.4	43.4 *+4.7%*	41.4 *0.0%*	43.4 *+4.7%*	43.4 *+4.7%*
Latvia	38.0	40.3	40.4 *+0.2%*	40.3 *-0.0%*	40.4 *+0.2%*	40.3 *+0.0%*
Lithuania	38.2	41.0	41.1 *+0.3%*	41.0 *0.0%*	41.1 *+0.3%*	41.1 *+0.3%*
Poland	37.7	38.8	42.6 *+9.7%*	38.8 *0.0%*	42.6 *+9.8%*	42.6 *+9.8%*
Portugal	52.4	52.4	53.2 *+1.5%*	52.4 *+0.0%*	53.2 *+1.5%*	52.9 *+1.0%*
Romania	30.5	31.5	35.5 *+12.6%*	31.5 *0.0%*	35.5 *+12.6%*	33.8 *+7.4%*
Slovakia	38.8	40.6	42.4 *+4.3%*	40.6 *0.0%*	42.4 *+4.3%*	42.8 *+5.4%*
Slovenia	47.8	50.2	51.5 *+2.6%*	50.2 *0.0%*	51.5 *+2.6%*	51.2 *+2.0%*
Spain	52.0	52.0	52.5 *+1.0%*	52.0 *0.0%*	52.5 *+1.0%*	52.4 *+0.8%*

The absolute levels of average interregional rail speeds (see Table C.4) are substantially below those of roads. The impacts of the various scenarios, in particular the Maximum Rail scenario, on these rail speeds are generally larger than on road speeds and around 10 percent. A particular strong improvement can be noticed in the maximum scenario case of Portugal (some 35 percent).

Table C.4 Impact on interregional rail speeds

		Scenarios				
		Reference	Maximum Road	Maximum Rail	Maximum	Balanced
	2006	2031	2031	2031	2031	2031
Bulgaria	23.4	23.8	23.8 *0.0%*	26.5 *+11.6%*	26.5 *+11.6%*	24.2 *+1.9%*
Czech Republic	27.6	27.8	27.8 *0.0%*	30.3 *+9.0%*	30.3 *+9.0%*	30.9 *+11.2%*
Estonia	22.1	22.1	22.1 *0.0%*	24.3 *+10.1%*	24.3 *+10.1%*	22.1 *0.0%*
Greece	21.3	21.4	21.4 *0.0%*	23.4 *+9.3%*	23.4 *+9.3%*	23.0 *+7.6%*
Hungary	25.0	25.1	25.1 *0.0%*	27.3 *+8.6%*	27.3 *+8.6%*	27.3 *+8.6%*
Latvia	24.6	24.6	24.6 *0.0%*	28.7 *+17.0%*	28.7 *+17.0%*	27.3 *+11.1%*
Lithuania	24.1	24.1	24.1 *0.0%*	30.2 *+25.5%*	30.2 *+25.5%*	29.6 *+22.9%*
Poland	26.2	26.3	26.3 *0.0%*	28.4 *+7.7%*	28.4 *+7.7%*	27.5 *+4.3%*
Portugal	20.7	20.8	20.8 *0.0%*	28.1 *+35.1%*	28.1 *+35.1%*	25.1 *+20.6%*
Romania	19.6	19.6	19.6 *0.0%*	21.5 *+9.6%*	21.5 *+9.6%*	20.7 *+5.7%*
Slovakia	24.2	24.2	24.2 *0.0%*	24.9 *+2.7%*	24.9 *+2.7%*	24.9 *+2.7%*
Slovenia	27.9	28.0	28.0 *0.0%*	28.2 *+0.5%*	28.2 *+0.5%*	28.2 *+0.5%*
Spain	31.6	31.8	31.8 *0.0%*	34.0 *+6.9%*	34.0 *+6.9%*	32.5 *+2.4%*

Territorial cohesion

The investments in the various scenarios have limited impact on the income distribution as measured by the Gini-coefficient of GDP per capita of the various regions (table C.5). It thus appears that all regions within a country profit from the increased accessibility and the ensuing economic growth.

Table C.5 Impact on Gini-coefficient of GDP per capita of regions

		Scenarios				
		Reference	Maximum Road	Maximum Rail	Maximum	Balanced
	2006	2031	2031	2031	2031	2031
Bulgaria	18.20	17.66	17.66 *-0.0%*	17.68 *+0.1%*	17.67 *+0.1%*	17.67 *+0.0%*
Czech Republic	18.01	17.20	17.14 *-0.3%*	17.23 *+0.2%*	17.18 *-0.1%*	17.17 *-0.2%*
Estonia	30.65	29.60	29.60 *-0.0%*	29.58 *-0.1%*	29.58 *-0.1%*	29.60 *-0.0%*
Greece	10.25	10.10	10.07 *-0.3%*	10.10 *+0.0%*	10.07 *-0.3%*	10.08 *-0.2%*
Hungary	23.47	22.48	22.46 *-0.1%*	22.46 *-0.1%*	22.44 *-0.2%*	22.44 *-0.2%*
Latvia	26.26	22.80	22.80 *+0.0%*	22.79 *-0.0%*	22.80 *0.0%*	22.79 *-0.0%*
Lithuania	15.42	15.11	15.11 *+0.03%*	15.06 *-0.36%*	15.05 *-0.38%*	15.06 *-0.33%*
Poland	21.82	21.55	21.54 *-0.06%*	21.54 *-0.08%*	21.52 *-0.14%*	21.53 *-0.09%*
Portugal	20.04	19.79	19.79 *+0.0%*	20.07 *+1.4%*	20.07 *+1.4%*	19.88 *+0.5%*
Romania	22.15	20.39	20.38 *-0.0%*	20.41 *+0.1%*	20.40 *+0.0%*	20.48 *+0.4%*
Slovakia	21.60	19.16	19.14 *-0.07%*	19.15 *-0.02%*	19.14 *-0.02%*	19.13 *-0.12%*
Slovenia	14.09	13.41	13.39 *-0.2%*	13.41 *-0.0%*	13.38 *-0.2%*	13.39 *-0.2%*
Spain	12.78	12.08	12.02 *-0.44%*	12.10 *+0.23%*	12.05 *-0.21%*	12.05 *-0.26%*

Sustainability

Lastly, the future share of rail trips of all interregional trips (excluding air) has been assessed (Table C.6). The results show the substantial impact that rail improvements can have on this indicator. Apparently the modal split can be influenced quite substantially by the type of investments. In various cases the Maximum Rail scenario improves the share of the railways by 20 to 40 percent (even doubling the share of rail transport in Lithuania). Again the impact on the rail share is low in Slovenia and Spain, but high in Portugal.

Table C.6 Impact on the share of railways in interregional trips

		Scenarios				
		Reference	Maximum Road	Maximum Rail	Maximum	Balanced
	2006	2031	2031	2031	2031	2031
Bulgaria	22.2	21.2	17.6 *-17.0%*	+30.2 *+42.8%*	25.6 *+21.0%*	21.9 *+3.5%*
Czech Republic	24.4	23.0	19.8 *-13.8%*	28.0 *+21.9%*	24.4 *+6.4%*	25.5 *+11.1%*
Estonia	21.1	25.6	24.1 *-5.7%*	31.3 *+22.5%*	29.7 *+16.3%*	24.1 *-5.7%*
Greece	21.2	20.0	18.2 *-8.9%*	+25.5 *+27.8%*	23.4 *+17.0%*	22.8 *+13.9%*
Hungary	23.5	22.2	20.8 *-6.6%*	27.6 *+24.3%*	25.9 *+16.8%*	25.9 *+16.8%*
Latvia	23.0	20.3	20.2 *-0.5%*	31.2 *+53.8%*	31.1 *+53.2%*	27.8 *+38.8%*
Lithuania	18.5	16.1	16.0 *-0.6%*	33.0 *+104.7%*	32.8 *+103.7%*	31.3 *+94.2%*
Poland	30.0	28.8	25.1 *-13.1%*	33.3 *+15.6%*	29.3 *+1.5%*	27.5 *-4.5%*
Portugal	15.7	15.7	15.5 *-1.5%*	28.7 *+82.6%*	28.3 *+80.4%*	24.0 *+52.9%*
Romania	25.0	23.7	18.4 *-22.3%*	31.1 *+31.3%*	24.8 *+4.8%*	23.7 *-0.0%*
Slovakia	24.3	22.7	21.3 *-6.1%*	24.2 *+6.8%*	22.8 *+0.4%*	22.3 *-1.5%*
Slovenia	20.8	19.4	18.6 *-4.0%*	19.6 *+1.4%*	18.8 *+2.7%*	19.0 *-1.9%*
Spain	30.8	30.9	30.6 *-1.1%*	33.6 *+8.8%*	33.3 *+7.7%*	32.1 *+3.9%*

In conclusion, the results of the investment scenarios as assessed with the SASI model show that the investments in transport infrastructure do have an impact on accessibility (road and rail speeds), and thereby on economic growth. They increase per capita income in the long run typically by up to 0.5 percent; maximum increases of 1.5% are found. In addition, if infrastructures are improved, the whole country (and regions across borders) tends to profit; the income distribution between regions does not change significantly.

Perhaps the largest impact of the investment scenarios is on sustainability as shown in the modal split. The model simulations show that rail shares in interregional travel can be safeguarded and even improved by rail investments, even if at the same time investments are made in road infrastructure.

Cross border effects – some examples

In various country reports not only the impacts of projects on the particular country have been shown, but also those on neighbouring countries. In most cases those effects are strongest just across the borders and are smaller for regions further away. These cross-border effects can best be shown by maps and three-dimensional figures which show the level of the effect of scenarios. Below follow two examples of cross-border effects:

- the effects of road improvements in Slovakia on interregional road speed in adjacent countries Hungary, Austria, Czech Republic and Poland (Figure C.1),
- the effects of road and rail improvements in Hungary on GDP per capita in nearby countries Slovakia, Poland, Romania, Serbia and Montenegro and Bosnia and Herzegovina (Figure C.2).

It can be seen the effects are strongest in these neighbouring countries but spread, though only marginally, across large parts of Europe.

Figure C.1 Average speed of interregional road trips: European impacts, Balanced Scenario, Slovakia, 2031

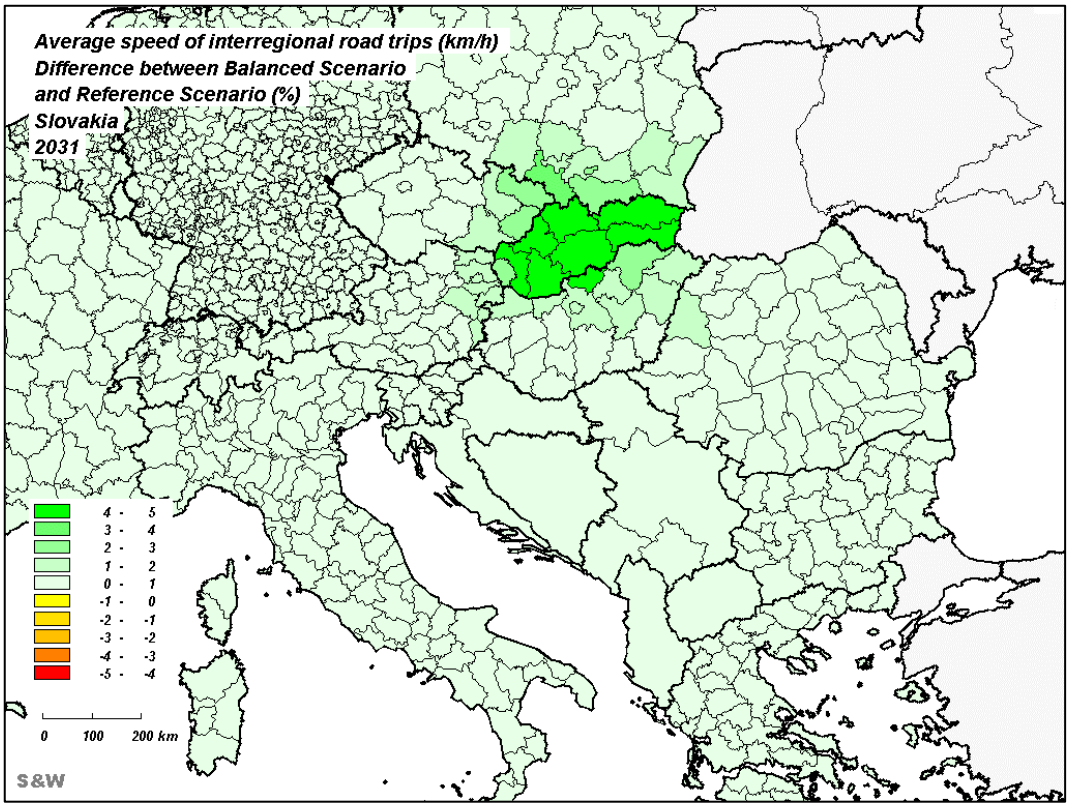
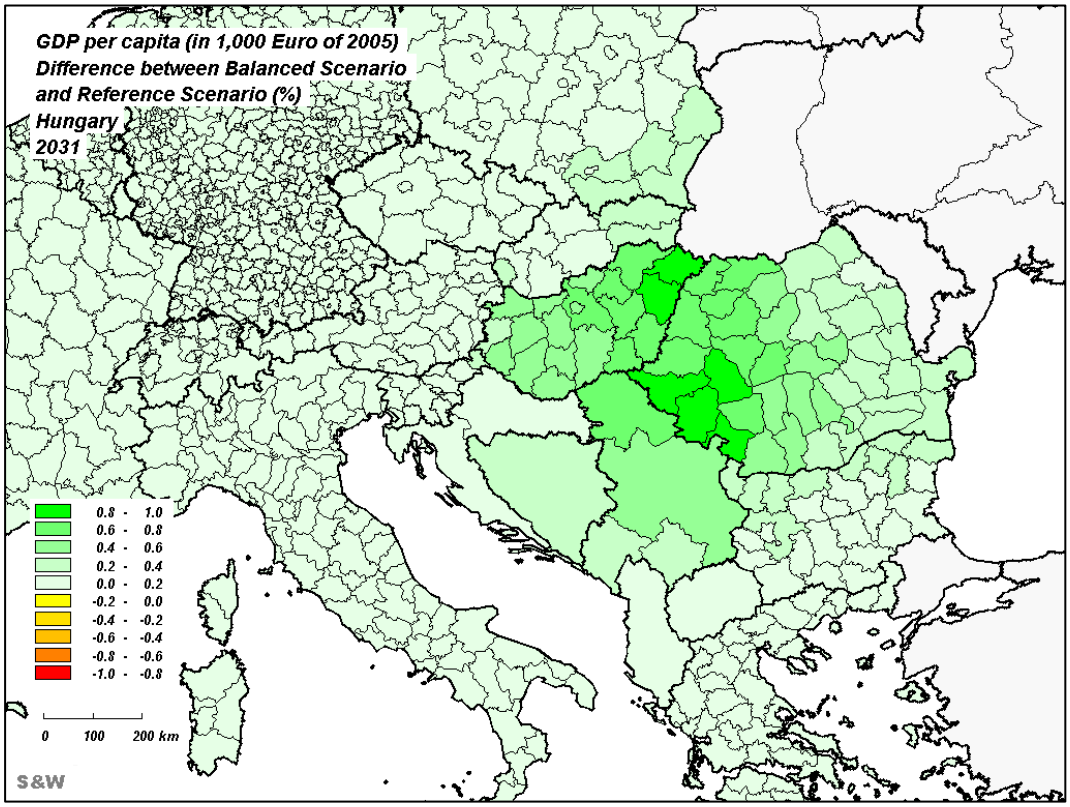


Figure C.2 GDP per capita: European impacts, European impacts, Hungary, Balanced Scenario, 2031



ECORYS

Impacts on accessibility

Next to the effects of the groups of projects on interregional road and rail speeds and thereby on gross domestic product (GDP), the accessibility of regions is positively affected by the projects. The accessibility problems of the countries analysed expressed in the Accessibility Problem Index Road and Rail (see Section 2.8 of main report) are summarised in Tables C.7 and C.8.

