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Impact Assessment

Accompanying the document

PROPOSAL FOR A REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

on Union Guidelines for the development of the trans-European transport network

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1. PROCEDURAL ISSUES AND CONSULTATION OF INTERESTED PARTIES

Identification

Lead DG: Directorate General for Mobility and Transport

Agenda Planning: 2011/MOVE/009

1.1. Background in the development of the TEN-T policy

The Trans-European transport network (TEN-T) policy has been developing since the mid 80ies to provide the infrastructure needed for a smooth functioning of the internal market, to ensure economic, social and territorial cohesion and to improve accessibility across the entire EU territory. The first support framework was set up in 1990, leading to the insertion of trans-European networks in the Maastricht Treaty (1992) and the adoption of a list of 14 major projects at the European Council in Essen in 1994. The first Guidelines defining the TEN-T policy and infrastructure planning were adopted in 1996.

In 2004, a thorough revision of the Guidelines took into account the EU enlargement and the expected changes in traffic flows.[1] The list of Priority Projects covering the Member States of the recent enlargement was extended to 30. Apart from theses 30 Priority Projects, which are declared to be of "European interest", the Guidelines include maps for each Member State for each of the transport modes. All these are declared to be "projects of common interest".

In addition to the Guidelines, financial and non-financial instruments aimed at facilitating the implementation of projects. These instruments include the TEN Financial Regulation[2] and the Cohesion Fund, the European Regional Development Fund (ERDF) and loans from the European Investment Bank as well as coordination initiatives taken by the Commission.

In light of the challenges for the TEN-T policy that have also been identified by the White Paper 'Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system[3] (hereinafter "the White Paper"), the revision of the Guidelines accompanied by this impact assessment report defines a long-term strategy for the TEN-T policy that would contribute to the transport sector meeting the goals of the White Paper with a 2030/2050 horizon.

1.2. Organisation and timing

For the preparation of the revision of the Guidelines, an inter-service group on the TEN-T policy review was set up on 6 October 2010 and meetings were organised between December

[1] Decision No 884/2004/EC of the European Parliament and of the Council of 29 April 2004 amending Decision No 1692/96/EC on Community guidelines for the development of the trans-European transport network; this Decision was replaced by Decision No 661/2010/EU of the European Parliament and of the Council of 7 July 2010 on Union guidelines for the development of the trans-European transport network (recast). The recast consisted mainly of a codification of the existing Guidelines, the only change of substance consisted in adjusting the indicative target dates, from 2010 to 2020, for Member States that acceded on 1 May 2004.

[2] Regulation (EC) No 680/2007 of the European Parliament and of the Council of 20 June 2007 laying down general rules for the granting of Community financial aid in the field of trans-European transport and energy networks.

[3] COM(2011)144

2010 and April 2011 in order to collect the views of various services[4]. For the preparation of this Impact Assessment, an Impact Assessment Steering Group (IASG) was set up and met three times between December 2010 and April 2011[5]. Comments from participating DGs have been received and taken into account until 13 April 2011.

1.3. Consultation process

With a view to preparing the ground for later policy developments, the Commission launched a reflection on the future of TEN-T Policy in February 2009 with the adoption of a Green Paper opening the debate on main challenges and on key objectives for TEN-T Policy and possible ways to meet them.[6] The Green Paper proposed three network planning options (dual structure with the wide TEN-T "comprehensive network" and updated Priority Projects; Priority Projects only; a new dual layer structure comprising the "comprehensive network" and a "core network").

Building on the contributions from stakeholders, the Commission set up six Expert Groups, which between November 2009 and April 2010 analysed a number of key aspects of the future TEN-T development[7]. The Expert Groups' recommendations were included in a Commission Working Document which was presented for public consultation on 4 May 2010.[8]

These two public consultations attracted more than 530 contributions in total. A large majority of contributors supported the option of a new dual-layer approach to TEN-T planning, with a "comprehensive network", that would mainly update and adjust the current TEN-T, as the basic layer; and a "core network", overlaying the comprehensive network and consisted of the strategically most important parts of the TEN-T. Other aspects that enjoyed large support and have been particularly relevant for the current exercise were: the promotion of more environmentally-friendly solutions for transport; resource efficiency; the identification of infrastructural needs from a genuinely European perspective, with a stronger view to meeting service requirements; continuity with previous developments, in particular continued support for the implementation of the current Priority Projects in a future core network; and strengthening the link between transport and TEN-T policy, for instance in the development of interoperability and traffic management systems. The summaries of all the contributions received are available on DG MOVE's website. [9]

Large Ministerial and stakeholder conferences were held in October 2009 in Naples[10] and in June 2010 in Zaragoza.[11] The Zaragoza conference provided a framework for in-depth presentations and discussions with Member States, the European Parliament and stakeholders

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[4] It involves LS, SG, ECFIN, RTD, ESTAT, ENTR, CLIMA, ENV, MARKT, ELARG, MARE, REGIO, EMPL, INFSO, BUDG, ENER, EEAS and MOVE.

[5] 7 December 2010, 25 February 2011 and 8 April 2011

[6] "TEN-T: A Policy Review. Towards A Better Integrated Trans-European Transport Network at the Service of the Common Transport Policy", COM (2009) 44 final.

[7] The fields covered by the expert groups are: the structure of a comprehensive and core network and the methodology for TEN-T planning; integration of transport policy into TEN-T planning; intelligent transport systems and new technologies within the framework of the TEN-T; TEN-T and connections outside the EU; TEN-T financing; TEN-T legal and non-financial aspects. The results are published on: http://ec.europa.eu/transport/infrastructure/tent_policy_review/expert_groups/doc/ten-t_policy_review-report_of_the_expert_groups.pdf

[8] "Consultation on the future trans-European transport network policy", COM (2010) 212 final.

[9] http://ec.europa.eu/transport/infrastructure/consultations/doc/2009-07-31_summary_report_green_paper_on_future_ten-t_networks.pdf and http://ec.europa.eu/transport/infrastructure/consultations/2010_09_15_future_policy_en.htm.

[10] "TEN-T Days 2009: The future of Trans-European Transport Networks: building bridges between Europe and its neighbours", 21-22 October 2009: http://ec.europa.eu/transport/ten-t_days_2009/index.html.

[11] Drawing up the EU Core network - Final report, Zaragoza, June 2010: https://www.ten-t-days-2010-zaragoza.eu/

on the Green Paper, on the Commission's working document of May 2010 and on the main conclusions of the Expert Groups.

Taking into account the results of the public consultation process, the Commission came forward in January 2011 with a Staff Working Document that further developed the methodology and the planning and implementation scenarios. [12] This Working Document has been presented and discussed during the Informal Transport Council held in Budapest on 7th and 8th February 2011 and the TRAN Committee of the European Parliament on 14 February 2011.

In light of the above, it can be concluded that the consultation process has been wide and intensive, meeting all the Commission's minimum consultation standards. [13] In addition, this 2-year long process of internal and external consultation has played a key role in focusing the Guidelines' revision on a limited choice of options.[14]

1.4. External expertise used in the assessment

A wide range of external opinions was collected during the revision process. In addition to the already mentioned Expert Groups, a number of other studies and ex-post evaluations were carried out.

An ex-post evaluation was carried out on the 2000-2006 TEN-T Programme and a mid-term review on the 2007-2013 TEN-T Programme was recently conducted. This is following directly upon the work carried out by the TEN-T Executive Agency (hereinafter TEN-T EA) on a mid-term review of the TEN-T Programme, whereas DG MOVE and the Agency jointly conducted a mid-term review of the multi-annual programme portfolio. [15]

In parallel, important reviews conducted with the Member States on the implementation of the Priority Projects in 2010 have delivered a detailed view of the progress achieved today on the projects of European interest[16].

The transport model TRANSTOOLS and the TENconnect studies I and II were used to help define the planning methodology. Further studies have been taken into account, including on the TEN-T planning methodology, on the impact of the development of ports on TEN-T and a post recession revision of the study "Traffic flow: Scenario, Traffic Forecast and Analysis of Traffic on the TEN-T, taking into consideration the external dimension of the Union".[17] The list of key documents that have been used for the purpose of this Impact Assessment report are listed in annex 1.

1.5. Consultation of the Impact Assessment Board

Following the submission of a draft report to the Impact Assessment Board (IAB) on 15 April 2011 and a hearing with the IAB on 18 May 2011, the IAB sent its opinion on 23 May 2011, asking DG MOVE to resubmit the draft report.

In its opinion of 23 May 2011, the IAB made five recommendations that were addressed in the final version of the IA report in the following manner:

(1) The report should clarify the objectives of the proposal and explain the links between them.

The revised IA defines more clearly the general objective of the proposal and establishes a closer link between the general objective as revised and the specific objectives. The

[12] "The New Trans-European Transport Network Policy. Planning and implementation issues", SEC(2011) 101.
[13] Further details can also be found on DG MOVE's internet site at: http://ec.europa.eu/transport/infrastructure/consultations/index_en.htm.
[14] In this respect, see section 4 and annex 3 of the present impact assessment report.
[15] For ex-post assessments, see annex 2.
[16] TEN-T Progress Report, Implementation of the Priority Projects, June 2010:
[17] "Trans-European transport network planning methodology" and "Supplementary model calculations supporting TEN-T network planning and impact assessment" (TENconnect 2)

possibility of trade-offs or synergies between these objectives and of addressing them in a balanced way within the policy options have also been assessed in a new subsection 3.4. The objective related to the standards for management systems and harmonisation of operational rules on the TEN-T projects of common interest has been detailed further.

(2) The report should improve the presentation of policy options and consider assessing in greater detail a wider range of policy options.

Section 4 of the report has been revised to include a summary of the planning and implementation scenarios assessed to generate the policy options, as well as to clarify the criteria and the pre-screening process used to discard a number of unviable options, initially presented in Annex 3. The revised IA report also includes a short description of each option, as well as a summary of the qualitative assessment of the options' effectiveness with regard to achieving each of the specific objectives of the policy initiative. The argument why only two policy options (in addition to the baseline scenario) have been retained has been strengthened. The differentiation between the baseline and Policy Option 1 has been strengthened as well as the rationale for retaining Policy Option 1 for in-depth assessment.

(3)The report should improve the assessment of impacts

The revised IA report explains in the beginning of section 5 why the results of a fully-fledged modelling exercise of the expected impacts of the envisaged Policy Options could not be used as the primary support for the assessment of impacts. An annex has been added to the IA report to provide full transparency on this aspect (see new annex 6). As the Board suggested, the modelling results have been used to provide an order of magnitude of impacts. They also have been considered, where available, in conjunction with the results of other studies to complement the qualitative analysis of impacts. The assessment of various impacts has been strengthened. Amongst others, the description of environmental impacts has been improved and includes a more thorough assessment of the "rebound effect". Also the impact on employment and their link to the estimated investment needs have been substantiated further. Finally, the revised IA report discusses in more details how the expected policy impacts are likely to be affected by the implementation aspects and by the budgetary constraints faced by Member States.

(4) The report should be clearer about the differences in expected impacts of policy options

The revised IA report substantiates and explains in greater detail why the expected positive impacts are likely to be higher in policy Option 2 compared to Option 1. To this end, the comparison of options in section 6 of the report has been further developed.

(5) Procedure and presentation

Following the Board's recommendation, the different positions of the stakeholders have been better reflected throughout the report, especially in section 4 of the IA. The revised IA report also makes more clear use of proportionality and subsidiarity as conditions that need to be met by all policy options as part of the process of policy options pre-selection.

The revised IA report addresses also the technical comments transmitted by the IAB to DG MOVE.

A revised version of the IA report has been sent to IAB on 15 June 2011.On 7 July 2011, the IAB issued a positive opinion on the revised IA report, which contained three main recommendations for further improvement:

(1) Further strengthen the assessment of options

Following the IAB recommendation, the qualitative assessment of the impact of options has been further improved, particularly by strengthening the argumentation with regard to the expected occurrence of modal shift and the ensuing consequences for air and noise pollution. More examples on the impact of transport infrastructure on employment have been added and short term and long term impacts have been distinctly highlighted.

(2) Improve the comparison of options

The IAB noted that some of the scores assigned to options' effectiveness in addressing the problem drivers were not consistent with the qualitative assessment developed earlier. Consistency has subsequently been ensured.

(3) Report the stakeholders' views

Following the IAB recommendation, the stakeholders' views have been more consistently reported throughout the document.

With regard to *procedure and presentation*, the IAB also recommended that efforts be made to bring the length of the report closer to the recommended 30 pages. Efforts to this end have been made, but giving the wide scope of the policy area covered, the wide ranging changes proposed and the high number of initial policy options that needed to be assessed, the margins for shortening the length of the report were limited.[18]

2. PROBLEM DEFINITION: WHY IS THERE A NEED TO ACT?

As noted earlier, it is through the Maastricht Treaty that the Union has been given the task of contributing to the establishment and development of trans-European infrastructure networks in the area of transport.[19] The goal inscribed in the Treaty is to support the development of the internal market, reinforce economic, social and territorial cohesion, link islands, landlocked and peripheral regions with the central regions of the Union and bring the EU territory within closer reach of its neighbouring states.[20]

2.1. The Europe 2020 Strategy: A renewed political context

The recent economic crisis has wiped out years of economic and social progress and exposed structural weaknesses in Europe's economy. To get the EU economy back on track, the Commission adopted on 3 March 2010 the Europe 2020 strategy (hereinafter 'the EU2020 Strategy') for smart, sustainable and inclusive growth. The strategy, setting out a vision of Europe's new social market economy for the 21st century, [21] was endorsed by the European Council on 17 June 2010.

Promoting sustainable transport has been identified as one of the means for achieving one of the three key EU2020 priorities: sustainable growth.[22] The ensuing 'Resource efficient Europe' flagship of the EU2020 Strategy called for the modernisation and decarbonisation of transport through, amongst others, infrastructure measures, and announced the intention of the Commission "*to accelerate the implementation of strategic projects with high European added value to address critical bottlenecks, in particular cross border sections and inter modal nodes (cities, ports, logistic platforms)*.[23] It also called on Member States to "*ensure a coordinated implementation of infrastructure projects, within the EU Core network, that critically contribute to the effectiveness of the overall EU transport system*". Transport infrastructure being considered as the backbone of the internal market, this objective has been

[18] Tables and figures, which are presented in a high number in the report in order to better illustrate the argument and support the reader in following the wide scope of argumentation, are as a rule not counted within the recommended 30 pages length of a report.