The tables show the effects of the scenarios on the Accessibility Problem Index: index values above one indicate accessibility problems, whereas index values below one indicate above-average performance. As reference level the average of EU25 in the year 2006 has been taken, i.e. the average of the Accessibility Problem Index in the 25 EU member states and the two accession countries Bulgaria and Romania. The impacts shown are only those in the particular country but include the effects in this country of cross-border projects carried out in neighbouring countries.

With respect to road accessibility, the impacts of the scenarios are a reduction of up to twelve percent of the problem index, or an improvement of up to twelve percent of accessibility. More important perhaps is the conclusion that with investments in transport infrastructure the gap in road accessibility between countries can be reduced. Whereas in the reference situation for 2031 the API ranges between 0.85 and 1.5, the range narrows to 0.84-1.32 in the Maximum Road scenario.

This conclusion holds even more for rail accessibility. In this case the effects of scenarios are estimated to be at maximum twenty percent (except Portugal), while the range in the API narrows from 0.73-1.81 to 0.69-1.60.

Despite the quite detailed presentation of the numbers, they should for several reasons be treated as illustrations of possible effects only. Firstly, the scenarios are just indicative lists of possible projects, because not all of them may be realised in the next programming period. Secondly, it has been assumed in the scenarios that the projects will be effectively implemented. i.e. that they increase travel speeds on the affected road or rail sections.

The general conclusion can be, though, that investments in transport infrastructure in the next programming period can have long-lasting effects on accessibility of regions and might also help to reduce the differences in accessibility, both between transport modes and between countries.

Table C.7 Impact on the Accessibility Problem Index for Road (EU25+2 average 2006 = 1)

		Scenarios				
		Reference	Maximum Road	Maximum Rail	Maximum	Balanced
	2006	2031	2031	2031	2031	2031
Bulgaria	1.251	1.142	1.015 *-11.1%*	1.145 *+0.3%*	1.017 *-10.9%*	1.134 *-0.7%*
Czech Republic	1.093	0.999	0.913 *-8.6%*	1.000 *+0.1%*	0.914 *-8.5%*	0.914 *-8.6%*
Estonia	1.331	1.228	1.188 *-3.3%*	1.225 *-0.2%*	1.186 *-3.4%*	1.188 *-3.3%*
Greece	1.145	1.083	1.026 *-5.3%*	1.085 *+0.2%*	1.028 *-5.1%*	1.027 *-5.2%*
Hungary	1.100	1.007	0.968 *-3.8%*	1.008 *+0.1%*	0.968 *-3.8%*	0.968 *-3.8%*
Latvia	1.201	1.082	1.078 *-0.4%*	1.081 *-0.1%*	1.078 *-0.4%*	1.081 *-0.1%*
Lithuania	1.234	1.109	1.104 *-0.5%*	1.110 *+0.1%*	1.106 *-0.3%*	1.105 *-0.4%*
Poland	1.261	1.151	1.047 *-9.8%*	1.150 *-0.1%*	1.046 *-9.1%*	1.046 *-9.2%*
Portugal	0.917	0.879	0.865 *-1.6%*	0.880 *0.1%*	0.865 *-1.6%*	0.870 *-1.0%*
Romania	1.622	1.501	1.263 *-15.8%*	1,503 *+0.1%*	1.264 *-15.8%*	1.317 *-12.3%*
Slovakia	1.213	1.101	1.059 *-3.8%*	1.102 *0.0%*	1.060 *-3.7%*	1.041 *--5.4%*
Slovenia	0.944	0.865	0.843 *-2.5%*	0.865 *0.0%*	0.843 *-2.5%*	0.848 *-2.0%*
Spain	0.878	0.850	0.841 *-0.1%*	0.851 *+0.1%*	0.842 *-0.9%*	0.844 *-0.7%*

Table C.8 Impact on Accessibility Problem Index for Rail (EU25+2 average 2006 = 1)

		Scenarios				
		Reference	Maximum Road	Maximum Rail	Maximum	Balanced
	2006	2031	2031	2031	2031	2031
Bulgaria	1.378	1.275	1.268 *-0.5%*	1.021 *-19.9%*	1.016 *-20.3%*	1.257 *-1.4%*
Czech Republic	1.357	1.275	1.272 *-0.2%*	1.115 *-12.5%*	1.112 *-12.8%*	1.087 *-14.8%*
Estonia	1.418	1.363	1.364 *+0.1%*	1.149 *-15.7%*	1.150 *-15.6%*	1.364 *+0.1%*
Greece	1.370	1.324	1.324 *0.0%*	1.116 *-15.7%*	1.115 *-15.8%*	1.121 *-15.3%*
Hungary	1.460	1.375	1.373 *-0.1%*	1.165 *-15.3%*	1.164 *-15.3%*	1.164 *-15.3%*
Latvia	1.423	1.366	1.366 *0.0%*	1.011 *-26.0%*	1.011 *-26.0%*	1.059 *-22.5%*
Lithuania	1.592	1.543	1.542 *-0.1%*	0.984 *-36.2%*	0.964 *-36.2%*	1.005 *-34.9%*
Poland	1.311	1.230	1.226 *-0.3%*	1.104 *-10.2%*	1.101 *-10.5%*	1.138 *-7.5%*
Portugal	1.959	1.870	1.869 *-0.1%*	0.860 *-54.0%*	0.858 *-54.1%*	1.133 *-39.4%*
Romania	1.899	1.813	1.803 *-0.6%*	1.442 *-20.5%*	1.433 *-20.9%*	1.564 *-13.7%*
Slovakia	1.498	1.406	1.402 *-0.3%*	1.346 *-4.3%*	1.343 *-4.5%*	1.341 *-4.6%*
Slovenia	1.117	1.062	1.059 *-0.3%*	1.060 *-0.2%*	1.057 *-0.5%*	1.058 *-0.4%*
Spain	0.755	0.728	0.727 *-0.1%*	0.679 *-6.7%*	0.678 *-6.8%*	0.693 *-4.8%*

European impacts

Finally the results of six European scenarios are presented in which the transport projects of all fifteen countries are combined. The first five scenarios are the combination of the five scenarios simulated for each country:

- the **Reference** Scenario
- the **Maximum Road** Scenario
- the **Maximum Rail** Scenario
- the **Maximum** Scenario
- the **Balanced** Scenario

A sixth scenario is a variant of the Balanced Scenario in which it is assumed that also the northern section of the Rail Baltica will be completed by the end of the funding period 2007-2013. In the Balanced Scenarios of Estonia, Latvia and Lithuania it is assumed that the Rail Baltica will be implemented only between Warsaw and Kaunas in that period, whereas the remaining sections between Kaunas and Riga and between Riga and Tallinn will be left for later implementation. The variant Balanced Scenario is called **Rail Baltica** Scenario.

The same set of indicators as for the analysis by country were used, except the two primacy indicators which by definition can only be applied at the national scale:

- *Competitiveness*: GDP per capita and average speeds of interregional road and rail trips,
- *Territorial cohesion*: Gini-coefficient of distribution of accessibility and GDP per capita among the European regions,
- *Sustainability*: the share of rail in interregional passenger trips.

Table C.9 Strategic objectives and related indicators

Objective	Indicator	Level
Economic competitiveness	Average speed of interregional road trips (kph)	European, regional average
	Average speed of interregional rail trips (kph)	European, regional average
	GDP per capita (Euro)	European, regional average
Territorial cohesion	Gini coefficient[58] of accessibility (0-100)	European
	Gini coefficient of GDP per capita (0-100)	European
Environmental sustainability	Share of interregional rail trips (%)	European, regional average

[58] The Gini coefficient is a measure which represents the deviation from a fully egalitarian distribution of indicator values between regions (i.e. equal indicator values in all regions).

Overall Impacts

Table C.10 presents the impacts of the proposed priority transport investments on the above indicators for EU25, i.e. for the present European Union and the two accession countries Bulgaria and Romania.

For each indicator the table shows the value of the indicator in 2006 and the indicator values of the six European scenarios in 2031. The numbers in italics are the differences between the indicator values of the policy scenarios compared with those of the Reference Scenario in 2031 in percent.

Table C.10 Strategic objectives and related European indicators, EU25+2

Objective	Indicator		Scenario					
			Refer-ence	Maxi-mum Road	Maxi-mum Rail	Maxi-mum	Bal-anced	Rail Baltica
		2006	2031	2031	2031	2031	2031	2031
Economic competitive-ness	Average speed of inter-regional road trips (kph)	42.9	43.7	45.2 *+3.4%*	43.7 *0.0%*	45.2 *+3.4%*	44.9 *+2.6%*	44.9 *+2.6%*
	Average speed of inter-regional rail trips (kph)	27.8	28.1	28.1 *0.0%*	29.6 *+5.4%*	29.6 *+5.4%*	29.1 *+3.6%*	29.2 *+3.8%*
	GDP per capita (Euro)	22,965	38,733	38,787 *+0.1%*	38,801 *+0.2%*	38,854 *+0.3%*	38,831 *+0.3%*	38,835 *+0.3%*
Territorial cohesion	Gini coefficient of accessibility (0-1)	22.0	21.3	21.1 *-1.1%*	21.1 *-1.0%*	20.9 *-2.0%*	21.1 *-1.0%*	21.1 *-1.1%*
	Gini coefficient of GDP per capita (0-100)	35.0	32.2	32.1 *-0.1%*	32.1 *-0.1%*	32.1 *-0.3%*	32.1 *-0.2%*	32.1 *-0.2%*
Environmental sustainability	Share of interregional rail trips (%)	29.9	29.9	28.9 *-3.1%*	32.2 *+7.6%*	31.1 *+4.0%*	30.6 *+2.3%*	30.6 *+2.5%*

As was to be expected, the results for the whole of Europe show less variation between the scenarios than the country results presented in the previous section as the fifteen CF15 countries are only a relative small part of Europe. Table 4.15 indicates that the economic impacts of the scenarios on the whole of Europe are nevertheless significant. The transport improvements of the policy scenarios increase the average income in Europe by up to 120 Euro per capita per year in the year 2030 (0.3 percent) in the Maximum scenario. This effect is due to both road investments (45% increase in the Maximum scenario) and rail (55%) investments. The improvements in rail speed are larger than those of road speed. Average interregional road speed increases by up to 3.4 percent, while average rail speed increases by 5.4 percent

The impacts on the cohesion indicators, which reflect the impact on the spatial structure of Europe, are small. Both the Gini coefficient of accessibility and of GDP per capita show a slight convergence effect (equally due to road and rail projects). Although convergence occurs, the accelerated growth effect on GDP per capita in the CF15 countries in relation to the other EU countries is modest. Apparently transport investments alone are not sufficient to overcome the income gap.

The environmental effects of the policy scenarios in terms of increased rail share are significant. If only rail projects were implemented as in the Maximum Rail Scenario, rail use would increase by almost eight percent. If also the planned road projects are implemented as in the Maximum and Balanced Scenarios, this effect is reduced by the growth in road travel.

Tables C.11 and C.12 show the same indicators for EU15 and the new member states and accession countries (NMAC) separately.

Table C.11 Strategic objectives and related European indicators, EU15

Objective	Indicator		Scenario					
			Refer-Ence	Maxi-mum Road	Maxi-mum Rail	Maxi-mum	Bal-anced	Rail Baltica
		2006	2031	2031	2031	2031	2031	2031
Economic competitive-ness	Average speed of inter-regional road trips (kph)	45.9	46.2	46.5 *+0.7%*	46.2 *0.0%*	46.5 *+0.7%*	46.5 *+0.7%*	46.5 *+0.7%*
	Average speed of inter-regional rail trips (kph)	29.9	30.1	30.1 *0.0%*	31.0 *+3.1%*	31.0 *+3.1%*	30.7 *+2.0%*	30.7 *+2.1%*
	GDP per capita (Euro)	27,944	45,316	45,363 *+0.1%*	45,382 *+0.1%*	45,428 *+0.2%*	45,405 *+0.2%*	45,409 *+0.2%*
Territorial cohesion	Gini coefficient of accessibility (0-1)	22.8	22.6	22.6 *-0.1%*	22.5 *-0.4%*	22.5 *-0.5%*	22.6 *-0.1%*	22.5 *-0.1%*
	Gini coefficient of GDP per capita (0-100)	23.2	23.5	23.5 *-0.0%*	23.5 *-0.1%*	23.5 *-0.1%*	23.5 *-0.1%*	23.5 *-0.0%*
Environmental sustainability	Share of interregional rail trips (%)	30.9	31.1	30.9 *-0.6%*	32.2 *+3.6%*	32.0 *+2.9%*	31.7 *+1.9%*	31.7 *+1.9%*

Table C.12 Strategic objectives and related European indicators, NMAC (new member states and accession countries)

Objective	Indicator		Scenario					
			Refer-Ence	Maxi-mum Road	Maxi-mum Rail	Maxi-mum	Bal-anced	Rail Baltica
		2006	2031	2031	2031	2031	2031	2031
Economic competitive-ness	Average speed of inter-regional road trips (kph)	35.3	36.6	41.0 *+11.9%*	36.6 *0.0%*	41.0 *+11.9%*	39.9 *+8.9%*	39.9 *+8.9%*
	Average speed of inter-regional rail trips (kph)	22.6	22.7	22.7 *0.0%*	25.5 *+12.4%*	25.5 *+12.4%*	24.6 *+8.4%*	24.7 *+8.9%*
	GDP per capita (Euro)	4,551	11,078	11,164 *+0.8%*	11,155 *+0.7%*	11,239 *+1.5%*	11,215 *+1.2%*	11,219 *+1.3%*
Territorial cohesion	Gini coefficient of accessibility (0-1)	15.7	13.9	13.2 *-5.5%*	13.6 *-2.4%*	12.9 *-7.6%*	13.6 *-2.6%*	13.5 *-2.9%*
	Gini coefficient of GDP per capita (0-100)	36.2	36.0	35.9 *-0.3%*	35.9 *-0.3%*	35.8 *-0.5%*	35.9 *-0.3%*	35.9 *-0.3%*
Environmental sustainability	Share of interregional rail trips (%)	26.1	24.8	20.7 *-16.6%*	31.9 *+28.7%*	27.1 *+9.5%*	25.8 *+4.2%*	26.1 *+5.5%*

Tables C.11 and C.12 confirm that, as was to be expected, the results for the new member states and accession countries differ much more between the scenarios, whereas the old

member states are only little affected – through cross-border effects and because the CF15 countries Spain and Portugal belong to the old member states.