[19] Treaty on the Functioning of the European Union (TFU), Title XVI, art. 170 – 172.

[20] A Communication on improving transport relations with third countries, which refers also to the importance of connecting the TEN-T with the networks of the neighbouring countries will also be adopted later this summer.

[21] COM(2010) 2020

[22] The conclusions of the Report on the "Consultation on the Future Trans-European Network Policy" also stressed that stakeholders widely agree that the TEN-T network should be developed in a sustainable way with regards to low carbon transport systems.

[23] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, COM(2011)21.

also retained as one of the "Twelve levers to boost growth and strengthen confidence" in the recently adopted Single Market Act[24].

The Transport White Paper: new priorities for TEN-T

As a follow up of the EU2020 Strategy, the Commission adopted on 28 March 2011 a roadmap towards a competitive and resource efficient transport system[25]. This strategy sets out to remove major barriers and bottlenecks in many key areas across the fields of transport infrastructure and investment, innovation and the internal market. The aim is to create a Single European Transport Area with more competition and a fully integrated transport network which links the different modes and allows for a profound shift in transport patterns for passengers and freight. The White Paper aims at dramatically cutting carbon emissions in transport by 60% by 2050.

More specifically, the White Paper has concluded that no major change in transport will be possible without the support of an adequate network and a smarter approach to using it. Infrastructure planning and adequate development, i.e. defining where transport flows and which (combination of) modes as well as technologies are available for use, are seen as essential components in the process of redefinition of the transport system to inverse its current unsustainable trends.

The EU Budget Review: new financing framework for TEN-T

The EU2020 Strategy also urged that all EU policies, instruments and legal acts, as well as financial instruments, be mobilised to pursue the Strategy's objectives. Consequently, in its "EU Budget Review" Communication[26], the Commission suggested ways to adapt the budget to tomorrow's requirements and set a number of key principles to better target the use of EU funds to secure the Union objectives, and as set out in the EU2020 Strategy: prioritisation - "*directing resources where the rewards can come more quickly, more broadly and more strongly*"; focusing on the EU added value - "*plug gaps left by the dynamics of national policy-making, most obviously addressing cross-border challenges in areas like infrastructure, mobility, territorial cohesion…- gaps which would otherwise damage the interests of the EU as a whole*".[27]

Cross-border infrastructure is given as "one of the best examples of where the EU can (…) *deliver better value results. Transport, communication and energy networks bring enormous benefits to society at large*".[28]

2.2. Description and scope of the problem: a fragmented network not fit for purpose

The EU 27, taken as a whole, is well endowed with transport infrastructures. It currently counts 5,000,000 km of paved roads, out of which 61,600 km are motorways, 215,400 km of rail lines, out of which 107,400 km electrified, and 41,000 km of navigable inland waterways. Its maritime ports handled 414 million passengers and 3,934 million tonnes of freight in 2007, while about 14 million tonnes of freight and almost 800 million passengers were carried through its airports.

Whereas most of these transport infrastructures have been developed under national policy premises, the TEN-T policy has helped to complete a large number of projects of common interest, interconnecting national networks and overcoming technological barriers across national borders. Amongst the success stories is the high-speed railway line linking Paris,

[24] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions COM(2011) 206/4
[25] White Paper for Competitive and Sustainable Transport, COM(2011) 0144
[26] COM(2010) 700
[27] COM(2010) 700 final, p. 4-6.
[28] Ibid, p. 9.

Brussels, Cologne/Frankfurt, Amsterdam and London. It has not only interconnected national networks and marked a breakthrough of a new generation of railway traffic across borders, but it has also provided citizens and business travellers with a competitive travel option within Europe. Similarly, the fixed rail/road link between Denmark and Sweden, linking up two regions on each side of Øresund, has led to a significant increase in cross-border trade patterns and has served as a powerful lever of economic development, in particular the emergence of a common labour market between Copenhagen and Malmö.

As regards intelligent transport systems, TEN-T policy has helped in particular to prepare the various modal intelligent transport systems (ITS) projects, such as European Railways Traffic Management System (ERTMS), the Single European Sky Air Traffic Management Research (SESAR), Vessel Traffic Management and River Information Services.

Nevertheless, the wide consultation process, the external expertise, the ex-post assessments conducted and the internal analysis used over the last two years have shown that the European Union does not dispose yet of a complete trans-European infrastructure network, and especially not for rail and inland waterways, where essential parts are still missing and constitute important bottlenecks. The infrastructure network in the EU today is indeed fragmented, both from a geographical and a multi-modal perspective. It is also not sufficiently integrated in the international trade flows that feed the European internal market.

Despite important efforts towards improvement[29], European rail and inland waterway networks are still lacking capacity and efficiency. Only the road network is nearly complete and provides access to intermodal nodes, albeit significant improvements are still needed in EU12. The air and sea transport networks are available, but no priorities have been given to establish a 'hierarchy' within those networks and/or a good interconnection[30].

2.2.1 The infrastructure network is fragmented between countries

Missing cross-border sections

The current fragmentation of EU infrastructure networks can be illustrated by Figure 1 showing the current status of implementation of the Priority Projects. Even if good progress has been achieved (the green sections) many of the planned Priority Projects will not be completed by the deadline agreed and set in the current Guidelines (around 2015 – 2020 in most of the cases). On some sections works will start only after 2013. This is mainly the case for cross-border sections which clearly appear to be the most complex projects[31] on the TEN-T in terms of implementation. This led the 2010 TEN-T Priority Project progress report[32] to conclude that today's TEN-T mainly consists of an assembly of national sections that are not yet or only partially interlinked.[33]

[29] Eighteen of the current thirty Priority Projects are entirely dedicated to rail and two to inland waterways.

[30] Court of Auditors Report on Ports

[31] By "projects", it is meant here sections that are being allocated funding on the basis of the TEN-T Guidelines. A project is in general a section of a Priority Project.

[32] Progress Report 2010—Implementation of the Priority Projects: http://ec.europa.eu/transport

[33] The report gave a list of cross-border bottlenecks that are still left for completion. For instance, the biggest rail freight market at this moment, Germany, is lacking good cross-border connections with works ongoing or still to be started on each of them (with the Netherlands, continuation of the Betuwe Line to Duisburg; with France, works ongoing between Saarbrücken and Mannheim, and between Strasburg and Offenburg; with Denmark, missing access routes to the Fehmarn; with Austria, connection München to Salzburg under works until 2025 at least, with the Czech Republic, the connection between Praha and Dresden is still to be upgraded; with Poland, Berlin – Warsawa needs an improved interconnection, the same for Dresden to Wroclaw. In a similar way, Italy has not any flat trajectory to the rest of the EU. The future Swiss Gothard tunnel will offer the fastest possibility for crossing the Alps with just one locomotive and no obligation to adapt train length in accordance with the physical parameters of the Alpine crossings as of 2019. For Inland Waterways, the barriers are less directly linked to cross-border sections as for rail, but the bottlenecks do have just the same detrimental effect (like Straubing – Vilshofen or missing links such as the Seine-Escaut). This phenomenon can be observed in Figure 1 for almost all cross-border sections.

Divergences between eastern and western parts of Europe

For the time being, a considerable disparity in the quality and availability of infrastructure persists within the EU. The Member States which joined the EU in 2004 and 2007 have a motorway network of a limited extent (about 4.800 km, though they are readily catching up on this), have no high speed rail lines and – more importantly – their conventional railway lines are often in poor condition.[34]

The initial Guidelines and Priority Projects were approved well before the last two rounds of enlargement. While the revision of the Guidelines in 2004 partly addressed this matter, an imbalance between old and new Member States continues to endure, not least due to widely differing starting endowment levels.[35] Figure 1 illustrates that North-South connections are predominant whereas East-West connections are still lacking.

Missing connections with neighbouring and overseas countries

Despite high traffic volumes on many connections between the EU and the neighbouring countries, the Guidelines so far have not included these connections among the priority objectives. Apart from these, [36] the Priority Projects do not include links to the neighbouring countries. Moreover, most of the major Seaports, the connecting points of the EU to overseas countries, are not included in the Priority Projects.

2.2.2 The infrastructure network is fragmented between and within transport modes

Multi-modal "hard" infrastructure is missing

By functioning mostly separated from each other, the different modes are further fragmenting the network. Currently, important ports and airports remain poorly linked to the rail network, and a large share (>40%) of long distance freight transport (> 300 km) is carried out by road transport in isolation.[37] Inland waterways are also in many cases not connected with logistics centres.

Intermodal nodes, enabling the exchange of passengers and goods across modes, are underdeveloped. Important nodes in cities, such as big railway stations and major airports, do in many cases not have well functioning multimodal links. The lack of intermodal nodes, and therefore of efficient co-modality options, increases infrastructure capacity bottlenecks in all modes, and in particular in road, rail and ports.

[34] Energy and Transport in Europe – Statistical Pocketbook 2010.

[35] The wide differences in endowment with regard to transport infrastructure across the EU, and in particular between the old and the new Member States are well documented in the Fifth Report on Economic, Social and Territorial Cohesion, November 2010, as well as in DG ELARG's report on transport http://ec.europa.eu/regional_policy/sources/docoffic/official/reports/cohesion5/pdf/5cr_en.pdf.

[36] Priority Project 12, 'Nordic Triangle', and Priority Project 6, 'Lyon-Trieste-Divaca-Ljubljana-Budapest-Ukrainian border' and PP24 Rotterdam – Genoa via Switzerland

[37] Source: TRANSTOOLS

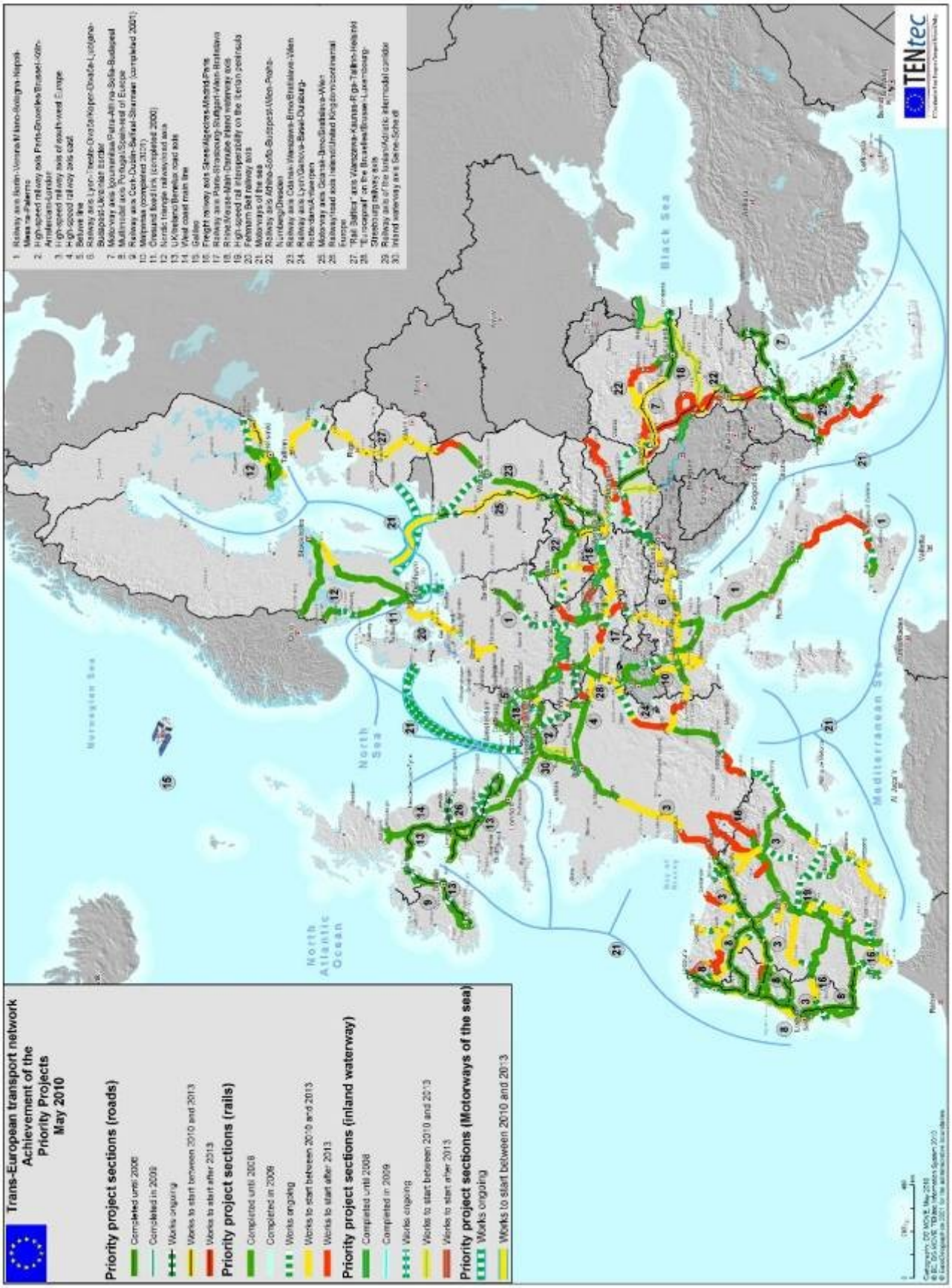

Figure 1: Achievements of the Priority Projects – May 2010

Source: TENtec

Interoperability is lacking

The current TEN-T is further fragmented by a lack of interoperability, i.e. of compatibility among the technical parameters[38], operational systems[39] and rules[40] that are used on the different Member States' networks. Differing sets of operational rules and standards, based on longstanding traditions and legislation of individual Member States, are multiplying the barriers and bottlenecks in the transport system. The effectiveness of huge investments in infrastructure alone is severely hampered because interoperability problems and operational rules such as train control signalling systems, document handling, language regimes, train crew certifications, composition of trains, tail lights and so forth are not tackled at the same time as the "hard" infrastructure in a traditional sense, comprising of aspects such as rail gauge, train length, axle loads and traction energy supply systems.[41]

As highlighted in the Special Report from the European Court of Auditors,[42] rail transport is the most prominent example where interoperability between and within transport modes is missing. The EU currently uses seven gauge sizes and seven types of electric currents (with different voltages and frequencies, alternating or direct current, etc).[43] In certain cases where efficient solutions have been brought about – for instance multi-current locomotives able to circulate on several networks – then these efforts and investments are hampered in the absence of harmonisation of sometimes tiny details – such as the manual exchange of tail lights marking the end of the train. Figure 2 shows another example of the need to coherently address both infrastructure and the way that infrastructure is used.

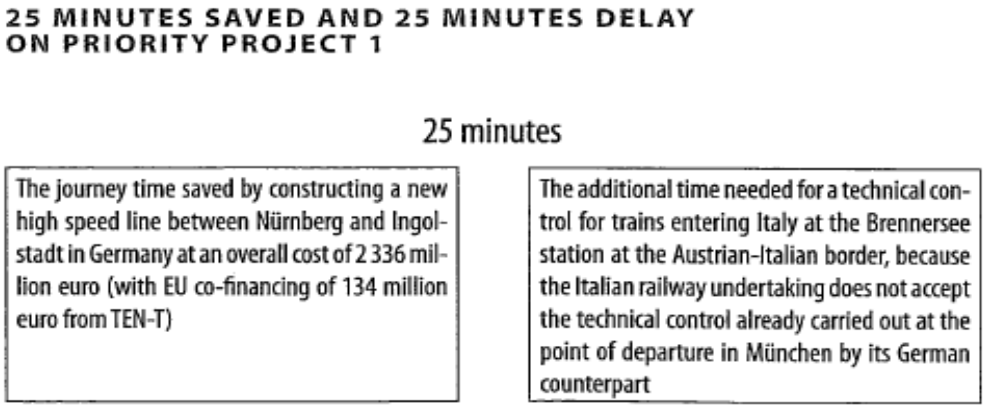

Figure 2: Example from the Special Report from the European Court of Auditors

Road transport is also hampered by interoperability issues. Today, international hauliers need on-board units that deal with the Eurovignette, five different national vignettes and eight different tags and tolling contracts if they wish to drive on all European tolled roads without stopping at tollbooths.[44]

In addition, the limited penetration of the common European systems such as ERTMS for rail and RIS for inland waterways as well as the lack of compatibility between the various

[38] Concerning traditional ("hard") infrastructure such as the different types of gauges or electrification systems in rail.
[39] For e.g. traffic management systems, signalling and river information systems.
[40] For e.g. train length, axle loads, safety, as well as administrative rules such as document handling, language regimes.
[41] Special Report No 8, European Court of Auditors, "Improving transport performance on trans-European rail axes: have EU rail infrastructure investment been effective?"
[42] Ibid.
[43] http://www.ertms.com/faq.aspx
[44] http://ec.europa.eu/transport/road/road_charging/road_charging_en.htm

national river and air traffic management systems are yet other examples of the various factors hindering the integration of the network.[45]

Conclusion

The lack of integration of the TEN-T logically leads to a suboptimal use of the infrastructure, by causing detours in traffic and bottlenecks. It results in economic inefficiencies, disparities in terms of social and territorial cohesion and higher external costs to the society in the form of congestion, accidents, air and noise pollution, and other environmental impacts.[46] The fragmentation of the network is therefore an important obstacle to the free movement of people and goods, an analysis confirmed by the conclusions of the ex-post and mid-term review reports (see annex 2). As a consequence, the existing TEN-T is not adequate to support the major transformation envisaged by the White Paper towards a competitive and resource efficient transport system by 2050.[47]

The subsections below analyse why today's TEN-T is not capable of supporting this transformation.

2.3. Why is the TEN-T network fragmented?

Following the process of internal and external consultation, and on the basis of the various assessment reports cited above, the Commission has identified that the fragmentation is due to 2 main aspects, the conceptual planning of the network configuration and its implementation. This translates into four main drivers, contributing to the problem of a fragmented TEN-T network. These drivers are: the insufficient EU-level planning of network configuration, insufficient adoption of common standards and rules for the interoperability of networks within the TEN-T, the limited cooperation among Member States in project implementation and the lack of sufficient conditionality of EU funding instruments. The first driver relates to the planning aspect, while the three others concern the implementation[48] of the TEN-T policy.

2.3.1 Insufficient EU-level planning of network configuration

Spatial configuration of the network has lacked a genuine European design

Transport infrastructure has been historically designed to serve national rather than European goals and national infrastructure planning remains to a large extent disconnected from planning at EU level. This is due, not least, to the fact that Member States do support the largest share of the budget with regard to transport infrastructure investments, including TEN-T projects. Quite naturally, national authorities see therefore investment efforts on their respective territories mostly as national investments rather than as contributions to a Union objective[49]. The current methodological approach to TEN-T planning and implementation also reflects and reinforces this tendency to approach transport infrastructure from a primarily Member States' individual interests perspective.

Thus, as regards the TEN-T wider/basic layer, where responsibility for completing the large numbers of projects concerned rests almost entirely with the Member States, "planning" has essentially meant adding together significant parts of national networks and connecting them at the common borders. In practice, that meant Member States submitting national network maps outlining existing and planned infrastructure for the various modes, on the basis of a broad set of characteristics for network configuration presented in the TEN-T Guidelines.

[45] NAIADES mid-term progress report and Commission Staff working paper on deployment of the Single European Sky technological pillar (SESAR)

[40] See annex 3 of the Impact Assessment accompanying the White Paper (SEC(2011)358)

[47] The Report on the "Consultation on the Future Trans-European Network Policy" explains that some environmental organisations explain that the existing TEN-T policy goals are inadequate to deal with climate change goals and Europe 2020 strategic objectives.

[48] Implementation refers to the means used to realise the network and optimise its use.

[49] €196 bn within the current financial perspective (2007-2013), compared to €8 bn from the TEN-T Programme and €43 bn through ERDF and Cohesion Fund.

These maps are appended in Annex I to the current Guidelines. Projects developing or improving infrastructure along these outline maps are deemed "projects of common interest" and are eligible for funding support from the EU budget.[50]

The selection of the Priority Projects has also been, to an important extent, a primarily bottom-up exercise. As a methodological approach, it has been developed in mid-1990s and endorsed by the European Council in Essen in 1996 when it adopted a first list of (fourteen) Priority Projects. It relies on proposals for development of projects along the (wider/basic) TEN-T outline presented by the individual Member States, which are then examined by the Commission for their compliance with a set of rather broadly formulated criteria for "priority projects", i.e. projects that are to be treated with priority in awarding financial support from the EU budget.[51] Thirty Priority Projects are currently benefitting from EU financial support and their list is appended as Annex III to the current Guidelines.

The list of projects inevitably reflects the Member States' inclination to give priority to transport sections linking up centres of national interest and, as such, the bottom-up bias of the selection process. There are thus Priority Projects without any cross-border dimension (Priority Projects 5, 10 and 29), or with a limited regional/national planning scope that lead to overall network inefficiencies/incongruence. For instance, Priority Projects 11, 12 and 20 rather belong to a single traffic flow, whereas Priority Projects 4, 28 and 17 are overlapping in important segments (See Figure 1).

In addition, a focus mainly at modal level, rather than an integrated approach across different modes of transport has been identified as another consequence of the current Guidelines provisions with regard to project selection. Thus, some Priority Projects address rail, others road or inland waterways, but there is no coherence between them leading to a multi-modal network approach.

The predominantly bottom-up network development is no longer adapted to new framework conditions

Mobility has increased over the last decades and has developed in a context of generally cheap oil, expanding infrastructure and loose environmental constraints[52]. Now that those framework conditions have changed, the building of new infrastructure to reduce congestion and accommodate higher levels of traffic is less and less a desirable solution. The impact of infrastructure on the environment also is a growing concern. In addition, the current economic crisis reasserts the importance of putting budget accounts into a long-term sustainable path. This implies reducing public deficit and debt and improving the quality of public finance. More cost-effective solutions have to be found to tackle transport needs than relying on expanding 'hard' infrastructure.

2.3.2 Insufficient implementation of common standards and adoption of common rules for the interoperability of networks within the TEN-T

The TEN-T policy so far has lacked a true perspective of harmonisation through EU legislation to address interoperability issues across both national networks and modes. The Court of Auditors Special Report and the European Coordinators Issues Paper[53] have particularly stressed this issue.

Currently, the TEN-T Guidelines only include target standards in the inland waterway sector. With the absence of links between TEN-T policy and existing EU legislation, Member States

[50] See art. 7, Union Guidelines for the development of the trans-European transport network.
[51] Ibid., art. 23.
[52] Average mobility per person in the EU, measured in passenger-kilometre per inhabitant, increased by 7% between 2000 and 2008, mainly through higher motorisation levels as well as more high-speed rail and air travel. (Impact Assessment accompanying the White Paper – SEC(2011)358)
[53] Position Paper of the European Transport Coordinators on the Future of the TEN-T Policy Brussels, 6 October 2009

have not sufficiently implemented all EU level technical specifications: ERTMS in the railway sector; implementation of the Single Sky policy and the ATM Master Plan for air transport; ITS for road transport.

This situation has prevented the TEN-T policy to serve as a useful lever to accelerate the deployment of much needed intelligent equipment on the network. Moreover, there is a close relationship existing between certain TEN-T instruments such as legally binding interoperability and safety standards, and transport market opening. They strongly encourage further initiatives similar to those taken in the field of rail interoperability. As a result, infrastructures are underused due to market arrangements reflecting the situation before market opening.[54]

2.3.3 Limited cooperation among Member States in project implementation

In addition to the lack of Member States planning coordination, TEN-T development so far has been crippled by insufficient Member States cooperation in order to coordinate their projects' implementation. This is particularly true of Priority Projects with a cross-border dimension, where active cooperation between a wide range of stakeholders is necessary. This aspect is highlighted by the conclusions of a number of specific studies, such as the multi-annual Priority Projects portfolio review, the European Coordinators' Issues Paper and the Court of Auditors' Special Report.[55]

This limited cooperation between Member States on cross-border projects has had implications at various levels: the lack of joint traffic forecasts led to differing investment plans; the lack of investment planning coordination led to disconnected or contradictory timelines, capacity planning, alignment, technical and interoperability characteristics, cost-benefit and environmental assessments; the lack of congruent investment decisions coupled with Member States' tendency to give priority to national transport sections linking up centres of national interest particularly affected investments in TEN-T projects, leading to extensive delays.[56]

2.3.4 Lack of sufficient conditionality of TEN-T funding instruments

As indicated above, the TEN-T Guidelines are linked with financial instruments to facilitate the implementation of projects identified as being of common interest. These instruments include: the TEN-T programme, the Cohesion Fund, the European Regional Development Fund (ERDF) and loans from the European Investment Bank. While the TEN-T Guidelines do not specifically deal with financial aspects, they do specify the characteristics of the projects eligible for financial support from the EU budget and, not least, the criteria for identifying the projects that are to be funded with priority. As such, the TEN-T Guidelines constitute an important instrument of conditionality for the allocation of EU funds. So far, the EU financial instruments supporting the TEN-T development have not proved sufficient to deliver complete projects within the timeframe agreed by the Guidelines, nor to ensure a focus of funding on the projects with highest EU added value. And part of the reasons for this lie in the rather loose framework for guiding investment decisions that the TEN-T Guidelines provide.

The TEN-T Guidelines provide a framework of conditionality of TEN-T funding instruments by means of provisions concerning both the planning of the network configuration and the implementation of the projects developing it. As highlighted above, the current bottom-up

[54] For the most intensively used rail freight corridor, from Rotterdam to Genova, analysis has shown that the freight volume transported could be doubled if, alongside with infrastructural improvement, the operational rules, the slot handling and the interoperability (ERTMS) issues would be addressed.

[55] See Annex 2

[56] Numerous examples are described in detail in the annual activity report of the European Coordinators. For instance, the Barcelona – Nîmes rail sections, where the cross-border tunnel is finished, but not the access routes; the Betuwe Line in the Netherlands is finished but the third rail track from the Dutch border to the German industrial area of the Ruhr will be completed only by 2015 at the earliest.

approach to planning has failed to ensure the development of a TEN-T configuration that constitutes a fully connected network, and in particular of cross-border links and multi-modal connecting points that generate the trans-European and, respectively, multi-modal dimensions of the TEN-T – and, as such, its EU-added value. At the level of implementation, the limited cooperation among Members States, particularly in cross-border projects, means that even when planning did address such high EU-added value links, delivery was significantly delayed. In addition, the lack of provisions for common operational rules and standards adoption along the TEN-T for most modes, as also pointed out earlier, mean that high "hard" infrastructure investments, with important EU funding contribution and EU-added value potential, remain significantly underused.

While the overall situation has improved over the years, especially with regard to the delivery of Priority Projects, thanks to new implementation instruments, such as the TEN-T Executive Agency (TEN-TEA) and the European Coordinators, and improved conditions for disbursing support under the TEN-T programme,[57] the delays in implementation of a number of projects reflect the currently limited capacity at EU level to guide implementation of EU projects, especially for the cross-border sections.

Generally, The Priority Project implementation mid-term reviews and the recent mid-term review made clearly apparent that there is still room for improving the impact of TEN-T co-funding, notably by focusing on the particular issue of cross-border coordination, touching upon issues of technical interoperability and operational rules, and by focusing on the problem that the financial perspectives do not permit to overturn the current 7-year limit of the perspectives.