In the new member states and accession countries GDP per capita increases through the transport projects by up to 160 Euro per capita per day, or 1.4 percent, in 2030, which is in both relative and absolute terms more than in the old member states. However, it has to be considered that the investment scenarios examined here include only projects in the CF15 countries (plus a few cross-border connections in neighbouring countries).

Despite this reservation the improvements in both the road and the rail systems of the new member states and accession countries are impressive. Average interregional road and rail speeds increase by up to twelve percent in the Maximum Scenario and still by eight percent in the Balanced Scenario and by nine percent in the Rail Baltica Scenario.

This results in substantial equalisation of the existing disparities in accessibility, as the significant reductions in the Gini coefficient for accessibility shows. As to be expected, this translates in much smaller reductions in the Gini coefficient for GDP per capita, though the convergence effect is still significant.

The sustainability effect of the planned projects could be very significant. If only the envisaged rail projects were implemented as in the Maximum Rail Scenario, rail use for interregional trips originating in the new member states and accession countries would increase by almost thirty percent. However, this effect is much reduced when as in the Maximum and Balanced Scenarios also the planned road projects are implemented. However, in all scenarios (except of course the Maximum Road Scenario) rail use increases – a challenge for the rail companies in these countries because also the total volume of travel is certain to increase.

Figures C.3 to C.18 show the spatial distribution of the indicators of Tables 4.15 to 4.17 in map form.

Figures C.3 and C.4 show population regional density and GDP per capita at the end of the simulation period in 2031 using the same colour scale and legend range as the maps of the present situation in Figures 2.3 and 2.4 in Section 2.8. While there is little change in the distribution of population, the economic landscape of Europe has changed significantly. All regions have become richer: Average GDP per capita in the whole of Europe has increased by about 30 percent, but in the new member states and accession countries by about 150 percent (NB in absolute terms the inhabitants in the old member states have gained more than twice as much than the residents of the new member states).

Figure C.5 and C.6 visualise the spatial distribution of these economic gains. Not surprisingly, the economic gains are concentrated in the CF15F countries: Portugal and Spain in the old member states and in all of the new member states and accession countries. The general patterns of the Maximum and Balanced Scenarios differ not very much but, the economic effects of the Balanced Scenario are slightly smaller, in particular in Bulgaria, Estonia, Portugal and Romania. This is logical as the Balanced scenario contains more projects than the Maximum Scenario.

Figure C.3 Population density (population/sqkm), Reference Scenario, 2031

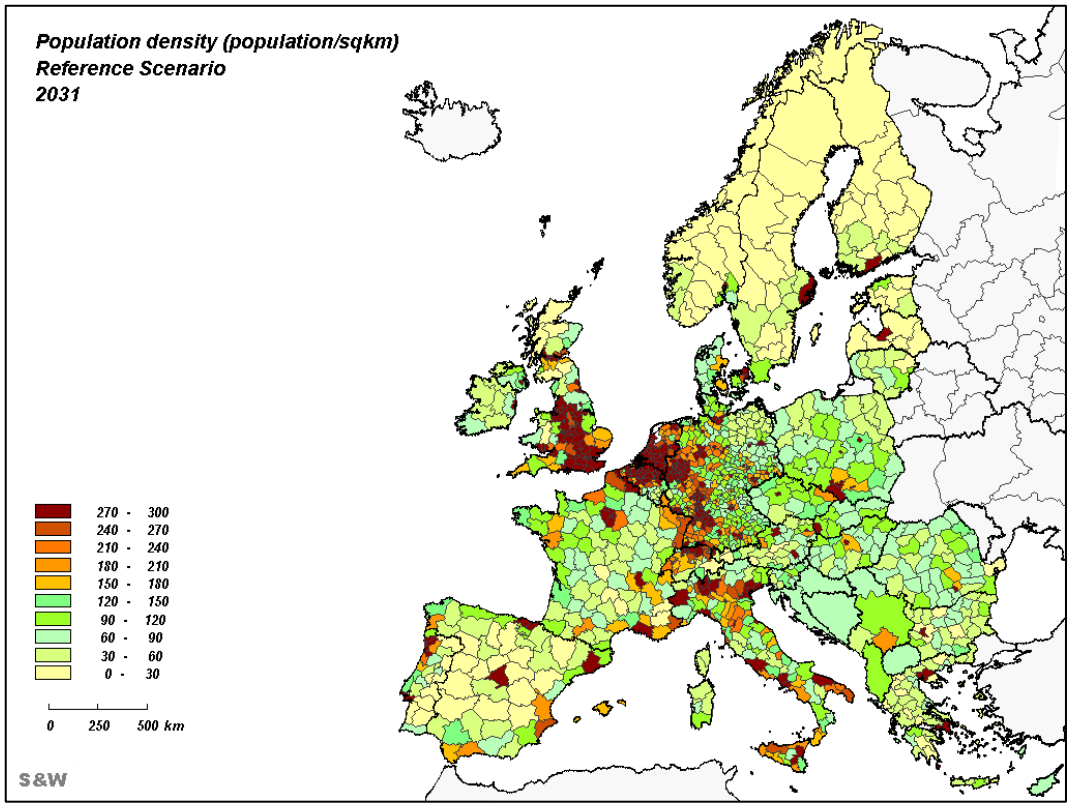


Figure C.4 GDP per capita (in 1,000 Euro 2005), Reference Scenario, 2031

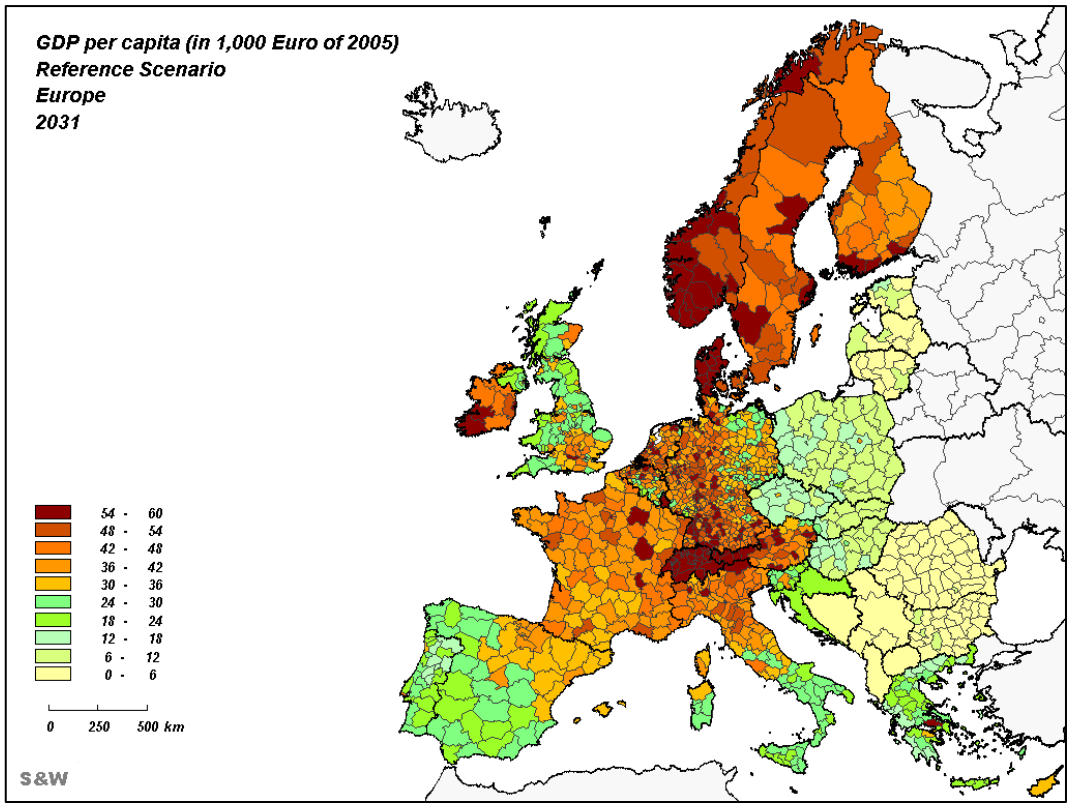
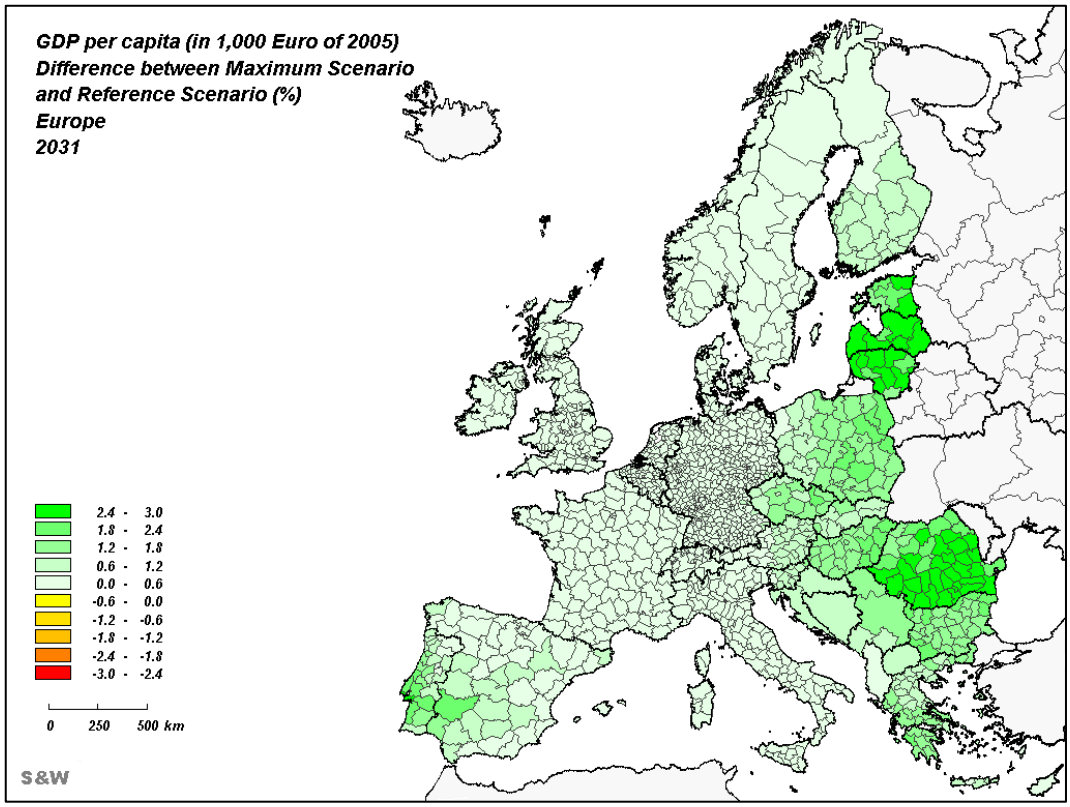


Figure C.5 Impact on GDP per capita, Maximum Scenario, 2031



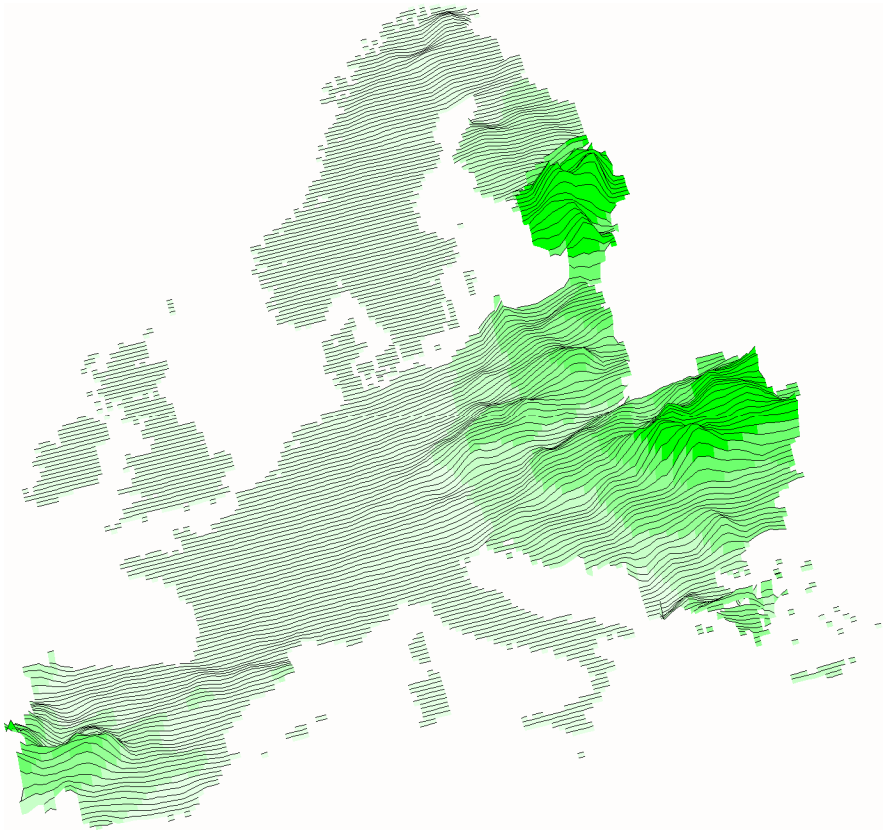
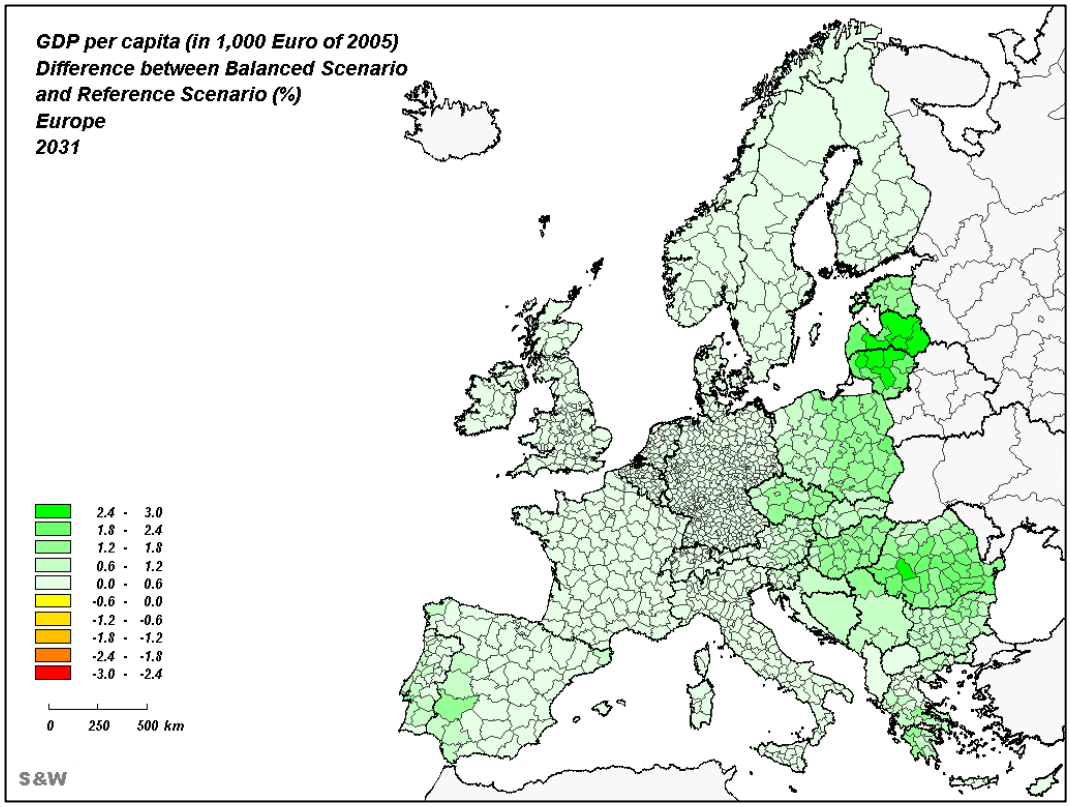
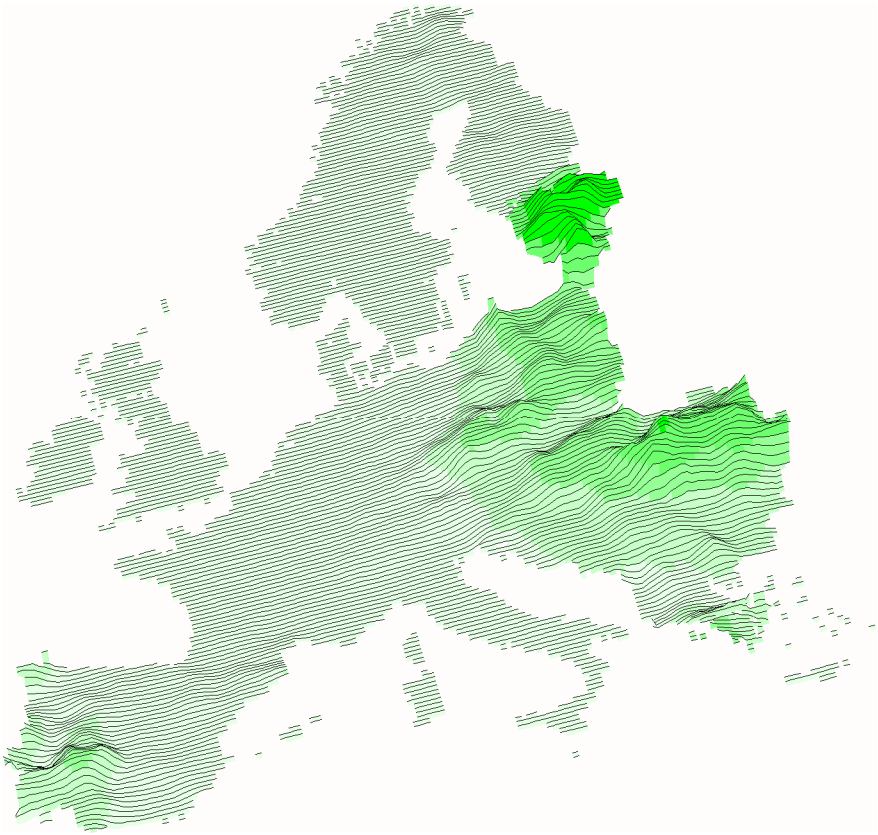