As regards the structural funds, EU funding has largely supported project implementation, but projects implementation lies with Member States for projects which generally need prior approval by the Commission. The current prioritisation of investment in the TEN-T Guidelines leaves many investments decisions follow rather national than European value added aspects. Moreover, significant capacity problems in design, implementation and management of large infrastructure projects on all modes constrain the progress in a number of countries eligible under the Cohesion Fund. As the Conclusions of the 5th Cohesion Report state, the future Cohesion Policy needs to impose stronger conditionalities in order to concentrate resources on European value added. The discussions with Member States show that they are open for stronger ex-ante conditionalities for TEN-T investments.

2.4. How would things evolve, all things being equal?

The Commission has carried out an analysis of possible future developments for TEN-T policy in a scenario of unchanged policies, the so-called baseline scenario. The baseline scenario is identical with the Reference scenario applied for the Impact Assessment accompanying the White Paper[58]. The Reference scenario[59] is a projection, not a forecast, of

[57] Until 2007, the TEN-T programme financial support was relatively scattered, with yearly calls for project selection, with a limited funding on cross-border projects. The 2007-2013 financial perspectives brought a significant change by allowing TEN-T co-funding rates up to 30% for cross-border projects. The multi-annual programme accompanying it, managed by the newly established TEN-TEA, ensured that up to 60% of the multi-annual budget was allocated to cross-border projects decisions. The allocations covered the entire financial perspectives, so as to give more long term security to these projects. The mid-term review reports (2010 and 2011, see Annex 2) point out however that the targeted higher maximum co-funding rate of 30% for cross-border sections is, in practice, not higher than 21% in average. The EU Financial Framework is an additional constraint: as these difficult cross-border projects often run across several MFF, the final contribution from the TEN-T budget may be as low as 5 to 10%. This left a picture of limited EU impact for a policy area with high EU added value.

[58] It is presented in more detail in Appendix 3 of the White Paper Impact Assessment as is the inventory of the policy measures included in this scenario.

developments in absence of new policies beyond those adopted by March 2010[60]. It therefore reflects both achievements and deficiencies of the policies already in place. This projection provides a benchmark for evaluating new policy measures against developments under current trends and policies.[61, 62].

The time horizon for the baseline scenario developed below is twofold: 2030 and 2050. 2030 is the target date for the achievement of the trans-European transport infrastructure framework as set in part 3 of this document. The 2050 horizon is required to ensure consistency between long-term impacts of proposed options of the trans-European infrastructure network and the goals of the White Paper.

2.4.1 Specific assumptions for infrastructure developments

In terms of infrastructure development, the baseline scenario assumes that the current Guidelines will apply, thus continuing the development of the current Priority Projects and the wider TEN-T. Among others, without prejudging the result of the negotiations for the Multiannual Financial Framework, it is assumed that the current financial perspective approach would be pursued for the period 2014-2020, including the availability of a similar TEN-T budget. According to the current forecasts drawn up in cooperation with the Member States, the total investment cost of the 30 TEN-T Priority Projects will be realised by 2025, which would represent an accelerated implementation pace.[63] The National transport plans currently discussed between the Commission and the Member States in the Framework of the Open Method of Coordination have also been taken into account in this forecast.

It is also assumed as part of the baseline scenario that, at European level, the Commission will continue its efforts to encourage Member States to coordinate their infrastructure policies, with a view to exchanging best practices and identifying obstacles to funding and solving cross-border constraints. In particular, the Open Method of Coordination is expected to have a certain impact through fostering transparency and up-to-date monitoring of project planning and implementation across Europe. Moreover, the European Institutions and Member States will continue to rely on the work of the European Coordinators,[64] taking care of 11 of the most difficult Priority Projects of the TEN-T network.

2.4.2 Expected developments

Impacts on drivers to TEN-T fragmentation

In the baseline scenario, by definition, the planning of the network will not change since the current Guidelines remain unchanged. The current dual layer with the basic layer and the 30 Priority Projects will be pursued. In 2030, in the baseline scenario, the fragmentation of the infrastructure network in general is not likely to improve, despite the completion of Priority

[59] The Reference scenario of the IA of White Paper builds on a modelling framework including PRIMES, TRANSTOOLS, PRIMES-TREMOVE transport model, TREMOVE and GEM-E3 models. For the purpose of this IA, and more specifically the TEN-Connect studies, the TRANSTOOLS model was considered as most appropriate dut to its infrastructure component. The assumptions used in the studies are identical with the assumptions of the White Paper. In this way, it can be assured that the baselines of TEN-T IA and of the White Paper are identical, and that the impacts are estimated on the same basis in the two IAs.

[60] The cut off date for the policy measures included in the Reference scenario (March 2010) is common to both initiatives. In other words, the Reference scenario does not incorporate policy measures that were adopted by the Commission after March 2010. In particular, the Reference scenario does not cover the Commission Decision of 14 October 2010 re-launching of the CARS 21 High Level Group on the Competitiveness and Sustainable Growth of the Automotive Industry in the European Union. For the same reason, it does not capture the recent initiatives of car manufacturers as regards electric vehicles (hereinafter "EV").

[61] For a brief presentation of the models used, see Appendix 5 of the White Paper IA

[62] In addition, the oil price projections are the result of world energy modelling with PROMETHEUS stochastic world energy model, developed by the National Technical University of Athens (E3MLab).

[63] Priority Projects 2010 – a detailed analysis.

[64] The Report on the "Consultation on the Future Trans-European Network Policy" mentioned that several contributors highlighted the facilitation role of the European Coordinators for major cross-border projects.

Projects. First of all the absence of a revised *planning* would mean that interconnectivity issues across borders as well as multimodality aspects would remain inadequately addressed. The same would be the case of connections with the neighbouring countries.

Second, as far as the *interoperability* of networks is concerned, a certain progress will be achieved, particularly in the interoperability of traffic management systems (ERTMS, ITS, RIS, SESAR). But overall, the impact on TEN-T efficiency would be too little, too late.

As an example, the introduction of ERTMS on the European interoperable network provides an important indicator of progress towards interoperability. Currently, around 4000 kilometres of lines for commercial services are in service in ten Member States[65], in particular high speed lines, and by the end of 2015, and 2020, this should grow to 11 500 km and 23 000, respectively.[66] In addition, a binding European Deployment Plan (EDP), adopted on 22 July 2009, aims at a swift and coordinated deployment by 2015 of ERTMS on 6 Corridors.[67]

Nevertheless, even if the above targets are reached by 2020, the interoperable section of the TEN-T will not constitute an interoperable European-wide network (see map below).[68] The six corridors of the EDP represent only 6 % of the Trans-European Network track length, even though they do carry 20% of the rail freight traffic. Moreover, as European Coordinator K. Vinck noted, "from an implementation point of view, delays are noticed on nearly all corridors"[69].

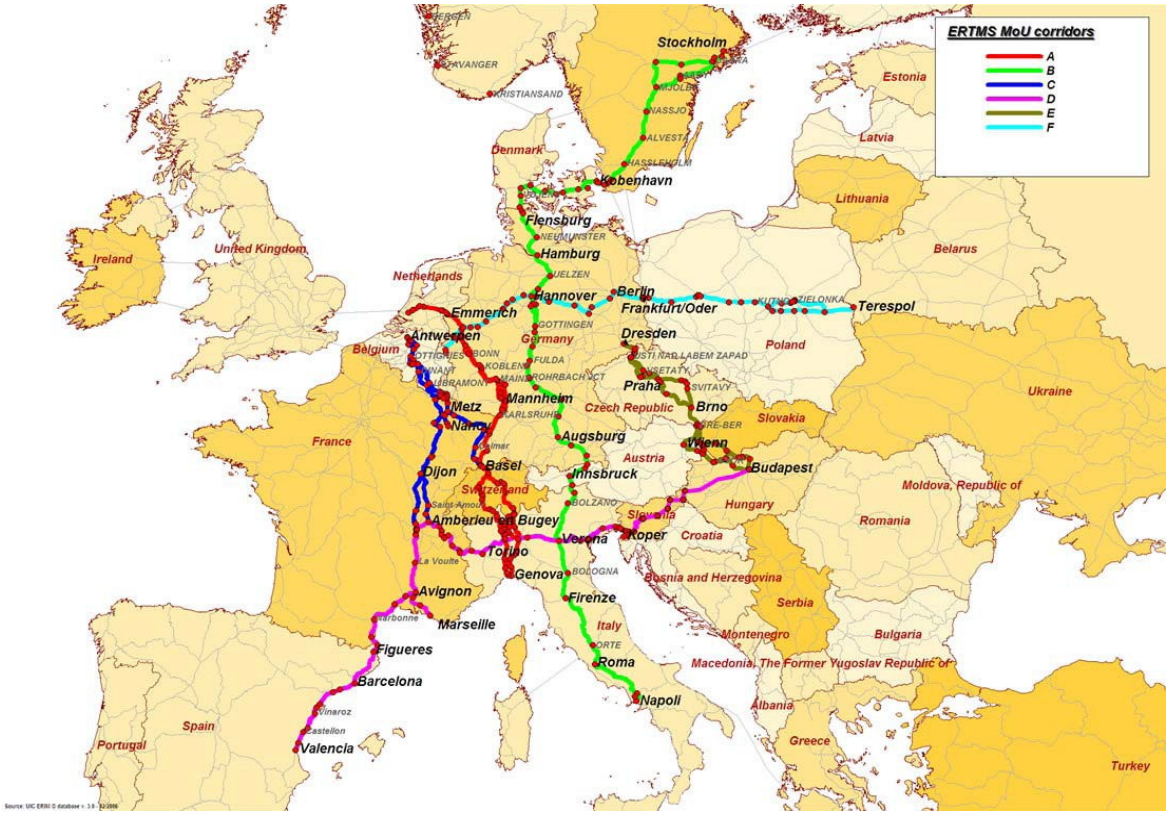

Figure 3: ERTMS Corridors

Source: UIC

[65] From the Annual Activity Report of Coordinator Karel Vinck on ERTMS, Brussels, 20 July 2010

[66] According to the figures in the ERTMS contracts signed recently and the national deployment plans submitted by Member States.

[67] These 6 Corridors fit in the 9 freight Corridors under Regulation COM(2007) 608 of the rail freight corridors.

[68] Commission Staff Working Document accompanying the Communication from the Commission to the Council and the European Parliament Progress report on the implementation of the Railway Safety Directive (Directive 2004/49/EC) and of the Railway Interoperability Directives (Directives 96/48/EC and 2001/16/EC) {COM(2009) 464 final}

[69] Annual Activity Report of Coordinator Karel Vinck on ERTMS, Brussels, 20 July 2010

As regards operational rules, much progress is not to be expected, since the different barriers to interoperability (administrative requirements, cross acceptance of vehicles, certification of vehicles operators, technical and commercial controls) would not be tackled together. Without increased top-down coordination between Member States, the situation is not likely to improve, despite the involvement of the European Coordinators and the use of the Open-Method of Coordination[70]. As indicated in the common report of the Coordinators[71], interoperability issues need to be addressed in common and alongside the planning and financial issues. In the absence of further legal and political commitments, it is unlikely that large and complex cross-border projects will be implemented and the capacity of current instruments to achieve a better *conditionality of EU funding* will remain limited. The co-funding within the TEN-T budget is likely to be too limited to kick off works on major cross-border sections or important bottlenecks with cross-border effects. Continuing with the current TEN-T policy approach would still leave key aspects of strategic European interest – i.e. solving bottlenecks and filling in missing links, developing multimodal connecting points – inadequately addressed. Some improvements could be achieved by means of the continuous sustained efforts of the European Coordinators, but their intervention will still address mainly the problem, and not its causes.

Impacts of TEN-T fragmentation

In the baseline scenario, with the continuation of the current Guidelines and current implementation, the free movement of goods will remain constrained by the low level of infrastructural interconnectivity between the European markets, especially as concerns the peripheral areas of Europe.[72] The current market segmentation of the Internal Market will thus endure, limiting the choice for consumers and the size of market for enterprises, especially for small businesses.

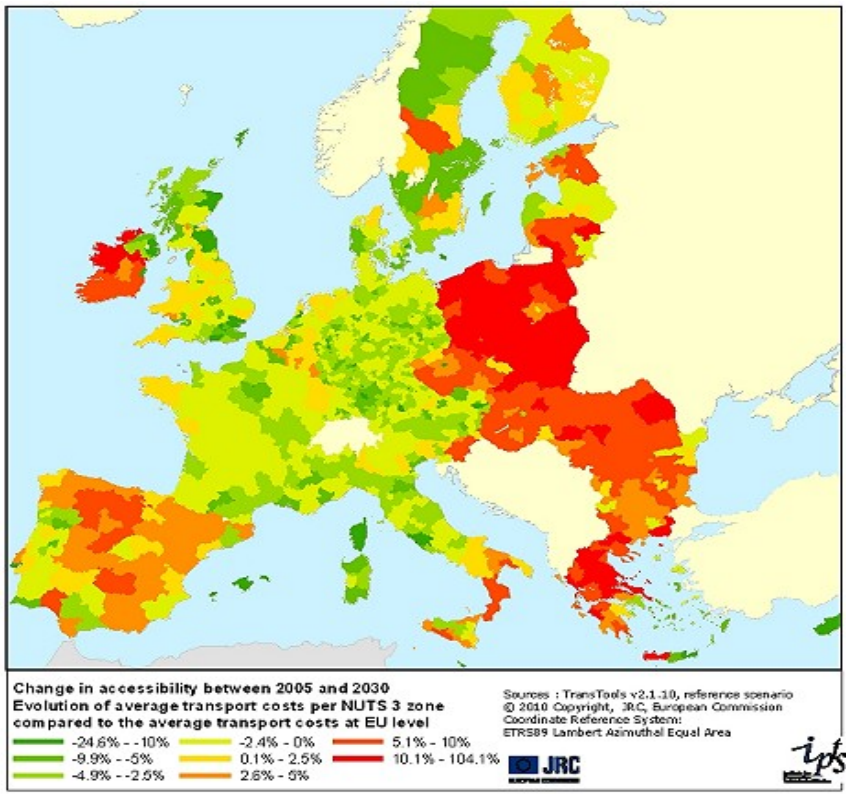

Figure 4: Change in accessibility between 2005 and 2030[73]

[70] See chapter 7
[71] http://ec.europa.eu/transport/infrastructure/european_coordinators/european_coordinators_en.htm
[72] See footnote 53
[73] See Impact Assessment White Paper, annex 3.

In addition, the expected rise in fuel costs and congestion levels by 2030 will lead to further divergence in accessibility at regional level. Peripheral areas with a high share of road transport are expected to worsen their situation, facing higher average transport cost increases than central areas. Moreover, with economic activity continuing to demonstrate signs of concentration in central EU regions, transport costs may hamper economic growth and job creation in peripheral regions.[74]

In the baseline scenario, the poor connection with neighbouring and 3rd countries and the lack of European-wide corridors providing easier access to EU markets for imports and an easier exporting route for exports, especially towards Eastern Neighbours, will limit the capacity for imports and exports with 3rd countries. The lack of adequate hinterland connections for major EU ports will create similar issues, since they would not prove an attractive/cost efficient point of (physical) access into the EU market.

It can be deducted from the above that the baseline scenario would have little if any positive impact on EU competitiveness. Indeed, its impact could be negative, due to the constraints on the free movement of goods, accessibility (see map above) and trade with third countries resulting from the lack of infrastructure. Moreover, the development of intelligent transport systems and management systems will be limited to the development foreseen in the current legislation (see above).

Impact on the transport system

In the baseline scenario, the Transport system will continue to be made of modes mostly co-existing apart from each other, with modal share following the current trends. Therefore, the potential efficiency gains from co-modality[75] would be limited to the initiatives already in place. Road transport, for which most of the European-wide network is realised, will continue to grow but will be hampered by congestion problems around major nodes. Though its share will be somewhat diminished, road will remain the main long distance transport mode. With transport prices continuing to rise in line with rising oil prices, the overall efficiency of the transport system is therefore likely to further decline as highlighted in the 2011 Transport White Paper. Rail transport efficiency would remain low due to continuing physical fragmentation and interoperability problems of the European network. Maritime transport would be affected by the lack of connection between ports and the other modes (hinterland connections).

Total transport activity is expected to continue to grow in line with economic activity. Total passenger transport activity would increase by 51% between 2005 and 2050 while freight transport activity by 82%.[76] The growth will not however be distributed proportionally among transport modes, nor across EU Member States.

In terms of modal split, the various modes are in general expected to maintain their relative importance at EU level. Passenger cars are expected to remain the largest mode, with almost 70% of total passenger activity, though this would represent a decrease of 3% compared to 2005 levels. Air, on the contrary is expected to grow by 3.4%, reaching 11.8% of total activity and consolidating its position as the second most important passenger mode (in terms of

[74] At present, the Iberian Peninsula is connected by a new rail link to the rest of the EU network in the same gauge. This link was realised with TEN-T support and helped in its implementation by the European Coordinator appointed. Since the recent opening of this line, a frequent shuttle between Barcelona and Lyon is operational. These efforts are being continued to strengthen the rail links on both sides of the Pyrenees, for both freight and passenger transport. Similar efforts are being made for connecting the Baltic (Rail Baltica) and Bulgaria / Greece (via Priority Project 22).

[75] Co-modality refers to a "use of different modes on their own and in combination" in the aim to obtain "an optimal and sustainable utilization of resources".

[76] This increase corresponds to an average annual increase of 1.2%, a rate that is slower than the assumed 1.7% annual increase of GDP. Passenger transport activity includes international aviation, while freight transport activity also includes international maritime.

passenger*kilometres). Railways are expected to gain 0.2% and reach 6.3% of total passenger transport volume. As regards freight, total transport volumes are expected to grow by 42%, with road and maritime transport growing at comparable rates. Rail is expected to grow faster (by almost 50%), aided by an expected slower increase in fuel costs and the positive impacts of the opening of the rail markets.

The geographic distribution of transport growth is not uniform. In absolute terms, road transport in EU-15 will attract most of the growth in demand. EU-10 and EU-2 will increase their transport volumes much faster though in relative terms, by 76% and 96% respectively. Growth is expected to be high for all modes in these member states, with road being the one growing fastest. Inland waterways traffic, especially in the Danube, is also expected to grow by more than 80%.

Source: Impact Assessment Report accompanying the White Paper on Transport (2011)

In the baseline scenario, road traffic congestion, expressed as congested versus total driving time, is to increase, according to the White Paper Impact Assessment. Congestion costs are projected to increase by about 50% by 2050, to nearly 200 bn € annually. The lack of new planned infrastructure connecting the peripheral areas would worsen this situation, as would the limited development of intelligent transport systems and interoperability, especially for rail. Cooperation among Member States (and sometimes also between Member States and local authorities) would continue to remain limited, thus failing to leverage the potential of synergic efforts at EU level to address major bottlenecks and inadequate or inexistent cross-border sections and, therefore, to reduce congestion.

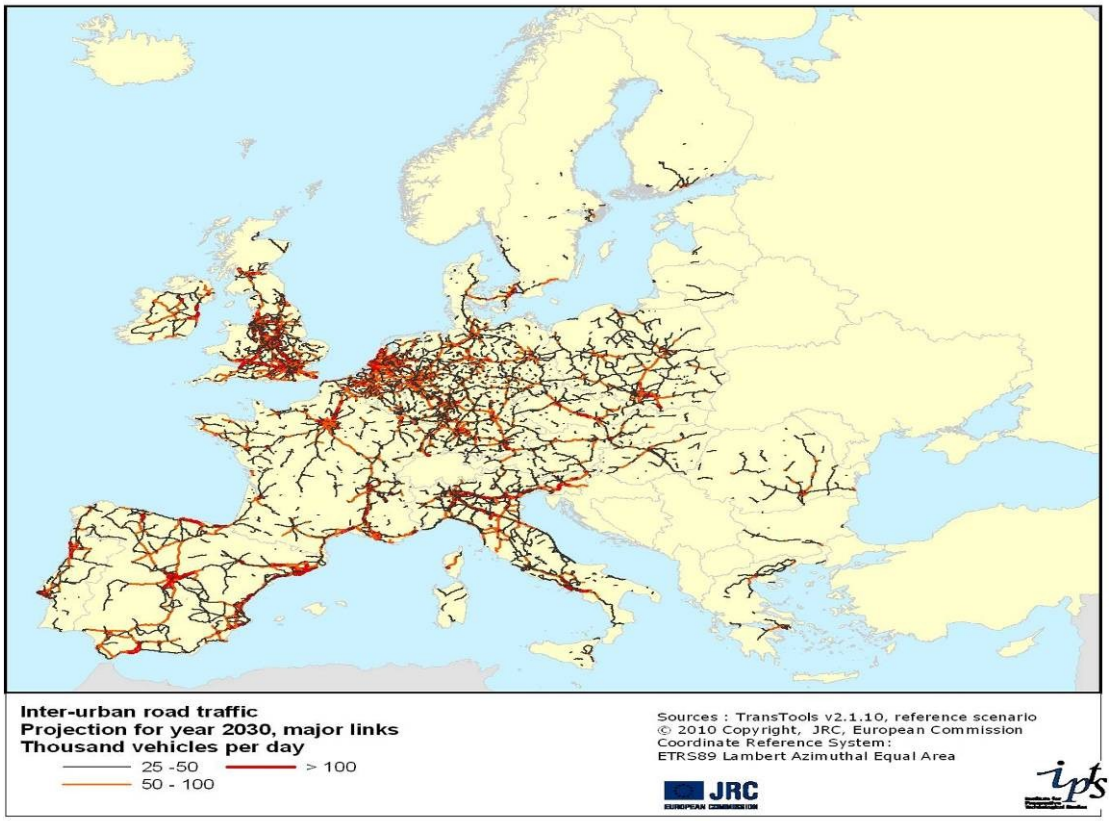

Figure 5: Congestion by 2030 in reference scenario

Source: Impact Assessment to the Transport White Paper, Annex 3

In the baseline scenario, the administrative burden on transport operators will remain the same as far as the implementation of the TEN-T Guidelines is concerned. Still, the administrative

burden will be reduced in line with the existing legislation for rail freight,[77] reporting formalities for ships or the Single European sky

Impact on the environment

According to projections presented in the White Paper Impact Assessment Report, fuel consumption (Mtoe) and emission of CO2 (Mio tonnes) are expected to increase by 15 % in 2020 (EU-25) in the baseline scenario. Oil products would still represent 89% of the EU transport sector needs in 2050.[78]

By implementing existing legislation, NOx emissions and particulate matter would drop however by about 40% and 50%, respectively, by 2030 and roughly stabilise afterwards. [79] As a result, external costs related to air pollutants would decrease by 60% by 2050. These projections are also supported by TENconnect II study results

The above data, coupled with that concerning the efficiency of the transport system, congestion and innovation presented earlier, indicate that the baseline scenario would have a negative impact on energy use on both a 2030 and 2050 time horizon, due to its negative impacts with regard to the overall efficiency of the transport system, including reducing congestion, encouraging modal shift and promoting innovative technologies development and adoption.

The impact on land-use change would be very limited as far as TEN-T infrastructure is concerned, since no further planning would be made and only the already planned infrastructure may be built. However, it would not prevent Member States from building projects of their own interest. It can be concluded that, if continuing with the current policy approach, the identified problem of infrastructure network fragmentation, in a context of expected increases in transport activities, would lead to increasingly negative economic, social and environmental impacts over time. With no policy change, the EU will not have the necessary infrastructure for addressing the goals inscribed in the Treaty and the priorities set out in the White Paper.

Sensitivity analysis

Considering the high degree of uncertainty surrounding projections over such a long time horizon, especially for such a complex system as transport network, an evaluation is provided below for the possible impact of external factors on the assumptions underlying the baseline scenario.

First, the high degree of uncertainty regarding budgetary constraints at the level of the Member States and the unknown factors concerning the next EU multi-annual financial framework and the TEN Financial Regulations needs to be taken into consideration[80]. The development of hard and soft infrastructure, being extremely costly, very much depends on the public and private resources available. The situation described above in the baseline Scenario is rather an optimistic scenario (Figure 1 of this document, from the 2010 Progress Report illustrates the existing delays on many sections of the Priority Projects) in terms of infrastructure development since it considers that the EU and the Member States will have sufficient resources available to complete the 30 Priority Projects by 2025. However, if investments in transport infrastructure are seen as a way out the crisis[81], the development of the TEN-T could be accelerated further.

[77] Regulation 913/2010 of the European Parliament and of the Council concerning a European rail network for competitive freight

[78] Ibid

[79] According to the Impact assessment of the White Paper, p 74

[80] These questions are developed further in part 5.6.2 of this document.

[81] For instance with a similar approach as for the European Energy Programme for Recovery, with a prioritisation of investments on key energy and Internet broadband infrastructure projects.

2.5. Does the Union have the right to act?

Articles 170 – 171 of the Treaty on the Functioning of the Union define the objectives and scope of the TEN-T policy. Article 170 specifies that "To help achieve the objectives referred to in Articles 26 [the completion of the internal market] and 174 [economic, social and territorial cohesion] and to enable citizens of the Union, economic operators and regional and local communities to derive full benefit from setting-up of an area without internal frontiers, the Union shall contribute to the establishment and development of trans-European networks in the areas of transport, telecommunications and energy infrastructures." It also specifies that "action by the Union shall aim at promoting the interconnection and interoperability of national networks as well as access to such networks."

Article 171 sets the obligation that "the Union shall establish a series of Guidelines covering the objectives, priorities and broad lines of measures envisaged in the sphere of trans-European networks; these Guidelines shall identify projects of common interest".

Article 172 sets the Framework for the application of the principle of subsidiarity, by stipulating that "Guidelines and projects of common interest which relate to the territory of a Member State shall require the approval of the Member State concerned." Moreover, Member States, as well as the regional or local authorities, bear the lion share of the financing related to the construction, maintenance and management of infrastructure. The need for coordination between the Union establishing the Guidelines and the Member States implementing it has led to the setting up of the TEN-T Guidelines Committee, as stipulated in the Article 21 of the current Guidelines. This Committee has been involved at every stage of the revision of the TEN-T Guidelines.

In areas which do not fall within EU exclusive competence, EU action has to be justified. In the present case, it is therefore necessary that the subsidiarity principle set out in Article 5 (3) of the Treaty on the European Union is respected. This involves assessing two aspects.

Necessity test

Firstly, it is important to be sure that the objectives of the proposed action could not be achieved sufficiently by Member States in the framework of their national constitutional system, the so-called necessity test. Given the fact that the overall concept is to create an EU-wide integrated transport network, the Member States per se are not able to meet these challenges individually for the following reasons:

As pointed out in the problem definition, Member States primarily consider transport flows of national importance when planning future infrastructure. Infrastructure planning to cater for long distance transport flows of European importance is, conversely not sufficiently considered by Member States. For the same reason, even when planning is cross border, they tend to allocate less importance and resources to the building of the cross border sections, as has been the experience with the current Priority Projects[82]. In some cases, the countries of both sides of a border are interested in the corresponding project to a different extent[83]. Regarding implementation, the lack of coordination between Member States leads to the development of different standards and operational rules hindering the coherence of the functioning of the TEN-T network and the Internal Market as a whole[84].

[82] Priority Project Progress report 2010

[83] In some cases the more central states are less interested in the project than the more peripheral ones. While the internal profitability of a project is the same on both sides of the border, there might be considerable differences in its socio-economic value: for the more peripheral country, the project would improve its accessibility and therefore may be very important; however for the more central country it would have little impact on its accessibility and therefore not have the same importance.

[84] See Position Paper of the European Transport Coordinators on the Future of TEN-T Policy, 6 October 2009

Therefore, the coordinated development – both in terms of planning and implementation – of TEN-T infrastructure to support long distance transport flows of European interest and economic, social and territorial cohesion needs to be undertaken at Union level.

The proposed policy options for renewed TEN-T Guidelines will focus on addressing trans-national aspects that cannot be satisfactorily taken into account by Member States, such as filling the missing links that could facilitate cross-border transport, the interoperability of equipment and establishing an internal market for Intelligent Transport Systems (ITS) and services. EU coordination would have thus also a clear added value with respect to setting of standards and increasing the quality of services as well as the management of cross-border infrastructure links and international traffic flows.