Figure C.6 Impact on GDP per capita, Balanced Scenario, 2031





Figures C.7 to C.9 show the impacts of the examined transport projects on sustainability, expressed by the share of interregional rail trips.

Figure C.7 shows the spatial distribution of the share of interregional trail trips in the Reference Scenario in the year 2031 with the same colour scale and legend range as Figure 2.7 in Section 2.8. The pattern appears very similar, but if one looks at details one can see that in the new member states and accession countries rail use in general declines, whereas in the old member states rail use increases.

Figure C.8 and C.9 show the combined impacts of the road and rail projects in the Maximum and Balanced Scenarios on the share of interregional rail trips. The colour scale of the maps resembles that of a traffic light: Red and yellow shades indicate further losses of rail passengers, green shades indicate a growth in rail use. As it was noted in Section 2.8, the share of rail trips is an expression of the competition between road and rail, so red and yellow shades can indicate a lack of rail development or a growth in road construction, and green shades can indicate slow road construction or rapid rail development. There are clearly some countries in which rail use is growing, such as Portugal, the Baltic states, the Czech Republic, Slovakia, Hungary and Greece, and other countries in which rail use decrease, due to (sometimes strong) improvements of the road network, such as in large parts of Poland, the eastern part of Slovakia and most of Romania.

Figure C.7 Sustainability of transport (share of interregional rail trips), Reference Scenario, 2031

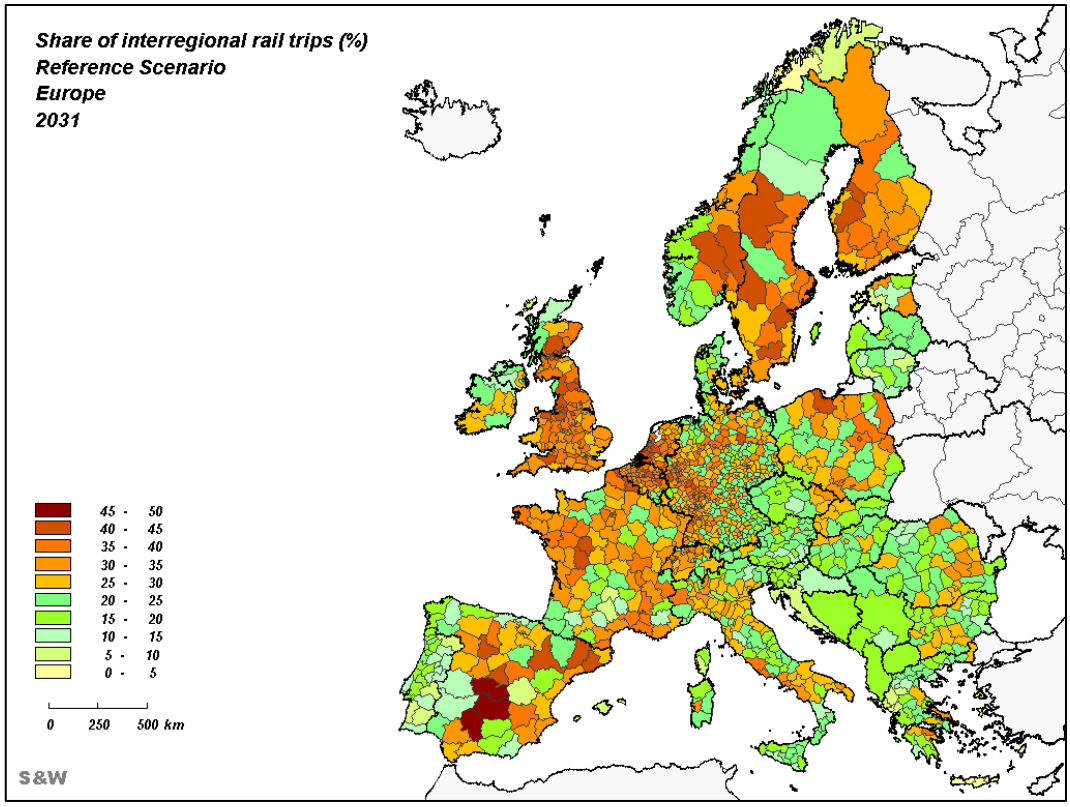


Figure C.8 Impact on sustainability of transport (share of interregional rail trips), Maximum Scenario, 2031

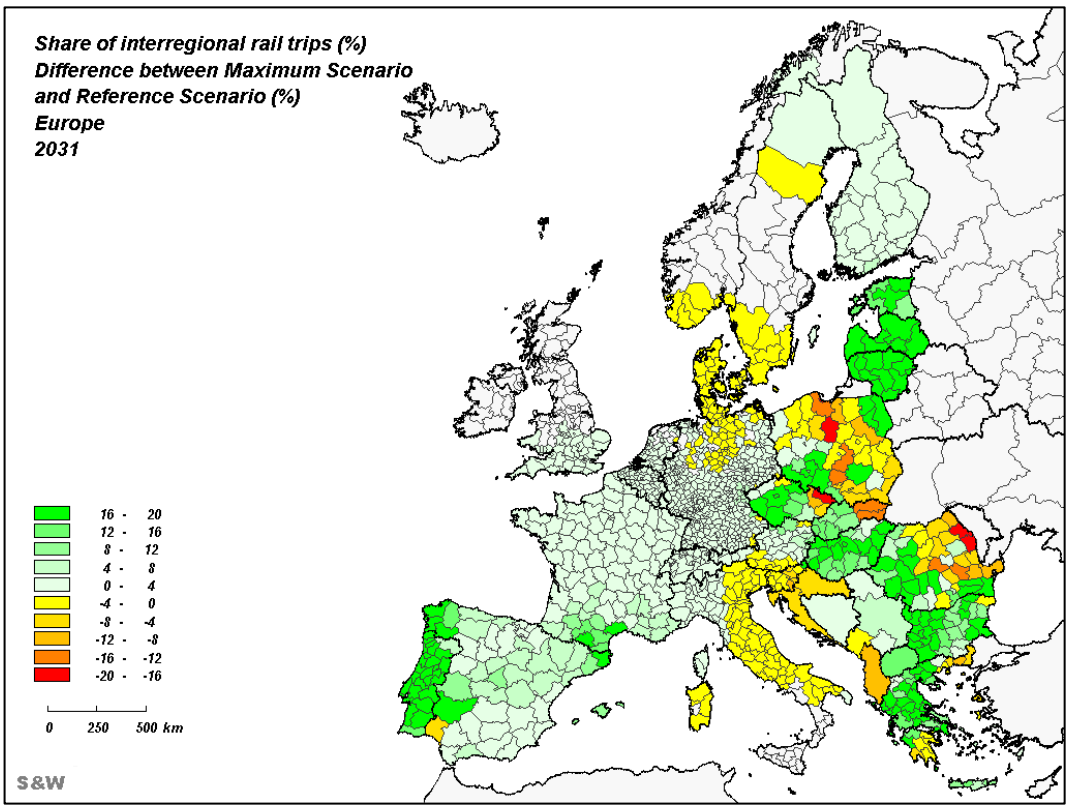
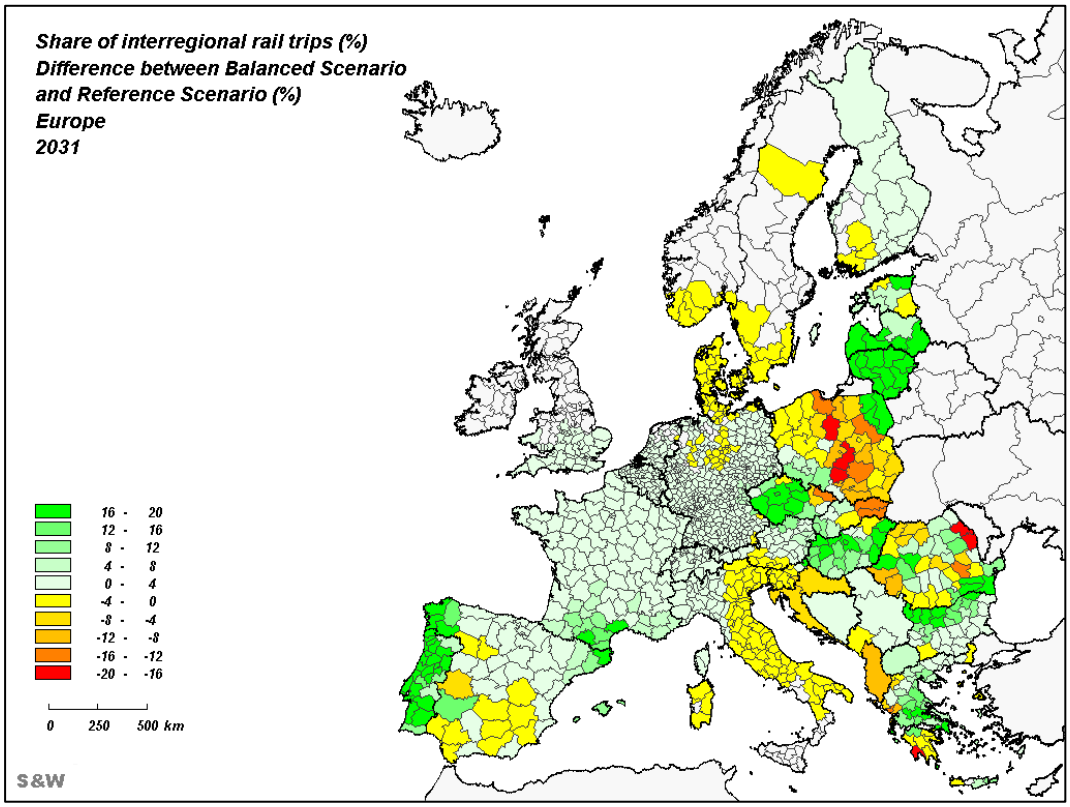


Figure C.9 Impact on sustainability of transport (share of interregional rail trips), Balanced Scenario, 2031



Figures C.10 to C.15 show the impacts of the policy scenarios on the Accessibility Problem Index for road and rail. The colour scale of the maps resembles that of a traffic light: green shades indicate average regional travel speeds above the European average, yellow values speeds slightly above the European average and red shades speeds significantly lower than the European average. The European average is defined as the average of the European Union and the two accession countries Bulgaria and Romania in the year 2006 in order to show improvements in accessibility over time

Figures C.10 and C.11 present the two indices in the Reference Scenario in the year 2030 using the same colour scale and legend range as the maps showing the present situation in Figures 2.5 and 2.6 in Section 2.8. The comparison shows that most regions in both the old and new member states have improved in both road and rail accessibility, although in the Reference Scenario no transport infrastructure projects completed after 2007 are assumed. The reason for these improvements are the effects of further European integration, including the accession of Bulgaria and Romania to the EU, leading to reduced border waiting times and other barriers between countries. Despite these improvements, large parts of the new member states, in particular in eastern Poland and Romania, remain below the European average in road accessibility. The situation is even worse with respect to rail accessibility, which without infrastructure improvements remains substandard in all new member states except north-western Poland, and the western part of Slovenia, and even in the old member state Portugal.

Figures C.12 and C.13 show the improvement of the Accessibility Problem Index for road and rail in the Maximum Scenario and Figures C.14 and C.15 in the Balanced Scenario. In particular in the Maximum Scenario the improvements in road accessibility are impressive (Figure C.12). Large parts of Slovenia, Hungary, the Czech Republic and western Poland are now better than the European average. Significant progress is also made in rail accessibility (Figure C.13), although the yellow, orange and red shades still dominate in most parts of the new member states.

The results for the Balanced Scenario are nearly identical for road accessibility (Figure C.14) as the reductions in projects mostly affect rail projects. Accordingly, there are more regions with orange and red shades remaining in Figure C.15.