Test of EU added value

Secondly, it has to be considered whether and how the objectives could be better achieved by action on the part of the EU, the so-called "test of European added value". The rationale for a European action in the field of TEN-T stems from the trans-national nature of the identified problem. However, it has to take into account that a 'one size fits all' approach would not be an adequate response. Therefore, an action at EU level coupled with actions at all administrative levels would yield significant added value.

For these reasons, the policy objectives set out in section 3 of the present Impact Assessment report cannot be sufficiently achieved by actions of the Member States alone, but can rather, by reason or scale of the proposed action, be better achieved with high involvement of the EU.

3. POLICY OBJECTIVES

Section 2 has shown that the TEN-T today is not sufficiently integrated to the extent of supporting the major transformation towards a competitive and resource efficient transport system by 2050. More specifically, it has been explained that the current fragmentation of the TEN-T network at all levels is a major obstacle to a smooth and resource efficient functioning of the internal market and to economic, social and territorial cohesion.

This section defines the general, specific and operational objectives of the proposed initiative, discusses possible trade-offs and synergies between objectives and verifies their consistency with other EU horizontal objectives.

3.1. Policy Objectives

3.1.1 General Objectives

The overall aim of this initiative is to provide by 2030 for the establishment of a complete and integrated TEN-T that would maximise the value added for Europe of the network. This optimal network would cover and link all EU Member States in an intermodal and interoperable manner. This network would also provide links to neighbouring and third countries, as well as all transport modes and systems that would support the move towards a competitive and resource-efficient transport system by 2050.

This aim is consistent with the 'Inclusion Growth' initiative of Europe 2020, the Single Market Act and with the general goal of the TEN-T policy; to improve the competitiveness of the EU economy as a whole, to support the completion of the internal market, and to contribute to a balanced territorial development of the Union.

In addition, as stipulated in the Europe 2020 Strategy, and further detailed in the White Paper, the TEN-T shall contribute to the 'Sustainable Growth' initiative, and in particular the 'Resource Efficiency' flagship, by facilitating a reduction of GHG emissions by 60% for

transport. It will also be in line with the renewed Sustainable Development Strategy[85] by contributing to more sustainable mobility.[86]

3.1.2 Specific Objectives

The general objective of establishing a complete and integrated TEN-T that would maximise the value added for Europe of the network can be translated into more specific goals. Each of these 4 specific objectives intends to address one of the 4 drivers leading to the problem of fragmentation.

The first specific objective shall enhance the EU **planning** that will enable to define the optimal network as defined above and to identify "the missing links" in the current TEN-T:

- Define a coherent & transparent approach to maximise the EU added value of the TEN-T, addressing aspects of network fragmentation linked to missing links, multimodality, and adequate connections to neighbouring and 3rd countries, as well as ensure adequate geographical coverage.

The next three specific objectives shall design a sound governance structure to secure the **implementation** of the optimal network and of the "missing links" identified. This governance structure would foster the implementation of European standards for management systems and push for the development of the harmonisation of operational rules and enhance MS cooperation. This will ensure that EU funds are allocated to the identified "missing links" and to the implementation efforts of these missing links. These specific objectives for implementation are:

- Foster the implementation of European *standards* for management systems and push for the development of harmonised operational *rules* on the TEN-T projects of common interest. This objective however does not aim at imposing new specific standards and rules, but rather at ensuring the effective adoption and implementation of common European standards already developed, both in the field of traffic management and information systems[87] and in the field of operational rules and technical specifications of physical infrastructure.[88]
- Enhance Member States cooperation in order to coordinate investments, timing, choice of routes, environmental and cost-benefit assessments for projects of common interest.
- Ensure that the optimal network configuration is a key element in the allocation of EU funding enabling the focus on cross-border sections, missing-links and bottlenecks.

[85] European Council, June 2006

[86] This goal is supported by some environmental organisations which want to focus on the reduction of unsustainable emissions, costly congestion and less road accidents for a more energy efficient and cleaner transport as shown in the Report on the "Consultation on the Future Trans-European Network Policy".

[87] ERTMS, SESAR etc., see the list detailed in the "operational objectives" sub-section.

[88] Such as train length, axel weight and the like.

Table 2: Mapping problem, drivers and objectives

Problem			*General objective*
Fragmentation of TEN-T network			Establish a complete and integrated TEN-T network that would maximise the value added for Europe of a network
Drivers to the problem			***Specific objectives***
Planning			***Planning***
Dr.1	Lack of a genuine European design in the spatial configuration of the network	*SO1*	Define a coherent & transparent approach to maximise the EU added value of the TEN-T network
Implementation			***Implementation***
Dr.2	Insufficient implementation of common standards and adoption of common rules for the interoperability of networks within the TEN-T	*SO2*	Foster the implementation of European standards for management systems and push for the development of the harmonisation of operational rules on the TEN-T project of common interest.
Dr.3	Limited cooperation among Member States in project implementation	*SO3*	Enhance Member States cooperation in order to coordinate investments, timing, choice of the routes, environmental and cost-benefit assessments for projects of common interest
Dr.4	Lack of sufficient conditionality of TEN-T funding instruments	*SO4*	Ensure that the optimal network configuration is a key element in the allocation of EU funding allowing to focus on cross-border sections, missing-links and bottlenecks

3.1.3 Operational objectives

In addition, the specific objectives have been further detailed in the following operational objectives, with two operational objectives for each of the specific objectives.

The methodology to define the network configuration should allow to:

- connect all main airports and seaports to other modes, especially (High-Speed) railways and inland waterway systems by 2050[89];
- and to shift 30% of road freight over 300 km to other modes such as rail or waterborne transport by 2030, and more than 50% by 2050.[90]

The implementation of European standards and adoption of common rules should be realised by:

- ensuring by 2030 the deployment of European transport management systems (ERTMS, SESAR, ITS, RIS, SSN and LRIT) on the projects of common interest[91][92]
- and ensuring the commitments of Member States to agree on common operational rules in order have fully functional projects of common interest by 2030.
- The enhancement of Member States cooperation will be realised by:
- Obtaining binding commitments by Member States for the implementation of essential cross-border projects with a binding timetable;
- and obtaining binding commitments by Member States for the implementation of bottlenecks and missing-links on their territory that have cross-border effects.

[89] This is also goal 6 of the Transport White Paper
[90] This is also goal 3 of the Transport White Paper
[91] This is in line with goal 7 of the Transport White Paper.
[92] As noted in The Report on the "Consultation on the Future Trans-European Network Policy", stakeholders agree that ITS and ICT could be a good supplement to classical infrastructure investment, to boost energy efficiency and environmental sustainability.

The optimal network configuration shall allow:

- ensuring priority for cross-border projects, bottlenecks and missing-links, interoperability and intermodality;
- and ensuring conditionality of EU funding upon compliance with EU environmental legislation (SEA, EIA & Natura 2000).[93]

3.2. Possible trade offs and synergies between the objectives

The overall goal in developing the TEN-T, and of the current revision process, is to maximise EU added value of the TEN-T network. Efficiency, from the point of view of the EU, could be seen as fulfilment of the whole set of objectives laid down in the Treaty in a balanced way, against the corresponding costs and efforts. Achieving a sound balance between traffic demand in central regions and accessibility in peripheral ones is therefore in this context, efficient.

The approach to planning the network configuration, as set out in the first specific objective, will be aimed at identifying the optimal network configuration from an EU-added value perspective. This methodology shall therefore find the right balance between a large coverage of the Union by the network and the need to take into account the main traffic flows, in order to solve the potential conflict between territorial cohesion and economic competitiveness. A geographical approach for strategic network planning does not necessarily contradict a purely traffic driven/competitiveness approach, as the geographical distribution of main nodes (major cities and economic centres) is the main driver of major long-distance traffic flows.

As set out in the fourth specific objective, an optimal network configuration shall be a key element in optimising the conditionality for the use of EU funds. As such, there should be no trade off between a network configuration that adequately covers the entire territory of the Union and an efficient allocation of EU funding. On the contrary, ensuring that EU funds are allocated only to projects aimed to develop parts of the optimised network configuration, coupled with stronger measures as concerns implementation requirements (as ensured by specific objectives 2, 3 and 4), will ensure that EU funds are allocated primarily to projects that ensure a high EU-added value. Moreover, the approach to define and implement the network shall be flexible, based on traffic needs: a four-line motorway, multi-modal connections or a high-speed rail line will not be needed on each connection of the network. Therefore, costs shall be in line with the needs, allowing for the maximisation of the EU added value by a smart approach for the allocation of EU funds.

Another possible trade off would be between the objectives of "Inclusive Growth" and "Sustainable Growth". Building new infrastructure can lead to an increase in traffic and so to increased emissions of pollutants and greenhouse gasses. The TEN-T policy aims at addressing this trade off first of all by enhancing modal shift, as set out in the 1st and 2nd operational objectives. Nevertheless, infrastructure planning measures alone would not be sufficient. They would need to be combined with a strong implementation approach and other transport policy measures (such as pricing, cleaner technologies …) in order to make transport more efficient and cleaner. Some of these measures are included in the operational objectives of the TEN-T Guidelines and some of them are part of the general transport policy, as set out in the Transport White Paper. In this way, transport infrastructure planning and implementation can serve both general objectives of inclusive and sustainable growth by being a main implementation tool of multiple initiatives of transport policy.

[93] The Report on the "Consultation on the Future Trans-European Network Policy" states that "EU funding should be made fully conditional upon maximum effort to avoid areas of high nature and biodiversity value."

4. POLICY OPTIONS FOR TEN-T DEVELOPMENT

This section will explore alternative policy options aimed at establishing a complete and integrated TEN-T network by 2030 as described in section 3 above.

4.1. Two-pronged process leading to identification of policy options

As described in the first section of this report, the input of the process of internal and external consultation, together with the findings of external studies and assessments, has allowed the Commission to identify more precisely the problem to be solved, the four main underlying drivers and the corresponding fields for action, namely the conceptual planning and the means for implementation as explained in part 2.4 above, and possible actions that would be appropriate to address those issues. On this basis, the two-pronged process described below was applied for generating a range of possible policy options that could address the drivers identified earlier as leading to TEN-T's current fragmentation and help thus achieve the objectives set out in section 3 of this report.

4.1.1. Identification of generic scenarios for planning and implementation

The Commission has first identified a range of possible generic policy scenarios in each field for action (planning and implementation). The scenarios are presented in Table 3 below.

Coherence with the overall EU Treaty objective of economic, social and territorial cohesion, with the Europe 2020 Strategy and its main priorities, with the priorities set in the White Paper for transport and the budgetary principles set out in the EU Budget Review Communication (as outlined in part 2.1 of this report), has provided the main conceptual grid that guided the Commission in considering the generic scenarios in the first place.

Five "**planning scenarios**" have been envisaged: business-as-usual, guidelines discarded, selection of new PPs (or Essen), Core Network and dense comprehensive network. The "planning scenarios" have been developed starting from the three policy options proposed for consideration in the first stage of the public consultation (Green Paper, February 2009), and taking into consideration the subsequent stakeholders' input.[94] The possible planning scenarios submitted to public consultation in February 2009 included one scenario, namely "Priority Projects" only, which was later not retained as part of the planning scenarios considered for the present IA. A majority of stakeholders considered this scenario as forfeiting the Treaty objectives of ensuring overall internal market accessibility and support for economic, social and territorial cohesion, as it diverts EU focus and funding away from the development of the overall/comprehensive TEN-T. The lack of coherence of this possible planning scenario with the overall Treaty objectives is therefore the reason why this scenario has not been eventually retained among the planning scenarios considered for policy options development.[95],

Five "**implementation scenarios**" (i.e. addressing issues such as standards allowing interoperability, cooperation among Member States and conditionality of funding) have been elaborated: business-as-usual, guidelines discarded, regulatory approach only, reinforced coordination and EU full operational management.[96] These alternative "implementation

[94] The Report on the "Consultation on the Future Trans-European Network Policy" mentioned while most Member States clearly point out that planning and implementation has to be done by them, some associations and European organisations preferred a centralised approach led by the EU level.

[95] It was subsequently substituted with a "dense comprehensive network" planning approach that, intuitively, was deemed to better ensure such coherence.

[96] These scenarios were developed following the recommendations of the expert groups set up to develop further the TEN-T policy revision options following the input of the stakeholders during the February – April 2009 public consultation process. The recommendations of "Expert group 3 – intelligent transport systems and new technologies within the framework of the TEN-T", "Expert group 5 – TEN-T financing" and "Expert group 6 – legal issues and non-financial instruments for TEN-T implementation", in particular, made apparent the need for coordinated intervention also at TEN-T implementation level.

scenarios" had not been distinctly considered in the first stage of public consultation. Rather, the need for tackling, at the same time, both planning and implementation aspects of the TEN-T policy became apparent following the public consultation process.

Scenarios envisaged in the field of planning	
Name	*Content*
A1 - Business as usual	- Same framework as in baseline, including the currently designated 30 PPs; - No identification of further PPs.
A2 - Guidelines discarded	- No EU guidance towards identification of projects of common interest following the end of the current MFF; - No "European interest" priority status as well as any eventual further EU support towards covering financial needs for current PPs.
A3 - Selection of new PPs (or Essen 2)	- Identification of new priority projects following the current, primarily bottom-up approach to project selection, as endorsed by the Essen European Council in 1994; - Largely unchanged process with respect to wider TEN-T identification and PP selection; - Upgrade of the wider TEN-T (based on projects completed and/or abandoned by Member States); - Revision of criteria for Priority Project identification to better specify the elements that would constitute the European added-value of priority projects[97].
A4 - Core Network	- Enhanced top-down and multi-modal approach to TEN-T planning; - Two planning layers: basic layer (comprehensive network resulting from an updating and adjustment of the current wider TEN-T) and top layer (core network, overlaying the comprehensive network and constituted of the EU strategically most important parts of the TEN-T); - Definition of methodologies for transparently and coherently identifying the network components for both layers across the territory of all Member States, and insuring their multi-modality; - Continued consultation throughout the process of application of the methodology, ensuring ownership of the process (and results) of TEN-T configuration identification by the Member States.
A5 – Dense TEN-T network	Same as in A4, but criteria and standards that in A4 would be applied to entire/comprehensive TEN-T network

Table 3a: Planning scenarios

[97] I.e., as identified based on current, accumulated, experience: mainly cross-border links, multimodal connecting links, links alleviating bottlenecks, links to neighbouring and third countries.