Figure C.10 Accessibility Problem Index Road (European perspective), Reference Scenario, 2031

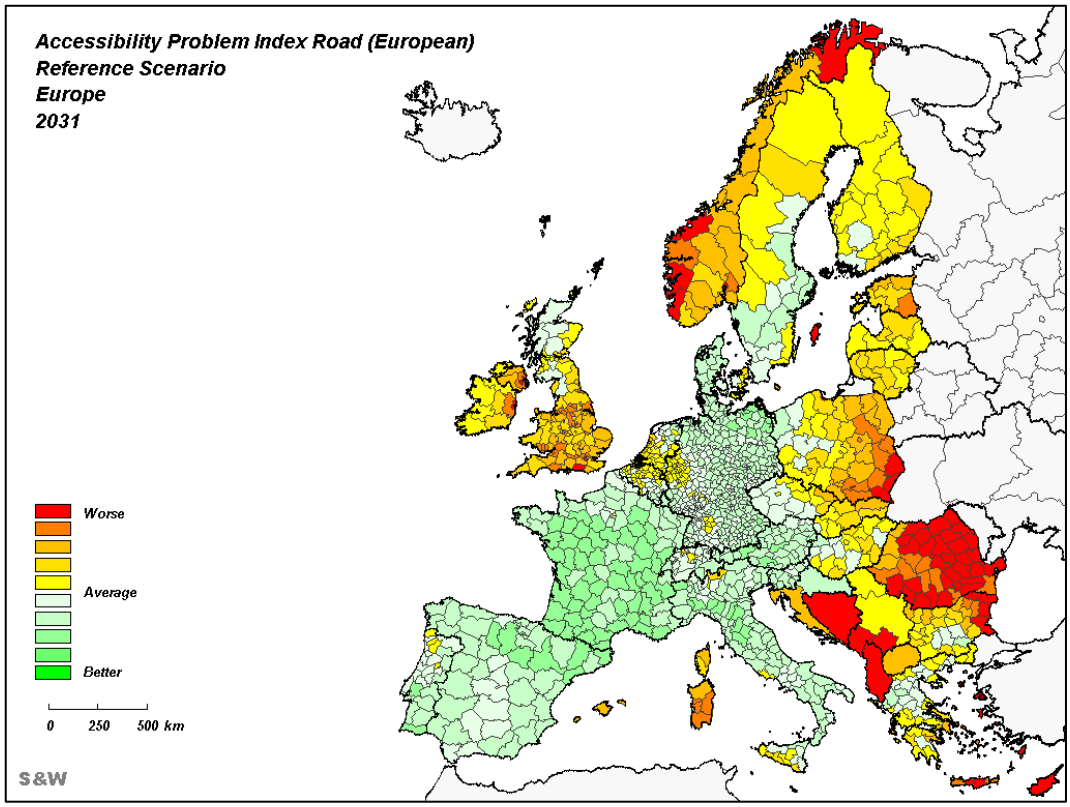


Figure C.11 Accessibility Problem Index Rail (European perspective), Reference Scenario, 2031

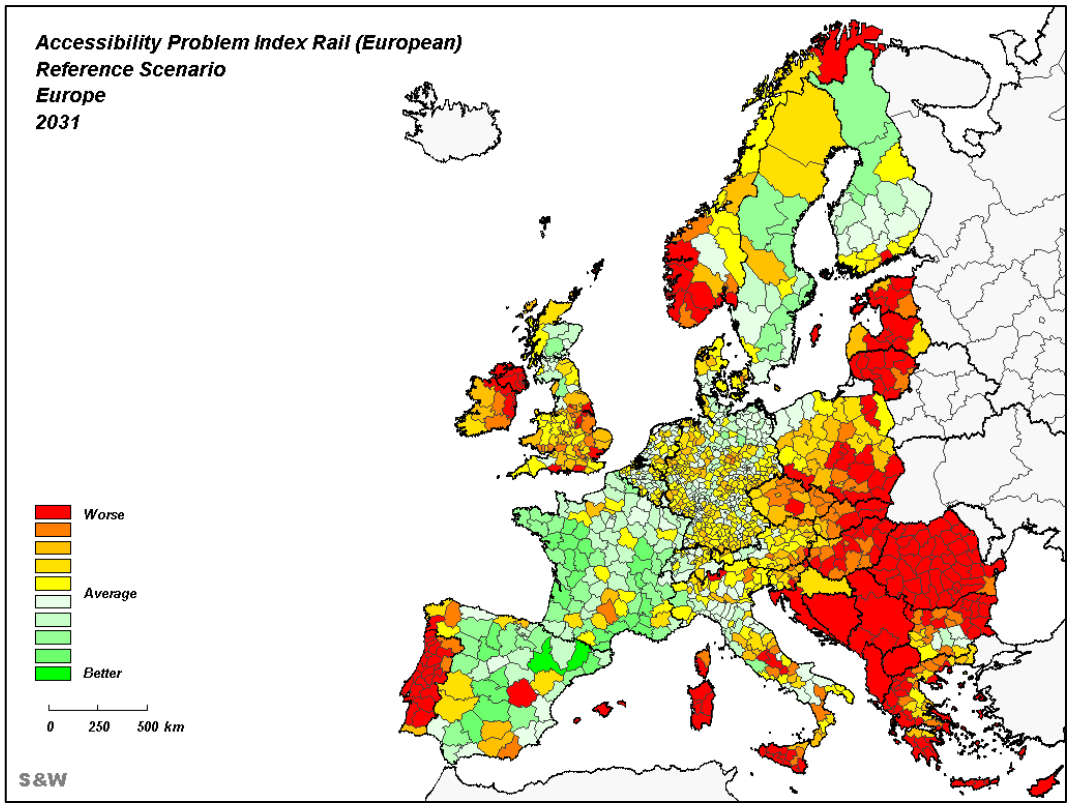


Figure C.12 Accessibility Problem Index Road (European perspective), Maximum Scenario, 2031

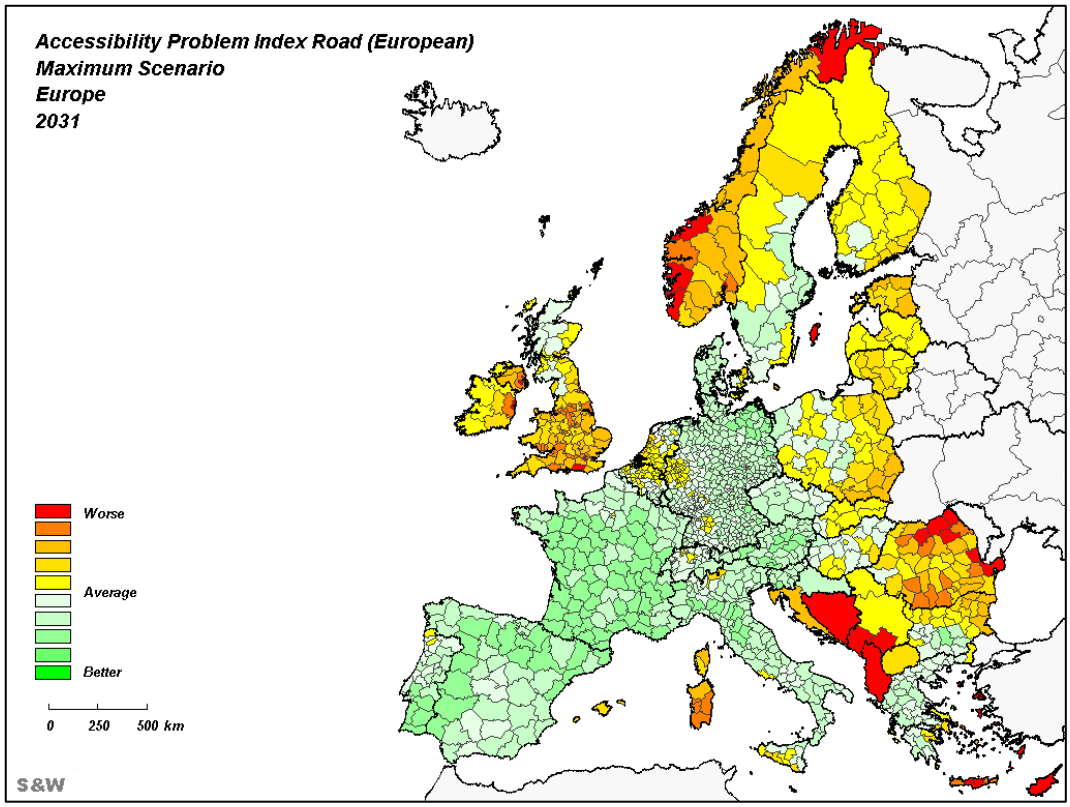


Figure C.13 Accessibility Problem Index Rail (European perspective), Maximum Scenario, 2031

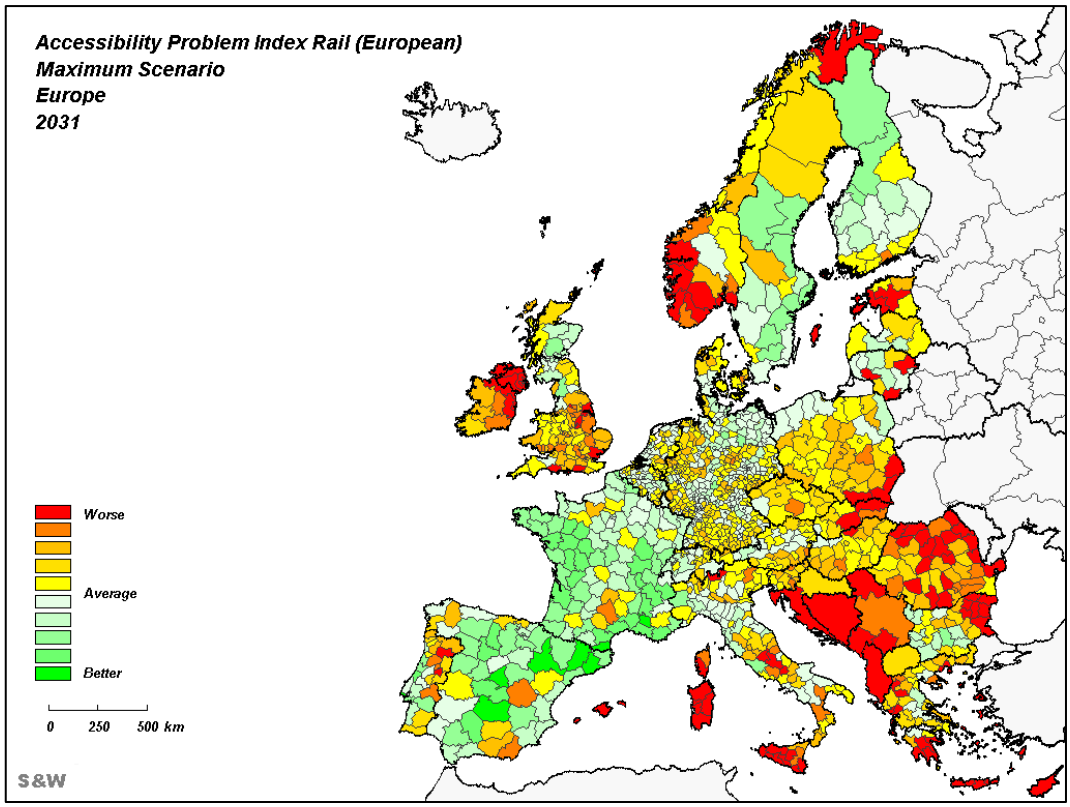


Figure C.14 Accessibility Problem Index Road (European perspective), Balanced Scenario, 2031

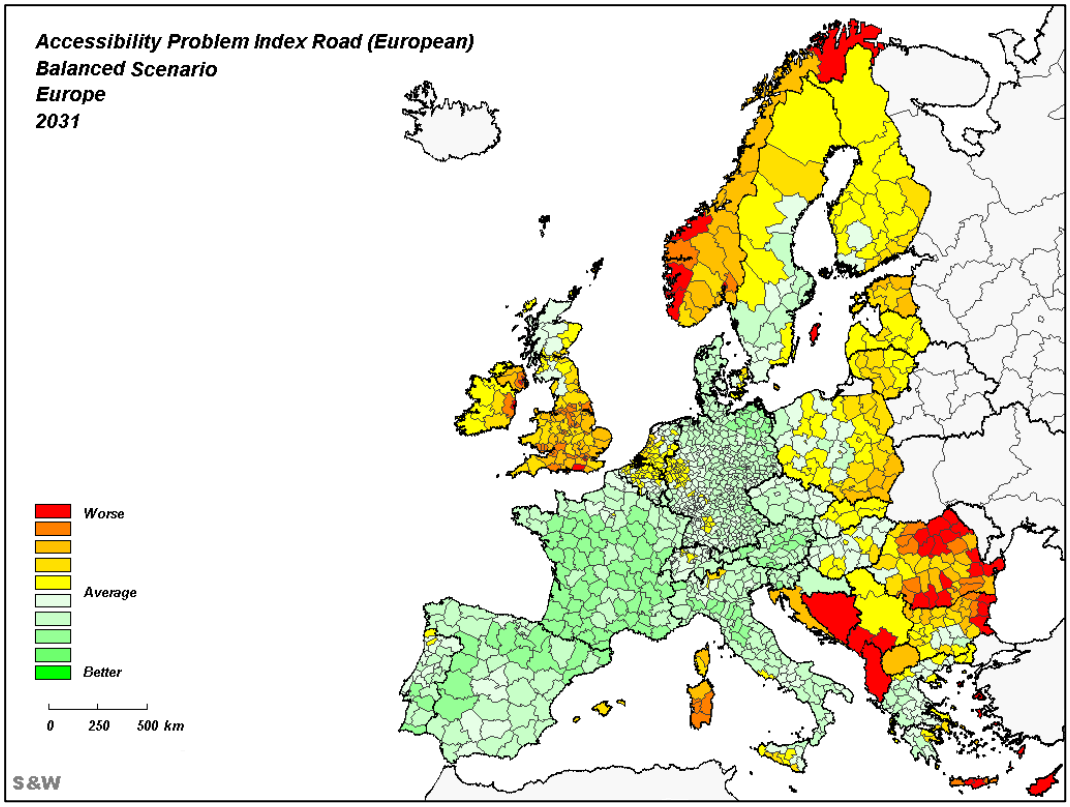


Figure C.15 Accessibility Problem Index Rail (European perspective), Balanced Scenario, 2031

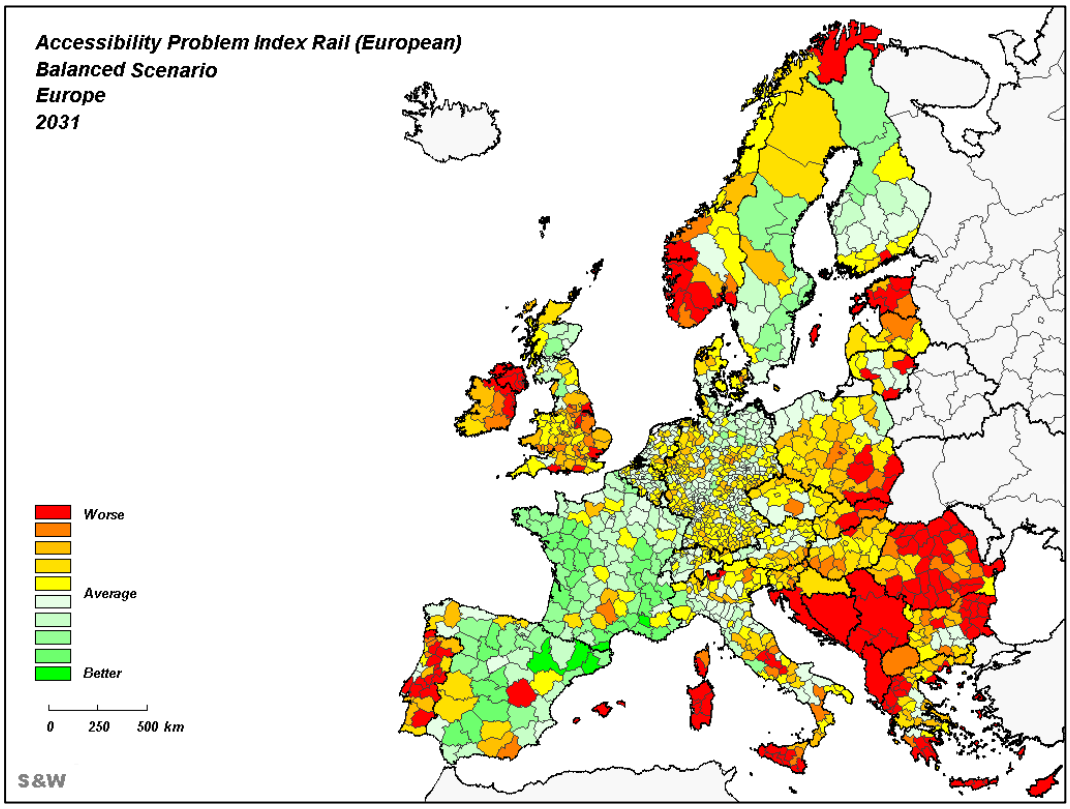


Table C.13 summarises the effects of the five policy scenarios on the Accessibility Problem Index for EU25+2, EU15 and the new member states and accession countries (NMAC). The index values are standardised in a way that the Accessibility Problem Index of EU25+2 in the year 2006 is defined as being 1; and all other index values expressed relative to that standard. Index values above 1 indicate accessibility problems, whereas index values below 1 indicate above average performance.

Table C.13 Accessibility Problem Index, EU25+2, EU 15 and NMAC (new member states and accession countries)

Level	Mode		Scenario					
			Refer-ence	Maxi-mum Road	Maxi-mum Rail	Maxi-mum	Bal-anced	Rail Baltica
		2006	2031	2031	2031	2031	2031	2031
EU25+2	Road	1.000	0.957	0.930 *-2.8%*	0.955 *-0.2%*	0.930 *-2.8%*	0.935 *-2.3%*	0.934 *-2.4%*
	Rail	1.000	0.955	0.947 *-0.8%*	0.907 *-5.0%*	0.901 *-5.7%*	0.920 *-3.7%*	0.919 *-3.8%*
EU15	Road	0.929	0.903	0.896 *-0.8%*	0.903 *0.0%*	0.897 *-0.7%*	0.898 *-0.6%*	0.898 *-0.6%*
	Rail	0.934	0.902	0.902 *0.0%*	0.871 *-3.4%*	0.870 *-3.5%*	0.883 *-2.1%*	0.883 *-2.1%*
NMAC	Road	1.323	1.210	1.083 *-10.5%*	1.214 *+0.3%*	1.086 *-10.2%*	1.107 *-8.5%*	1.107 *-8.5%*
	Rail	1.410	1.326	1.314 *-0.9%*	1.104 *-16.7%*	1.095 *-17.4%*	1.156 *-12.8%*	1.144 *-13.7%*

The table confirms the findings of the maps. Already the Reference Scenario brings some improvement in accessibility through progress in European integration, although no new transport infrastructure is implemented. The average of the regions in the old member states is always below 1, i.e. has accessibility above the European average. The new member states start from very high problem values above one, i.e. their accessibility is severely substandard, in particular rail accessibility. Moreover, despite all the transport infrastructure investments considered in the scenarios, the average of the regional index values in the new member states remains above one, i.e. below the European average, in all scenarios, even in the Maximum Scenario.

Creating European synergies

A final question is whether spatial impacts of the transport projects in the different countries reinforce each other, i.e. develop synergies. Synergies exist if the total effect of all projects combined is larger than the sum of the effects of the individual projects. Already in the analysis of the projects of individual countries cross-border effects have been identified (see Figures C.1 and C.2), although in the national analyses only few cross-border connections in neighbouring countries were considered. As in the European scenarios examined here *all* projects in *all CF15* countries (and selected cross-border connections to other countries) are considered, the national effects in the European scenarios should be larger than the national effects in the corresponding national scenarios. Whether this is the case, is examined in Table C.14.

Table C.14 European synergies: GDP per capita

		European Scenarios			National Scenarios		
		Reference	Maximum	Balanced	Reference	Maximum	Balanced
	2006[a]	2031	2031	2031	2031	2031	2031
Bulgaria	2,012	5,344	+88 *+1.6%*	+49 *+0.9%*	5,344	+35 *+0.6%*	+6 *+0.1%*
Cyprus	18,192	33,670	+10 *+0.0%*	+7 *+0.0%*	33,668	+2 *0.0%*	+2 *+0.0%*
Czech Republic	6,525	15,179	+182 *+1.2%*	+176 *+1.2%*	15,180	+101 *0.7%*	+107 *+0.7%*
Estonia	4,543	9,010	+194 *+2.2%*	+124 *+1.4%*	9,002	+154 *+1.7%*	+13 *+0.1%*
Greece	13,739	21,553	+223 *+1.0%*	+156 *+0.7%*	21,548	+87 *+0.4%*	+77 *+0.4%*
Hungary	6,263	14,914	+243 *+1.6%*	+211 *+1.4%*	14,906	+87 *+0.6%*	+86 *+0.6%*
Latvia	3,108	6,491	+176 *+2.7%*	+139 *+2.1%*	6,490	+114 *+1.8%*	+105 *+1.6%*
Lithuania	2,390	4,357	+119 *+2.7%*	+110 *+2.5%*	4,361	+82 *+1.9%*	+79 *+1.8%*
Malta	10,677	21,665	+86 *+0.4%*	+84 *+0.4%*	21,657	+68 *0.3%*	+68 *+0.3%*
Poland	5,158	14,007	+193 *+1.4%*	+172 *+1.2%*	14,003	+133 *+0.9%*	+118 +0.8%
Portugal	13,184	28,058	+559 *+2.0%*	+279 *+1.0%*	28,075	+444 *+1.6%*	+209 *+0.7%*
Romania	1,693	3,534	+91 *+2.6%*	+65 *+1.8%*	3,528	+61 *+1.7%*	+42 *+1.2%*
Slovakia	4,909	11,949	+140 *+1.2%*	+125 *+1.0%*	11,952	+26 *+0.2%*	+29 *+0.3%*
Slovenia	14,309	27,224	+218 *+0.8%*	+189 *+0.7%*	27,276	+36 *0.1%*	+31 *+0.1%*
Spain	30,914	30,923	+191 *+0.6%*	+138 *+0.4%*	30,914	+169 *+0.5%*	+107 +0.3%

a GDP values for 2006 are SASI model results based on 2001 data

Table C.14 compares the effects on GDP per capita in the Maximum and Balanced Scenarios of the European scenarios on the fifteen CF15 countries with those in the Maximum and Balanced Scenarios of the national scenarios. The comparison clearly confirms the synergy hypothesis. For all countries the effects in the European scenarios are much larger than those of the national scenarios. This result suggests that if also the transport projects in the other EU countries were considered, the economic effects would be even larger.

The Rail Baltica

Finally, the results of the sixth scenario, the Rail Baltica Scenario, will be briefly discussed. Figures C.16 and C.17 show the economic and environmental impacts of the northern Rail Baltica as difference in GDP per capita and share of interregional rail trips between the Rail Baltica and the Balanced Scenarios.

Figure C.16 Impact on GDP per capita, Rail Baltica Scenario v. Balanced Scenario (%), 2031

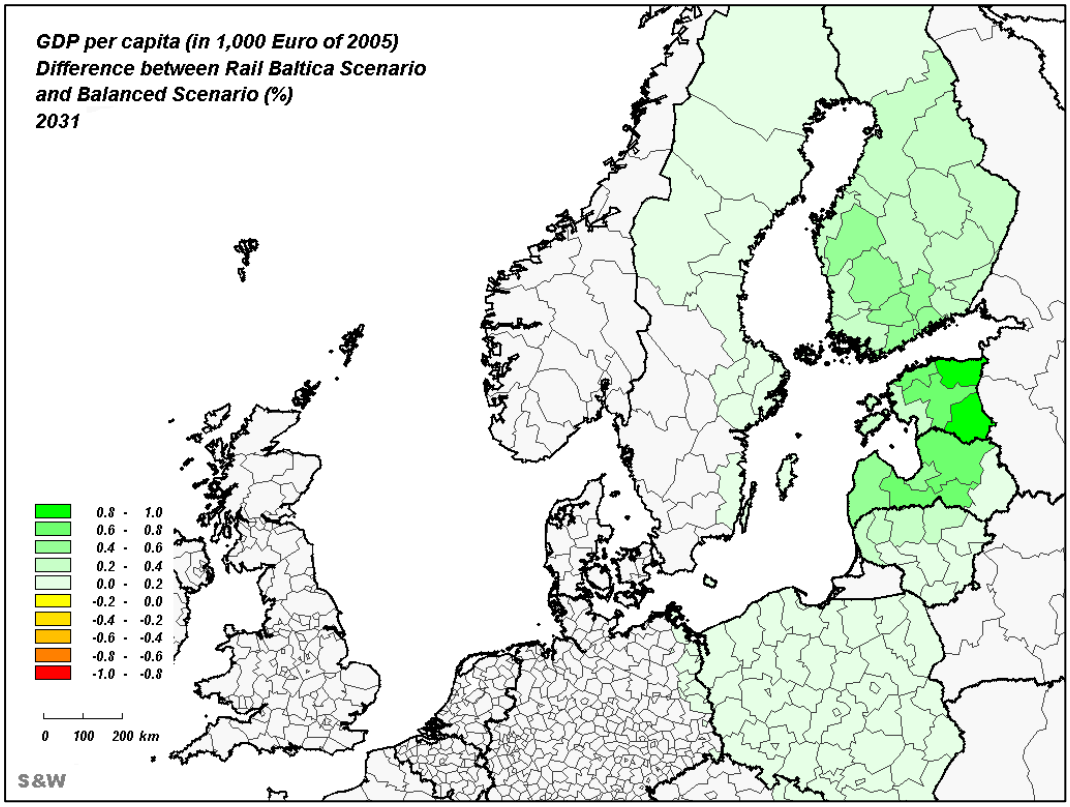
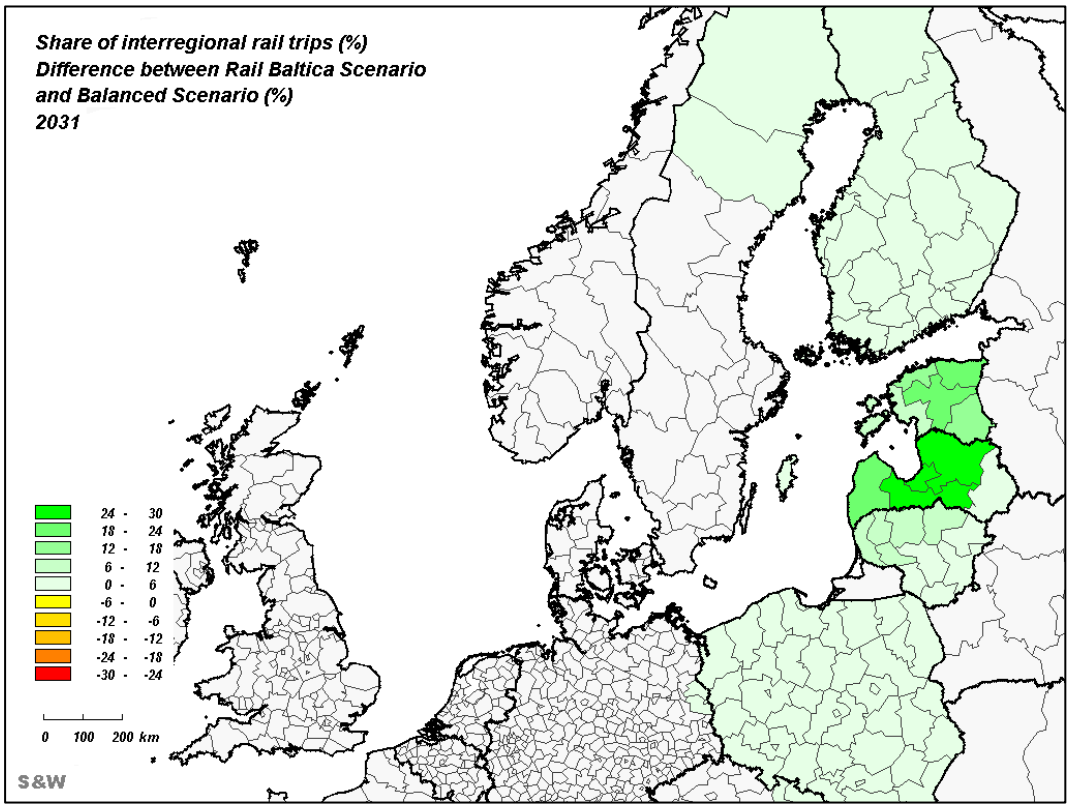


Figure C.17 Impact on share of interregional rail trips, Rail Baltica Scenario v. Balanced Scenario (%), 2031



The TEN priority project Rail Baltica proposes a revitalisation of the historical rail connection between Warsaw, Riga and Tallinn with a ferry extension to Helsinki. While the southern sections of the Rail Baltica between Warsaw and Kaunas (Lithuania) are included in the Balanced scenarios of Poland and Lithuania, the northern sections between Kaunas and Riga and between Riga and Tallinn are not part of the Balanced Scenarios of Latvia and Estonia. There also does not seem to be a strong interest in this northern extension by Lithuania, Latvia and Estonia. To assess the potential benefit of extending the Rail Baltica to the north beyond Kaunas already in the funding period 2007-2013, the Rail Baltica Scenario was simulated.

Figure C.16 clearly shows the significant additional economic effects of the northern extension of the Rail Baltica for the affected countries Latvia and Estonia and even for Finland. Figure C.17 indicates that the environmental impacts (increased share of rail transport) would be more concentrated on Latvia and Estonia, but would be substantial in particular for Latvia.

The results do suggest that the completion of the Rail Baltica north of Kaunas would merit careful consideration in the eventual transport schemes proposed by the Baltic States. They also call for a better co-ordination and co-operation between these countries, in which their common interests get sufficient priority.

Effects of pricing and transport cost increases

Introduction

As its name indicates, this study is concerned with the strategic evaluation of transport investment priorities, i.e. with transport infrastructure. However, there are many other fields in transport policy besides transport infrastructure investment. Interoperability and intermodality policies promote the integration of networks across countries and between modes. Regulation policies aim at opening transport markets and creating equal playing fields for operators and service providers. Demand management policies try to influence transport demand by taxation or other forms of transport pricing.

Regulation and pricing have in common that they both affect the cost of transport. The EU *White Paper* on European transport proposes to make transport users aware of the true costs of transport including the cost of environmental damage, accidents and time losses inflicted on others (through congestion). By marginal social cost pricing transport users are charged the full internal and external costs of each additional km travelled. Various forms of transport pricing, in particular of road transport, have been introduced in recent years in many European countries, such as tolls, fixed-fee subscriptions or distance-depending satellite charging systems on motorways and cordon charges in cities.