Scenarios envisaged in the field of implementation	
Name	*Content*
B1 – Business-as-usual	- Same as in baseline, including the current implementation instruments[98]; - Continuation of initiatives currently under way with regard to interoperability standards[99] and TEN-T projects.
B2 – Guidelines discarded	- No TEN-T implementation support activities foreseen or financed at the end of the current MFF at EU level.
B3 – Regulatory approach only	- Discontinuation of current coordination instruments, limiting EU action to a TEN-T Regulation that will strictly define the priority projects/network map to be funded, the interoperability standards to be applied and the timetables for completion; - Funding strictly conditional upon all criteria and standards being met.
B4 – Reinforced coordination	- Reinforced coordination at PP level or at Corridor level[100][101]; - Coordinated approach ensured by individual PPs or Corridor Decisions at PP/Corridor level in the undertaking of infrastructural investments, the management of PP/corridor capacity, the deployment of interoperability standards and traffic management systems; the Decisions will place the overall management authority under the aegis of the European/Corridor Coordinators, while the TEN-T EA will continue in its role of support towards project preparation and implementation.
B5 – EU full operational management (through a Regulation)	- Complete centralised management of the planned network via the EU agencies[102] under the coordination of the Commission and the European Coordinators; - EU level responsibilities including management of project proposal development and accompanying cost-benefit analyses and environmental impact assessments, management of funding and implementation of all TEN-T projects, establishment and deployment of interoperability standards and systems across the network.

Table 3b: Implementation scenarios

[98] Both the financial (TEN-T Programme and Cohesion Fund and EIB loans and grants) and the coordination (TEN-T EA, European Coordinators, TENtec) instruments.
[99] Such as the implementation of the ERTMS corridors, the ITS Directives, the Single European Sky etc.
[100] At PP level, in the case of A1 and A3 planning scenarios, and at corridor level (or "corridor approach") if combined with a network approach to TEN-T planning, as in the case of A4 and A5 scenarios.
[101] As noted in the Report on the "Consultation on the Future Trans-European Network Policy", the corridor approach including high-speed rail, ERTMS, green and freight corridors into the Core Network and a joint management involving infrastructure managers is seen as key for the development of TEN-T by some contributors.
[102] ERA, EASA, TEN-T EA

4.1.2. Identification of possible policy options

As pointed out earlier, the consultation process made apparent that only intervention covering both fields (planning and implementation) would be capable of tackling at the same time and in a satisfactory way all the various problem drivers and addressing all the specific policy objectives.

In light of this, the interaction between each of the five scenario envisaged for action at the level of planning with each of the five scenario envisaged for action at the level of implementation (including the respective planning and implementation scenarios pertaining to the baseline) has been considered within alternative policy options. 25 (theoretically) possible alternative policy options, constituting potentially viable policy alternatives for achieving the objectives identified in section 3 above, were thus initially generated.

Nevertheless, for reasons of compatibility between scenarios, five theoretical combinations involving the A2/"Guidelines discarded" scenario were discarded from the beginning, as this planning scenario is not compatible with any implementation scenario. "Guidelines discarded" was considered subsequently as a policy option in its own, without an implementation dimension.

Following this second phase of policy options generation, a total of 21 possible policy options[103], as briefly presented in the table below, have been identified.

	B1	*B2*	*B3*	*B4*	*B5*
A1	Business as usual / Continuation with current 30 PPs and current implementation approach	Continuation of current 30 PPs but with no further EU implementation support	Continuation of current 30 PPs with a purely regulatory approach to implementation	Continuation of current 30 PPs with reinforced coordination	Continuation of current 30 PPs with full EU operational management
A2	Guidelines discarded	Guidelines discarded	Guidelines discarded	Guidelines discarded	Guidelines discarded
A3	MS selection of new PPs (Essen 2) with current implementation approach	MS selection of new PPs (Essen 2) with no further EU implementation support	MS selection of new PPs (Essen 2) with purely regulatory approach to implementation	MS selection of new PPs (Essen 2) with reinforced coordination	MS selection of new PPs (Essen 2) with full EU operational management
A4	Dual layer (core and comprehensive) network with current implementation approach	Dual layer (core and comprehensive) network with no EU implementation support	Dual layer (core and comprehensive network with purely regulatory approach to implementation	Dual layer (core and comprehensive) TEN-T with Reinforced coordination	Dual layer (core and comprehensive) network with full EU operational management
A5	Dense TEN-T with current implementation approach	Dense TEN-T with no further EU implementation support	Dense TEN-T Purely regulatory approach to implementation	Dense TEN-T with reinforced coordination	Dense TEN-T with full EU operational management

Table 4: Identification of possible Policy Options

4.2. Pre-screening of envisaged alternative policy options

The high number and complexity of the resulting possible policy options raised issues of feasibility and efficiency of an in-depth assessment for all of them, making a preliminary assessment and the discarding of policy options necessary.

[103] See annex 3 of the present report.

The Commission performed therefore a preliminary assessment of the 21 possible policy options on the basis of their effectiveness in addressing current problem drivers (and, as such, towards attaining the policy objectives of the TEN-T Guidelines revision) and of their efficiency. In parallel, the coherence of the possible policy options with the principles of subsidiarity and proportionality has been assessed.

As regards the **effectiveness** criterion, each planning and, respectively, implementation scenario has been assessed with regard to its capacity to have a significant impact on the problem driver(s) it was designed to address. This preliminary analysis has proved an effective approach to reducing the range of policy options to those that promised to promote a sufficient departure from the current approach (business-as-usual/baseline scenario) in terms of achievement of the overall TEN-T policy objective.

The selection rule was given by the presumption that only those scenario combinations that would ensure a significant (positive) impact (i.e. rated medium [++] or high [+++]) on *all* problem drivers would be worthwhile considering as viable alternative policy options, capable of ensuring the achievement of the overall TEN-T policy goals. Conversely, any combination of scenarios for which the assessment included insufficient (i.e. negative [-] or none [0]) impacts on any of the drivers was discarded for further consideration as a policy option.

i. Insufficiently addressing the "planning" driver, that underpins aspects of TEN-T fragmentation due to the absence of a genuine European design, will mean perpetuating current physical – geographical and modal – fragmentation problems (missing cross-border links, missing or insufficiently developed inter-modal nodes/platforms, traffic bottlenecks) and failing to ensure "the establishment of a complete and integrated TEN-T that would maximise the value added for Europe of the network ".

ii. Insufficiently addressing the "interoperability" driver, even in a scenario where the physical fragmentation aspects are addressed, will lead to a situation where, due to limited interoperability, the TEN-T will still fail to function as an "integrated" network.[104]

iii. Insufficiently addressing the "limited cooperation among Member States in project implementation" driver would mean failing to fully leverage the efforts towards improved European planning coordination and interoperability. Continuing incongruence and delays in building cross-border links (see p. 13 in this report) would lead to an undesirable scenario where the impact of high investments of EU and Member States resources (financial but not only) would be importantly diluted, as sections on the TEN-T with significant EU-added value will fail to be timely delivered.

iv. Finally, insufficiently addressing the "conditionality of EU funding instruments" would mean risking that the efficiency of (limited) EU and Member States funds would remain suboptimal. They would continue to be dispersed towards favourite (i.e. highly politically rewarding) Member States projects, rather than being focused towards projects that would make most EU added value sense (i.e. from an enhancing overall EU competitiveness and balanced territorial development perspective).

The outcome of this selection process is summarised in the table 5 below. A more detailed assessment of each scenario's impacts on the problem drivers is presented in Annex 3 to this report.

[104] For example, what would be the added value of a fully integrated high-speed rail connecting the North and the South of the Continent or the East and the West, if the train had to stop at each border crossing to change drivers, or switch power adaptor or even locomotive, not to mention the number of fire extinguishers as would be the case with today's conventional rail transport?

Table 5: Effectiveness in addressing current problem drivers

Impacts on / Options	Planning coordination	Interoperability (adoption of common standards & systems)	Member States cooperation in project implementation	Conditionality of EU funding
A1B1 **Business as usual / Continuation with current 30 PPs and current implementation approach**	[0] Continued limited coordination in a bottom-up process	[0] Slow but not sufficient progress	[+] Improvements due to continued European Coordinators' support	[0] Current provisions are maintained
A1B2 **Continuation of current 30 PPs but with no further EU implementation support**	[0] Continued limited coordination in a bottom-up process	[0/-] Rhythm of adoption likely to slow down	[-] Likely deterioration due to removal of European Coordinators and TEN-TEA support	[-] Likely shift towards projects of primarily MS rather than EU interest
A1B3 **Continuation of current 30 PPs with a purely regulatory approach to implementation**	[0] Continued limited coordination in a bottom-up process	[0/+] Progress but in a likely slow rythm	[+] Improvements but likely not to the extent aimed for	[0/+] High on paper but likely limited in practice due to implementation inefficiencies
A1B4 **Continuation of current 30 PPs with reinforced coordination**	[0] Continued limited coordination in a bottom-up process	[++] Sustained progress due to specifically targeted support	[+++] Substantial increase due to strong emphasis on binding coordination commitments	[+++] High due to strong focus on both binding commitments and measures to support implementation
A1B5 **Continuation of current 30 PPs with full EU operational management**	[0] Continued limited coordination in a bottom-up process	[++] Strong EU-level coordination but likely strained implementation capacity	[-] Likely resistance by MS to shifting project implementation responsibilities at EU agencies level	[+] High in principle but likely much less effective in practice due to inefficiencies in implementation in an overly top-down approach
A2 **Guidelines discarded**	[-] MS are left to choose new projects for development in complete freedom	n/a	n/a	n/a
A3B1 **MS selection of new PPs (Essen 2) with current implementation approach**	[+] Better criteria leading to better EU steering of PP selection process	[0] Slow but not sufficient progress	[+] Improvements due to continued European Coordinators' support	[0] Current provisions are maintained

A3B2 **MS selection of new PPs (Essen 2) with no further EU implementation support**	[+] Better criteria leading to better EU steering of PP selection process	[0/-] Rhythm of adoption likely to slow down	[-] Likely deterioration due to removal of European Coordinators and TEN-TEA support	[-] Likely shift towards projects of primarily MS rather than EU interest
A3B3 **MS selection of new PPs (Essen 2) with purely regulatory approach to implementation**	[+] Better criteria leading to better EU steering of PP selection process	[0/+] Progress but in a likely slow rythm	[+] Improvements but likely not to the extent aimed for	[0/+] High on paper but likely limited in practice due to implementation inefficiencies
A3B4 **MS selection of new PPs (Essen 2) with reinforced coordination**	[+] Better criteria leading to better EU steering of PP selection process	[++] Sustained progress due to specifically targeted support	[+++] Substantial increase due to strong emphasis on binding coordination commitments	[++] Strong focus on both binding commitments and measures to support implementation but diluted by lower levels of coordination in planning
A3B5 **MS selection of new PPs (Essen 2) with full EU operational management**	[+] Better criteria leading to better EU steering of PP selection process	[++] Strong EU-level coordination but likely strained implementation capacity	[-] Likely resistance by MS to shifting project implementation responsibilities at EU agencies level	[+] High in principle but likely much less effective in practice due to inefficiencies in implementation in an overly top-down approach
A4B1 **Dual layer (core and comprehensive) network with current implementation approach**	[++] Enhanced coordination due to clear methodology for network configuration applied consistently across all MS	[0] Slow but not sufficient progress	[+] Improvements due to continued European Coordinators' support	[0] Current provisions are maintained
A4B2 **Dual layer (core and comprehensive) network with no EU implementation support**	[++] Enhanced coordination due to clear methodology for core network configuration applied consistently across all MS	[0/-] Rhythm of adoption likely to slow down	[-] Likely deterioration due to removal of European Coordinators and TEN-TEA support	[-] Likely shift towards projects of primarily MS rather than EU interest
A4B3 **with purely regulatory approach to implementation**	[++] Enhanced coordination due to clear methodology for core network configuration applied consistently across all MS	[0/+] Progress but in a likely slow rythm	[+] Improvements but likely not to the extent aimed for	[0/+] High on paper but likely limited in practice due to implementation inefficiencies

A4B4 **Dual layer (core and comprehensive) TEN-T** **Reinforced coordination**	[++] Enhanced coordination due to clear methodology for core network configuration applied consistently across all MS	[++] Sustained progress due to specifically targeted support	[+++] Substantial increase due to strong emphasis on binding coordination commitments	[+++] High due to strong focus on both binding commitments and measures to support implementation and strong planning coordination
A4B5 **Dual layer (core and comprehensive) network with full EU operational management**	[++] Enhanced coordination due to clear methodology for core network configuration applied consistently across all MS	[++] Strong EU-level coordination but likely strained implementation capacity	[-] Likely resistance by MS to shifting project implementation responsibilities at EU agencies level	[+] High in principle but likely much less effective in practice due to inefficiencies in implementation in an overly top-down approach
A5B1 **Dense TEN-T with current implementation approach**	[+++] Strong planning coordination for entire TEN-T (and not just a selected core)	[0] Slow but not sufficient	[+] Improvements due to continued European Coordinators' support	[0] Current provisions are maintained
A5B2 **Dense TEN-T with no further EU implementation support**	[+++] Strong planning coordination for entire TEN-T (and not just a selected core)	[0/-] Rhythm of adoption likely to slow down	[-] Likely deterioration due to removal of European Coordinators and TEN-TEA support	[-] Likely shift towards projects of primarily MS rather than EU interest
A5B3 **Dense TEN-T** **Purely regulatory approach to implementation**	[+++] Strong planning coordination for entire TEN-T (and not just a selected core)	[0/+] Progress but in a likely slow rythm	[+] Improvements but likely not to the extent aimed for	[0/+] High on paper but likely limited in practice due to implementation inefficiencies
A5B4 **Dense TEN-T with reinforced coordination**	[+++] Strong planning coordination for entire TEN-T (and not just a selected core)	[++] Sustained progress due to specifically targeted support	[+++] Substantial increase due to strong emphasis on binding coordination commitments	[+++] High due to strong focus on both binding commitments and measures to support implementation and high planning coordination
A5B5 **Dense TEN-T with full EU operational management**	[+++] Strong planning coordination for entire TEN-T (and not just a selected core)	[++] Strong EU-level coordination but likely strained implementation capacity	[-] Likely resistance by MS to shifting project implementation responsibilities at EU agencies level	[+] High in principle but likely much less effective in practice due to inefficiencies in implementation in an overly top-down approach

Legend: [-] negative; [0] none; [+] low; [++] medium; [+++] high.