However, the costs of transport may also increase through exogenous developments that cannot be influenced by policy. Between 1970 and 2006 the price of crude oil on the world market has grown by a factor of seven in real terms. In the last two years it has almost doubled. In North America, this has resulted in petrol prices growing by 30 percent per year, in Germany, because of its high fuel tax, of about 4 percent per year. And some experts believe that, because of the ultimate depletion of oil resources, political

instability in the Middle East and growing energy demand by fast developing countries like China and India, energy will continue to become more expensive.

Higher transport cost means reduced access to suppliers and markets, more expensive products and less consumption and production and hence lower economic growth. As not all regions depend on transport in the same way, accessibility of some regions will decline less than in others, and this will induce shifts in location advantages and hence changed location decisions of firms and households. These changes may reduce or increase existing economic disparities between regions, i.e. affect territorial cohesion and polycentricity of individual countries or Europe as a whole. This is why transport pricing policies and energy prices are of potential interest for European regional policy.

In this section therefore, as a complement to the analysis of transport infrastructure investments in the study, the potential spatial impacts of transport pricing policies and fuel price increases will be discussed drawing on the results of two other EU-funded studies:

- the project ESPON 2.1.1 "Territorial Impacts of EU Transport and TEN Policies" (Bröcker et al., 2005) and
- the 6th RTD Framework project STEPs "Scenarios for the Transport System and Energy Supply and their Potential Effects" (Mónzon and Nuijten, 2006).

In the two projects the SASI model also used in this study was applied to forecast the impacts of transport pricing schemes and fuel price increases, respectively, on regional economic development, territorial cohesion and polycentricity for the same study region as in this study.

It should be noted that the pricing scenarios used in this evaluation do not fully reflect social marginal cost pricing on a European scale[59] and only some, but not all possible uses of revenues have been taken into account. In additional not the full welfare impact is considered as for example external impacts are not accounted for. As such it cannot be seen as an evaluation of a social marginal cost pricing policy.

ESPON 2.1.1: Transport pricing[60]

The objective of ESPON Project 2.1.1 "Territorial Impact of EU Transport and TEN Policies" was to show the influence of EU transport and telecommunications policies on spatial development and territorial cohesion in Europe (Bröcker et al., 2005). The SASI model was applied to a number of different scenarios of implementation of the TEN and TINA networks and of additional transport policies.

The prospective scenarios covered the period between 2001 and 2021 They comprised infrastructure policies, pricing policies and combinations of both. All scenarios were compared with a Reference Scenario in which the transport infrastructure of the year

[59] To include this in a proper way would require further differentiation of charges for example with regard to occurring congestions levels etc.. For more information on the impacts of charging reference is made to the ESPON 2.1.1 project.

[60] See Bröcker, J., Capello, R., Lundqvist, L., Meyer, L., Rouwendal, J., Schneekloth, N., Spairani, A., Spangenberg, M., Spiekermann, K., van Vuuren, D., Vickerman, R. Wegener, M. (2005): *Territorial Impact of EU Transport and TEN Policies*. Final Report of ESPON 2.1.1. Kiel: Institut für Regionalforschung, Christian-Albrechts-Universität Kiel, 2005. http://www.espon.eu/mmp/online/website/content/projects/ 243/239/file_374/ fr-2.1.1_revised.pdf.

2001 was frozen for future years. In the Reference Scenario only the reduction of border waiting times and political and social barriers through further European integration take place like in all scenarios.

Transport pricing scenarios

Here only the transport pricing scenarios are presented. Three pricing scenarios were defined to capture different ideas on transport pricing at a broad European level. All pricing scenarios are based on the Reference Scenario, i.e. no infrastructure development is assumed. The following scenarios were applied:

- Scenario C1 assumes a ten percent reduction of rail fares to achieve a better modal balance by subsidising environment-friendly alternatives to road transport.
- Scenario C2 reflects a pricing policy directed at an increase of all travel and goods transport costs for road transport with ten percent;
- Scenario C3 finally assumes that all transport modes do not yet apply full social marginal costs. A ten percent increase in travel and goods transport costs is applied to all modes road, rail and air.

The pricing policies are introduced into the SASI model as changes of transport costs between regions over time. These changes lead to changes of regional accessibility.

Not all indicators used in the present study were calculated in ESPON 2.1.1. To be as comparable as possible with the scenario results presented in the previous section, the following indicators were selected from the ESPON 2.1.1 results and recalculated in the same form as in Tables C.10 to C.12:

Table C.15 ESPON 2.1.1: Strategic objectives and related indicators

Objective	Indicator	Level
Economic competitiveness	Accessibility road/rail	European, regional average
	GDP per capita (Euro)	European, regional average
Territorial cohesion	Gini coefficient of accessibility (0-100)	European
	Gini coefficient of GDP per capita (0-100)	European

Tables C.16 to C.18 show these indicators compared with the Reference Scenario for EU25 (the present European Union and the accession countries Bulgaria and Romania), EU15 (the old member states) and NMAC (the new member states and the accession countries) as in Tables C.10 to C.12 for the three transport cost scenarios of ESPON 2.1.1, C1, C2 and C3.

Table C.16 ESPON 2.1.1: Strategic objectives and related European indicators, EU25+2

Objective	Indicator		Scenario			
			Refer-ence	C1 Lower rail fares	C2 Road pricing	C3 SMCP all modes
		2006[61]	2021	2021	2021	2021
Economic competitive-ness	Accessibility road/rail	60.6	61.4	63.1 *+2.9%*	60.2 *-1.9%*	58.6 -4.5%
	GDP per capita (Euro)	24.180	35.493	35,670 *+0.5%*	35,346 *-0.4%*	34,994 *-1.4%*
Territorial cohesion	Gini coefficient of accessibility (0-1)	20.2	19.8	19.6 *-1.1%*	20.1 *+1.4%*	20.4 *+3.0%*
	Gini coefficient of GDP per capita (0-100)	33.1	32.3	32.4 *+0.1%*	32.3 *-0.1%*	32.3 *-0.0%*

Table C.17 ESPON 2.1.1: Strategic objectives and related European indicators, EU15

Objective	Indicator		Scenario			
			Refer-ence	C1 Lower rail fares	C2 Road pricing	C3 SMCP all modes
		2006	2021	2021	2021	2021
Economic competitive-ness	Accessibility road/rail	62.3	62.6	64.6 *+3.1%*	61.4 *-2.0%*	59.6 -4.8%
	GDP per capita (Euro)	28,930	41,972	41,187 *+0.5%*	41,798 *-0.4%*	41,374 *-1.4%*
Territorial cohesion	Gini coefficient of accessibility (0-1)	20.8	20.7	20.4 *-1.5%*	21.0 *+1.3%*	21.4 *+3.4%*
	Gini coefficient of GDP per capita (0-100)	22.7	22.5	22.5 *+0.1%*	22.5 *-0.1%*	22.5 *+0.0%*

Table C.18 ESPON 2.1.1: Strategic objectives and related European indicators, NMAC

Objective	Indicator		Scenario			
			Refer-ence	C1 Lower rail fares	C2 Road pricing	C3 SMCP all modes
		2006	2021	2021	2021	2021
Economic competitive-ness	Accessibility road/rail	54.3	56.3	57.3 *+1.7%*	55.5 *-1.4%*	54.6 -3.0%
	GDP per capita (Euro)	6,041	8,926	8,950 *+0.3%*	8,894 *-0.4%*	8,835 *-1.0%*
Territorial cohesion	Gini coefficient of accessibility (0-1)	14.9	13.5	13.5 *+0.2%*	13.7 *+1.3%*	13.7 *+1.4%*
	Gini coefficient of GDP per capita (0-100)	33.1	33.4	33.4 *-0.0%*	33.4 *+0.0%*	33.3 *-0.3%*

[61] 1 The GDP per capita values in 2006 in ESPON 2.1.1 were SASI forecasts based on 1996 data.

The results of the accessibility forecasts are as expected. Scenario C1, in which rail transport fares are reduced, results in an increase in accessibility, whereas Scenarios C2 and C3, in which transport prices are increased, result in a reduction of accessibility. The differences in accessibility translate into only small differences in GDP per capita but the direction is the same: transport cost reductions as in Scenario C1 result in economic gains, whereas transport cost increases lead to economic losses.

The cohesion indicators in Tables C.16 to C.18 show that in general railway fare reductions as in Scenario C1 lead to more equality in accessibility, except in the new member states and accession countries, whereas higher transport costs as in Scenarios C2 and C3 lead to more polarisation in accessibility. The impacts of the pricing scenarios on territorial cohesion in terms of GDP per capita are small but work partly in the opposite direction: in the old member states lower rail fares (Scenario C1) lead to slight polarisation and higher transport prices (Scenarios C2 and C3) to slight convergence, whereas in the new member states and accession countries only pricing of all modes has noticeable convergence effects.

The spatial pattern of the economic effects are shown in Figures C.18 and C.19 redrawn in the same map format as Figures C.3 to C.15. The economic effects depend on their direction. A reduction of rail fares (Scenario C1) has a small positive effect in the old member states and an even smaller one in the new member states. Road pricing (Scenario C2) and social marginal cost pricing of all modes of transport (Scenario C3) have a negative economic effect because they make transport and mobility more expensive. The effects of Scenario C3 are stronger and more pronounced in the old EU member states because the richer regions spend more on transport. However, these results might be different if the subsidies needed for Scenario C1 and the revenues achieved in Scenarios C2 and C3 were taken into account.

Figure C.18 ESPON 2.1.1: Impact of lower rail fares on GDP per capita, Scenario C1 v. Reference Scenario ((%), 2021

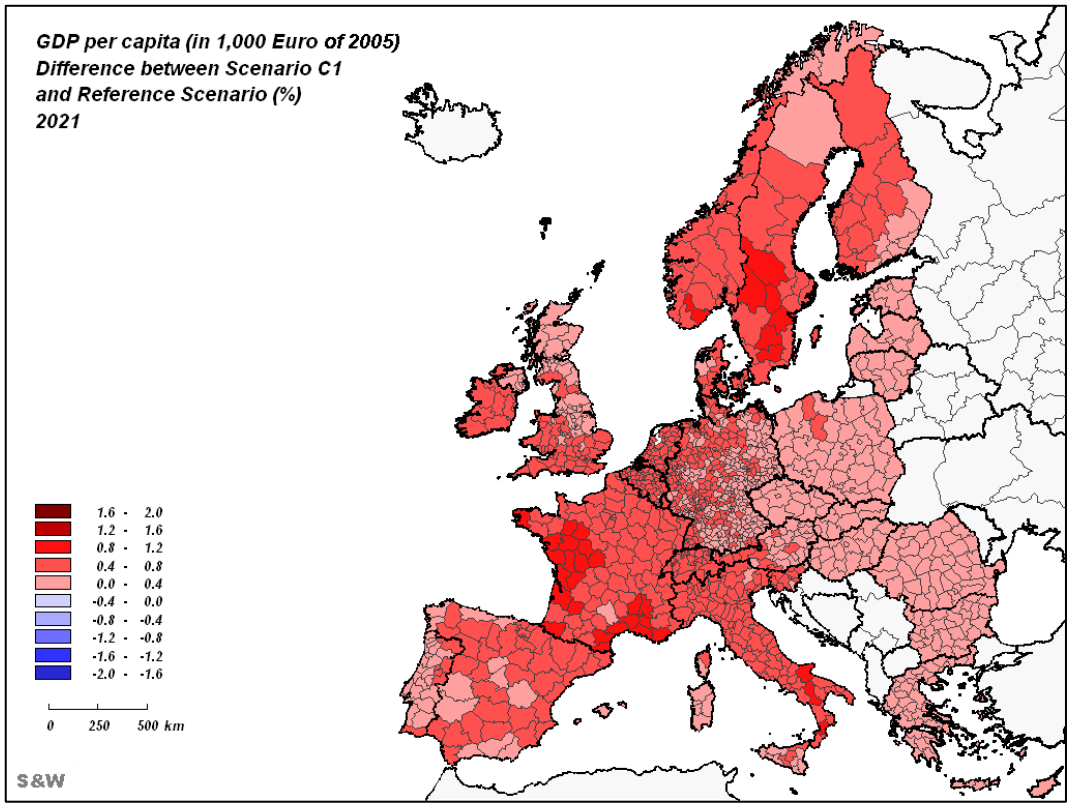
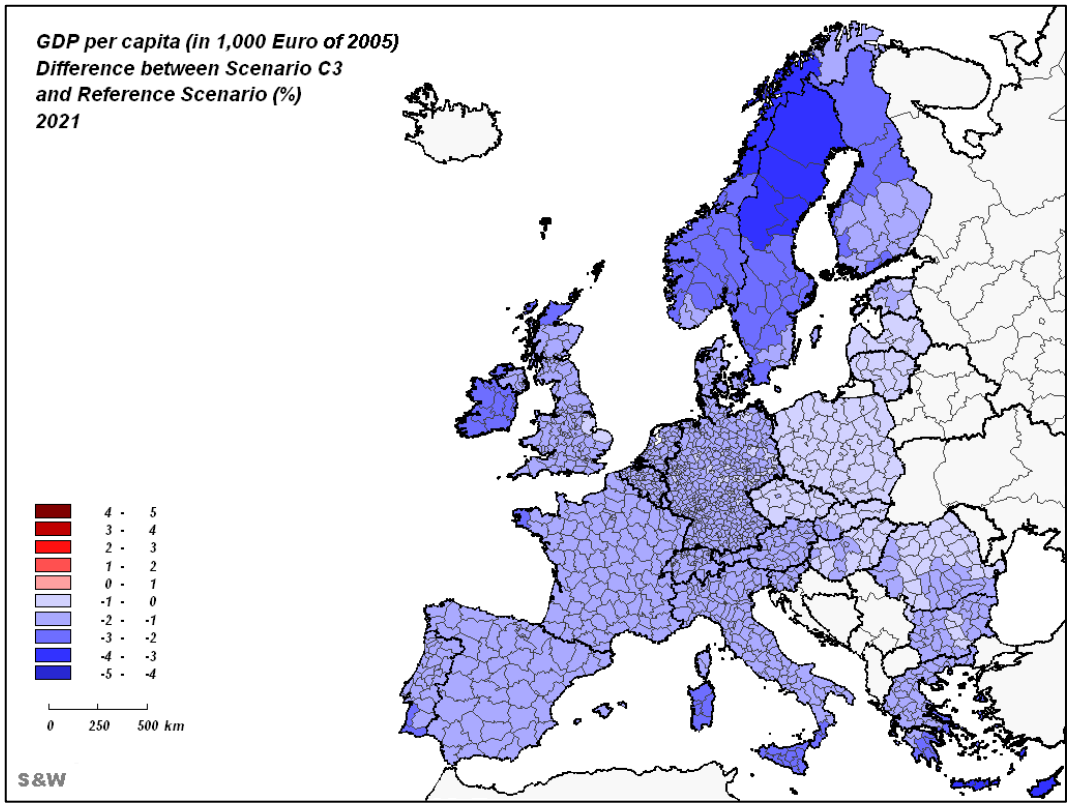


Figure C.19 ESPON 2.1.1: Impact of SMCP of all modes on GDP per capita, Scenario C3 v. Reference Scenario ((%), 2021



STEPs: fuel price increases[62]

It does not make a difference to transport users whether fuel at the petrol station becomes more expensive because of higher taxes or because of rising crude oil prices on the world market. It differs, though, for governments whether the revenues remain with them or go to oil producing countries. However, how these receipts are used is not considered in the SASI model, hence fuel price scenarios and transport pricing scenarios produce very similar effects.

The objectives of the EU 6th RTD Framework project "Scenarios for the Transport System and Energy Supply and their Potential Effects" (STEPs) were to develop, compare and assess possible scenarios for the transport system and energy supply of the future taking into account such criteria as the autonomy and security of energy supply, effects on the environment and economic, technical and industrial viability including the impact of potential cost internalisation and the interactions between transport and spatial development. Several simulation models were used to examine the impacts of scenarios of energy supply and fuel prices at the European and urban level, among them the SASI model also used in this study.

[62] See Monzón, A., Nuijten, A. (Eds.): *Transport Strategies under the Scarcity of Energy Supply*. Final Report of the project "Scenarios for the Transport System and Energy Supply and their Potential Effects". Den Haag, Netherlands: Buck Consultants (BCI), 2006.

Three levels of fuel price increases were examined: In the A scenarios a low increase in fuel prices of one percent per year is assumed. The B scenarios assume a medium level of fuel price increase of four percent per annum; this corresponds to the development of fuel prices in recent years. The C scenarios are worst-case scenarios with strong fuel price increases of seven percent per year.

For each level of fuel price increase five scenarios were simulated: a do-nothing scenario in which no policy response to rising fuel prices is assumed (A-1, B-1 and C-1), a business-as-usual scenario which assumes the continuation of current trends in policy making (A0, B0 and C0), a technology scenario which examines the effects of transport infrastructure and technology policies (A1, B1 and C1), a demand management scenario in which the effects of demand management policies are examined (A2, B2 and B2) and a combination scenario in which all polices are tested together (A3, B3 and C3). No changes in the transport networks were assumed.

Here only three of the fifteen scenarios examined in STEPs can be presented: the business-as-usual scenarios A0, B0 and C0. The three scenarios assume a one-percent, four-percent and seven-percent increase in fuel costs for transport users, respectively, combined with the assumption that current trends in policy making continue (for a full specification of the policies assumed in the scenarios, see the STEPs Final Report (Monzón and Nuijten, 2006).

For the presentation of the results the same four indicators as in the presentation of the results of ESPON 2.1.1 in the previous section are used (Table C.19):

Table C.19 STEPs: Strategic objectives and related indicators

Objective	Indicator	Level
Economic competitiveness	Accessibility road/rail	European, regional average
	GDP per capita (Euro)	European, regional average
Territorial cohesion	Gini coefficient of accessibility (0-100)	European
	Gini coefficient of GDP per capita (0-100)	European

Tables C.20 to C.22 show these four indicators for the three scenarios compared with the Reference Scenario A-1, which assumes the same fuel price increase of one percent per year as Scenario A0 but without the introduction of any new policies. Again the results were recalculated to be comparable with the results of the present study. As in Tables C.9 to C.12 the results are shown for EU25+2 (the present European Union and the two accession countries Bulgaria and Romania) and in separate tables for EU15 (the old EU member states) and NMAC (the new member states and the two accession countries Bulgaria and Romania).

Table C.20 STEPs: Strategic objectives and related European indicators, EU25+2

Objective	Indicator		Scenario			
			A-1 Refer-ence	A0 fuel price +1% p.a.	B0 fuel price +4% p.a	C0 fuel price +7% p.a.
		2006[63]	2031	2031	2031	2031
Economic competitive-ness	Accessibility road/rail	78.3	83.6	71.1 *-15.0%*	58.0 *-30.6%*	50.4 -39.7%
	GDP per capita (Euro)	22,948	38,682	38,078 *-1.6%*	36,600 *-4.9%*	36,111 *-6.6%*
Territorial cohesion	Gini coefficient of accessibility (0-1)	22.1	21.6	23.3 *+8.2%*	25.1 *+16.2%*	25.7 *+18.9%*
	Gini coefficient of GDP per capita (0-100)	35.0	32.2	32.3 *+0.1%*	32.4 *+0.6%*	32.5 *+0.7%*

Table C.21 STEPs: Strategic objectives and related European indicators, EU15

Objective	Indicator		Scenario			
			A-1 Refer-ence	A0 fuel price +1% p.a.	B0 fuel price +4% p.a	C0 fuel price +7% p.a.
		2006	2031	2031	2031	2031
Economic competitive-ness	Accessibility road/rail	80.6	84.7	71.2 *-16.0%*	57.6 *-32.0%*	49.9 -41.1%
	GDP per capita (Euro)	27,923	45,262	44,542 *-1.6%*	43,042 *-4.9%*	42,233 *-6.7%*
Territorial cohesion	Gini coefficient of accessibility (0-1)	22.9	22.9	24.6 *+7.9%*	26.5 *+16.1%*	27.1 *+18.9%*
	Gini coefficient of GDP per capita (0-100)	23.3	32.5	23.7 *+0.4%*	23.8 *+1.2%*	23.9 *+1.5%*

Table C.22 STEPs: Strategic objectives and related European indicators, NMAC

Objective	Indicator		Scenario			
			A-1 Refer-ence	A0 fuel price +1% p.a.	B0 fuel price +4% p.a	C0 fuel price +7% p.a.
		2006	2031	2031	2031	2031
Economic competitive-ness	Accessibility road/rail	69.7	78.8	70.4 *-10.7%*	59.5 *-24.5%*	52.7 -33.2%
	GDP per capita (Euro)	4,541	11,036	10,917 *-1.1%*	10,573 *-4,2%*	10,391 *-5,8%*
Territorial cohesion	Gini coefficient of accessibility (0-1)	15,7	13.9	15,6 *+12,4%*	16,7 *+20,3%*	17,1 *+23,0%*
	Gini coefficient of GDP per capita (0-100)	36.2	36.0	36.1 *+0.2%*	35.9 *-0.2%*	35.9 *-0.4%*

[63] The GDP per capita values in 2006 in STEPs were SASI forecasts based on 2001 data.

All three scenarios have significant negative impacts on accessibility. Both, the magnitude of the decline in accessibility and its spatial distribution among the European regions are affected. The effects vary with the scenario assumptions on fuel price increases: the stronger the price increase, the stronger the decline in accessibility. This results in levels of accessibility that are not only lower than in the moderate Reference Scenario, but even lower than today.

This impediment to free trade and mobility translates into **significant losses of economic growth**. In the worst-case Scenario C3 average GDP per capita in all European regions is 6.6 percent lower than in the Reference Scenario A-1 in the year 2031. But the negative economic impacts are not evenly distributed across the continent – this is shown in Figures C.16 and C.17. Not surprisingly, the negative effects on economic activity are felt most severely in the most peripheral regions which depend most on long-distance transport to markets: Spain and Portugal, northern England, the Nordic and Baltic countries and the West Balkan countries and the island states Cyprus and Malta. However, as several of the new member states are centrally located, the new member states and accession countries as a group are slightly less affected than the old member sates as a group. If the differences between the fuel price scenarios and the Reference Scenario are expressed in absolute terms, i.e. in Euro, the richer countries in the heart of Europe suffer much more: As Tables C.21 and C.22 show, the people in the old member states lose on average more than 3,000 Euro per year compared to about 650 Euro per capita in the new member sates and accession countries.

The cohesion indicators calculated for accessibility and GDP per capita show that transport pricing has a strong polarisation, i.e. anti-cohesion effect, as with higher transport prices transport costs become more important in location decisions and firms tend to move closer to their markets and suppliers. Again the intensity of the effect depends on the fuel price increases. As the Gini coefficients in Tables C.20 to C.22 show, in particular the disparities in accessibility among the new member states and accession countries deepen if transport becomes more expensive, whereas the old member states are less affected. The opposite is the case for the negative effects on economic cohesion, which are largest among the old member states.

Figure C.20 STEPs: Impact of 4% p.a. fuel price increase on GDP per capita, Scenario B0 v. Reference Scenario (%), 2031

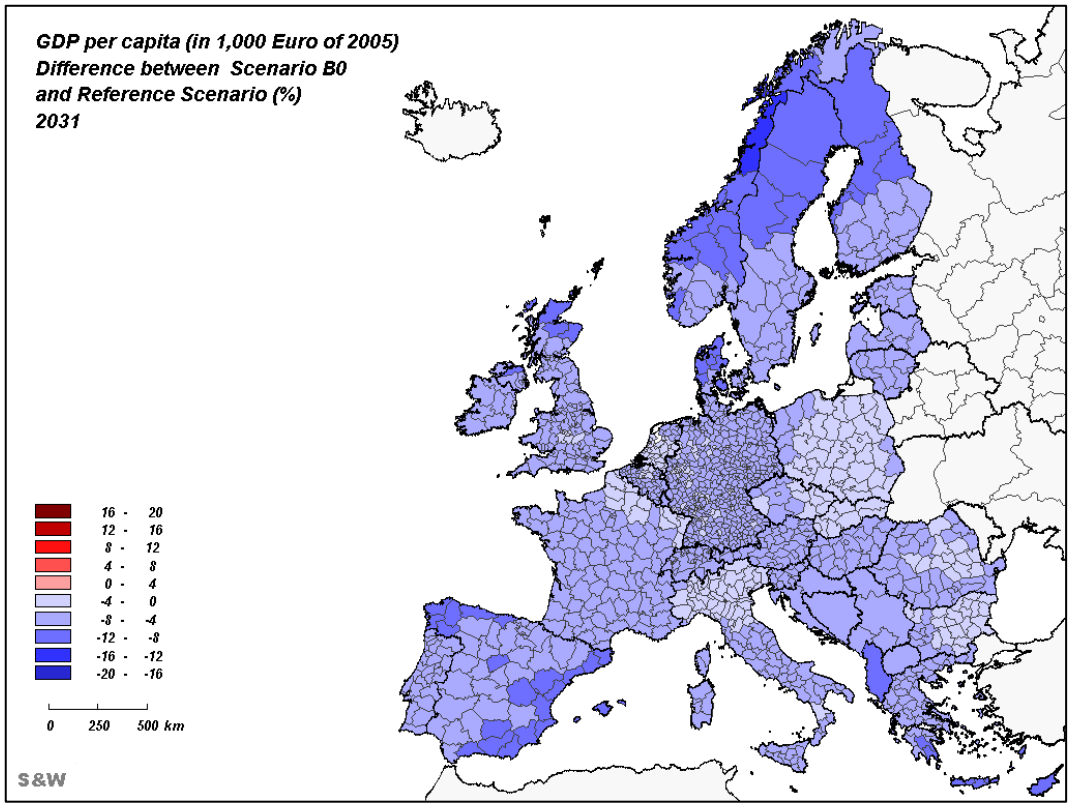
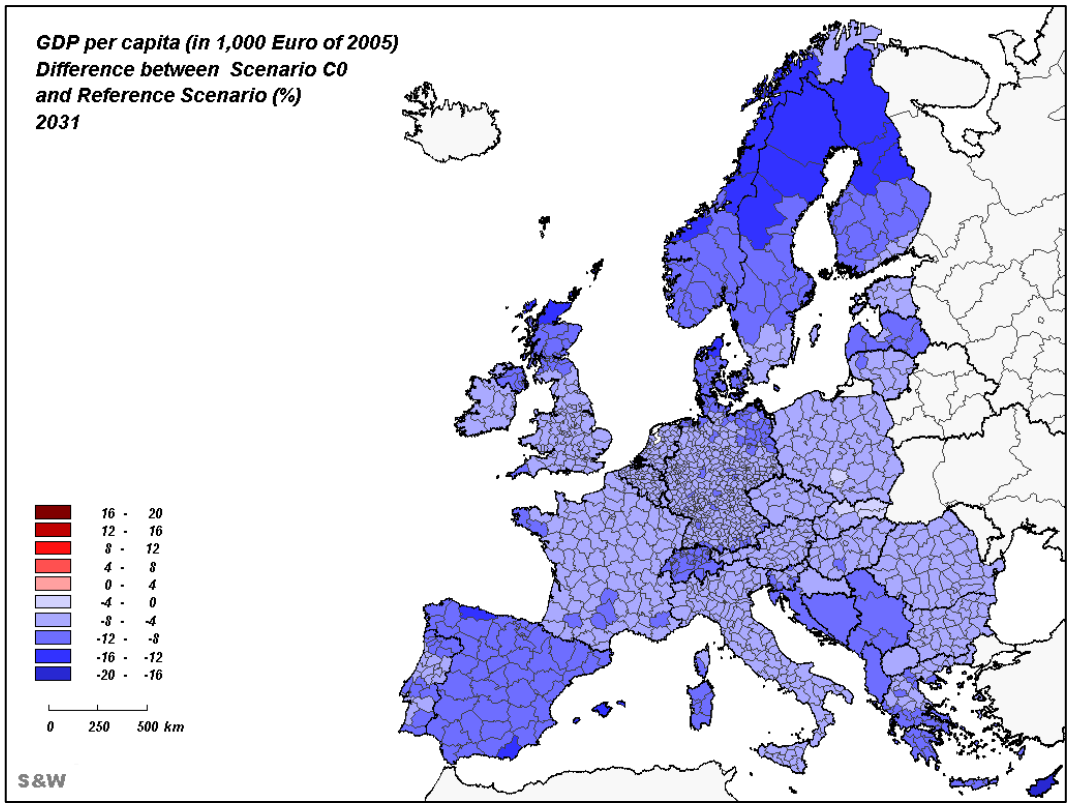


Figure C.21 STEPs: Impact of 7% p.a. fuel price increase on GDP per capita, Scenario C0 v. Reference Scenario (%), 2031



Conclusions

The experience with pricing scenarios in ESPON 2.1.1 and STEPs can be summarised as follows:

- Transport cost increases, whether they are caused by transport pricing or higher fuel prices, have a strong negative impacts on accessibility in all scenarios. The magnitude of the negative impact depends on the rate of cost increase. The resulting levels of accessibility are not only lower than in the moderate Reference Scenario but even lower than today.
- The accessibility effect of pricing scenarios depends on their direction: scenarios which make transport less expensive have a positive, scenarios which make transport more expensive, a negative economic effect. However this result might need to be qualified if the subsidies or revenues associated with the policies were taken into account.
- The transport cost increases have significant impacts on the economic development of Europe and its regions. In all scenarios there is a clear reduction of economic performance in Europe compared with the Reference Scenario. The reduction is higher if transport cost increases are larger. However, seen against the steady growth in GDP in the Reference Scenario, the reductions are not a loss compared with today, but slight reductions in growth. That means that even in the worst scenarios, the level of GDP per capita in real terms in 2031 is much higher than today.
- The fuel cost and policy scenarios have also strong impacts on the spatial organisation of Europe. Important territorial policy goals of the European Union such as cohesion and polycentricity are affected. However, at least in terms of cohesion, the predicted development might be considered not so negative because in absolute terms the economically stronger regions lose more than the poorer regions.

In summary, the SASI model predicts that growing transport costs will lead to a strong reduction in accessibility and economic growth in Europe.