As the table above makes apparent, following this preliminary assessment three scenario combinations came out as clearly viable policy options – A3B4, A4B4, A5B4 (in green), with a forth at the limit – A1B4 (in yellow). The latter combination scores high in terms of positive impacts on all but one of the drivers, rendering it potentially relevant for further consideration. Nevertheless, when approached as a policy option, it became apparent that it would not make a viable alternative. A reinforced approach to coordination (B4) could importantly improve the rhythm and consequently possibly the cost-effectiveness of the current 30 priority projects, but would not solve the central issue of network fragmentation due to current planning (A1). As argued in part 2 of this report, the currently planned priority projects simply do not add-up into, nor support, a geographically coherent, well-integrated, multi-modal network, that adequately covers the territory of all the EU Member States.

The **efficiency** of each scenario in attaining the specific policy objectives set out was also initially considered as part of the preliminary assessment process. However, it became apparent that, although an important information, cost estimates would not help discriminate among the options for the purpose of discarding them. Nevertheless, the preliminary estimates showed that a dense comprehensive network approach (A5) rendered any option including this planning scenario far too costly (as compared to the others[105]) and difficult, if not impossible to implement within the envisaged 2030 horizon. Moreover, if fully implemented, the result would be a dense, high standard, abundantly multi-modal network that would likely be under-used (hence little cost-efficient) on many of its parts.

In parallel, the Commission has also assessed the coherence of each policy option with the principles of **subsidiarity and proportionality**. As compliance with these principles is a *sine qua non* condition for any Union policy initiative, any policy option that did not fulfil this condition could not therefore constitute a viable alternative for action. The results of this screening are presented in the table below (for the detailed considerations, see Annex 3).

Planning	A1 Business as usual/ Continuation with current 30 PPs	**A2** **Guidelines discarded**	A3 MS selection of new PPs (Essen 2)	A4 Dual layer (core and comprehensive) network	**A5** **Dense TEN-T**
Subsidiarity and Proportionality Compliance	Yes	**No**	Yes	Yes	**No**
Implementation	B1 Current implementation approach	B2 no further EU implementation support	**B3** **Purely regulatory approach**	B4 Reinforced coordination	**B5** **Full EU operational management**
Subsidiarity and Proportionality Compliance	Yes	Yes	**No**	Yes	**No**

Table 6 : Compliance with subsidiarity and proportionality principle

It became thus apparent that any policy option that included, at the level of planning, the "A2/Guidelines discarded" or the "A5/Dense network approach" scenarios, and/or at the level of implementation, the "B3/Regulatory approach only" or the "B5/EU full operational management", could not constitute viable policy options, due to their contravening of the principles of subsidiarity and/or proportionality. Following this assessment, option A5B4 was discarded for further consideration as a viable policy option, in spite of the fact that,

[105] It is estimated that the Core Network represents about 25% of the Comprehensive network. Therefore, by simply extrapolating the investments needs of € 215 Bln for the Core Network by 2020, it gives a figure of € 860 Bln for investments needs on the Comprehensive Network for the period 2014 – 2020.

according to the effectiveness criteria, would have been most promising in terms of addressing current drivers and thus achieving the TEN-T policy objectives.[106]

4.3. Description of the policy options retained for in-depth assessment

In light of the above pre-screening process and taking into account that the pre-screened policy options should also respect the proportionality and subsidiarity principle, the two alternative policy options retained for in-depth impact assessment are the scenario combinations "A3B4/Selection of new priority projects with reinforced coordination" – labelled "Option 1", and "A4B4/Core network approach with reinforced coordination" – labelled "Option 2". The "A1B1/Business as usual" policy option, described extensively above in section 2.4 of this report, has featured in the subsequent impact assessment process as the reference/baseline scenario; for convenience, it has been labelled "Option 0".

4.3.1. Content of Policy Options

Policy Option 0: Baseline scenario

Policy Option 0, which has been presented in section 2 above, represents the future without any additional policy intervention to change current trends.

Policy Option 1: "Essen 2" with reinforced corridor coordination[107]

Under this option, the approach to planning the TEN-T remains unchanged, relying on the predominantly bottom-up selection process as endorsed by the Essen European Council in 1994.[108] The Member States will thus continue to be responsible for developing project proposals, while the Commission will select and prioritise projects that will be financially supported from the EU budget based on the extent to which the projects fulfil the criteria set out in the Guidelines. The 30 Priority Projects included on the current list will continue to be developed and funded according to the current Guidelines.

The current Guidelines' criteria for TEN-T identification and selection of projects of European interests will remain largely unchanged. The current TEN-T map will be however updated, to reflect evolutions in Member States' developed and planned infrastructure. In addition, drawing on the experience so far, and taking into account the expert and stakeholder recommendations, criteria will be revised in order to better specify the elements that would constitute the European added-value of the Priority Projects that will be subsequently selected. In particular, references to multi-modality aspects and links to third countries will be added. This should ensure that new Priority Project proposals will more effectively address current fragmentation aspects resulting from a limited coordination in TEN-T configuration planning.

As far as implementation is concerned, the individual Priority Project Decisions will provide for a coordinated approach to infrastructural investments, management of Priority Project axis capacity and building and coordinating transhipment facilities, the optimisation of the use of each transport mode (or co-modality), the comprehensive deployment of interoperable traffic management systems and the harmonisation of operational rules along the Priority Project.

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[106] Another argument that played against its retention was also that of cost-efficiency. As pointed out above, due to its dense comprehensive approach to planning, this option would have involved particularly high costs that, at a first look, would not have been justifiable in terms of its marginal benefits – i.e. as compared with the other two retained options – and, given the amount of works that it presupposed, would have long exceeded the 2030 timeline.

[107] This is the combination of A3 planning scenario and B4 implementing scenario, see Annex 3 of the present report

[108] In Essen, in 1994, the European Council adopted the first list of 14 transport projects of common interest, included in the 1996 TEN-T Guidelines. The selection of the projects was largely based on national priorities (bottom-up approach) rather than European ones (top-down approach). The same approach was used in the selection of the renewed list of 30 Priority Projects annexed to the 2004 Guidelines.

Both EU and Member States funding would be committed through the individual Priority Project Decisions, which would also establish binding timelines for completion. The European Coordinators will continue their activity with mandates similar to the current ones and relatively enhanced powers, grounded in the Priority Project Decisions. The mandate of the TEN-T EA will be maintained and extended to help ensure, alongside the Coordinators, added effectiveness in implementation, not least by supporting the development of Priority Project proposals with high EU added-value.

Policy Option 2: "Core network" with reinforced corridor coordination[109]

Under this policy option, the approach to developing the TEN-T configuration is importantly revised. The Commission would no longer seek to steer Members States' choices towards developing a European network by setting a number of (better) defined criteria, and offering support for project proposal development, but by taking a stronger, pro-active coordination role. It proposes and works with the Member States to agree upon an a priori configuration of the TEN-T, optimised at planning level to address major traffic flows needs, multimodality, cohesion and accessibility objectives.

A dual-layer approach to TEN-T development will also be proposed. A basic layer, or the "comprehensive network", will be constituted of the current wider TEN-T, as comprised in the maps and outline plans annexed to the current Guidelines, updated and adjusted following a number of clear and coherently applied rules. A second layer, constituted of the strategically most important parts of the comprehensive TEN-T, identified according to a specific methodology, transparently and coherently applied, will constitute the "core" of the network, on which project development and implementation will be supported with priority.[110] This will later allow the identification of key projects of European interest on an idealised network configuration that already includes current missing links (including multi-modal connection nodes and routes) and bottlenecks, and identifies needs for multi-modal connecting platforms development.

EU transparent and coherent planning methodology[111]

The TEN-T planning methodology envisaged in Option 2 would provide a coherent and transparent pan-European basis for the identification of the configuration of both the comprehensive TEN-T and its strategic core. It was developed by the Commission with the support of an expert group, and drawing on the stakeholder (including Member States) input and recommendations.[112] The methodology provides distinct rules and criteria for the identification of the comprehensive network and the core network respectively.

Comprehensive network

The methodology concerns the updating/adjusting of the current TEN-T maps, rather than a new process of TEN-T outline identification, following a number of principles: updating with

[109] This is the combination of A4 planning scenario and B4 implementing scenario, see Annex 3 of the present report.

[110] The comprehensive/basic layer of the TEN-T will constitute the object of general support at EU level (including financially, especially in the less endowed regions in the East of the Union), but the main focus will be placed on the development, with priority, of the multimodal core layer, as the latter will carry the main concentration of trans-national traffic flows, both for freight and passengers.

[111] "The New Trans-European Transport Network Policy: Planning and implementation issues", SEC(2011) 101

[112] The Commission established the expert group in autumn 2009, following the results of the first public consultation process (February – April 2009), which showed a clear majority support for the dual-layer network option. The expert group, chaired by Mr. Jonathan Scheele, former Director of directorate B in DG TREN, met four times between October 2009 and March 2010. It developed a recommendation for a Core Network planning methodology, of which a summary was included in a Commission Working Document of 4 May 2010 COM(2010) 212 final, as a basis for a subsequent public consultation. Taking into consideration the results of this second public consultation exercise, the discussions at the TEN-T Days in Zaragoza (June 2010), the input from Member States, mainly received at the Gödölló Informal Council, as well as the practical experience gained in its effective application, the methodology has been fine-tuned in the following months.

projects completed/abandoned and changes in national planning; addition of selected and well-defined missing links and nodes, especially in new MS; elimination of dead-ends and isolated links in current TEN-T if not justified by geographical particularities; implementation of minimum standards for infrastructure and equipment in accordance with relevant legislation currently in place; revision of the selection of seaports and airports according to a number of specific criteria (concerning mainly traffic volumes and accessibility conditions). As a result, the comprehensive network will directly reflect the relevant existing and planned infrastructure in Member States, while ensuring at the same time the accessibility of all regions of the Union. It will include road, rail, inland waterways, maritime and air infrastructure network components, as well as the connecting points between the modes. It will feature minimum infrastructure standards, and aim at interoperability wherever necessary for seamless traffic flows across the network. All European citizens and economic operators should be able to access the Core Network, via the Comprehensive Network, on comparable terms.

Core network

The aim was to develop a coherent and transparent methodology that could be applied consistently across all Member States and which comprises elements to enhance cohesion, economic efficiency and environmental sustainability simultaneously.

In addition to infrastructure interconnectivity and traffic related goals, the methodology was crafted to take into account a sound balance between these planning objectives and larger treaty mandated goals such as geographical coverage and cohesion, accessibility and competitiveness. Thus, all "primary city nodes" – corresponding to the capitals of all MS and large cities and conurbations across the EU – are linked within the Core Network. Large cities and conurbations include the MEGAs ("MEtropolitan growth areas") according to ESPON atlas 2006 and conurbations or city clusters with more than 1 million inhabitants, on the base of "Larger Urban Zones" ("LUZ") according to "Urban Audit" (EUROSTAT).

Adequate connections with neighbouring and other third countries have also been taken into account. For this reason, all major seaports of the Union are also considered primary nodes. Moreover, in order to connect the Core Network with corresponding infrastructure in neighbouring countries, the points where the multimodal axes cross the external border of the Union are considered primary nodes. As a result, the main existing connecting points with bordering countries, including rail or road platforms in the East of Europe and the seaports would become connected to the main economic centres of the EU.

In order to ensure the Member States' ownership of the process (and of the results) of core and comprehensive network identification, continued consultation with the Member States representatives would be ensured throughout the process of application of the methodology.

The current Priority Projects will be included in the core TEN-T, but whether in their entirety or partially will depend on their meeting the methodology criteria.[113]

As far as implementation is concerned, the establishment of multi-modal corridors along the core network, governed by specific binding legal instruments in the form of "Corridor Decisions" are envisaged to provide the basis for modal integration, interoperability and coordinated development and management of infrastructure. A specific methodology for corridor identification will ensure that each corridor links a number of multimodal nodes, supports co-modal transport solutions and involve at least three Member States. The specific Corridor Decisions will provide for a coordinated approach in the undertaking of infrastructural investments, in the management of corridor capacity, in building (wherever needed) and coordinating transhipment facilities (particularly for freight) that optimise the use

[113] This should not however affect the continuity of current Priority Projects because inclusion on the core network outlay plan will concern the prioritisation of *future* funding decisions.

of each transport mode, as well as for the comprehensive deployment of interoperable traffic management systems and the harmonisation of operational rules.

Core network corridors

Corridors are identified on the core network, following a number of criteria/benchmarks that need to be fulfilled. Corridors should:

- concern the most important cross-border long distance traffic flows of the core network;
- cross at least two borders between three Member States;
- respond to high quality standards, increasing energy efficiency, enhancing security and safety, and deploying new technologies, notably aiming at improving information management and e-administration procedures;
- serve as the main instrument for modal integration, interoperability, resource efficiency, as well as a coordinated development and management of infrastructure, along the core network.

Both EU and Member States funding would be committed through the individual "Corridor Decisions ", that would also establish binding timelines for completion. Corridor Coordinators will replace the current European Coordinators, but with a similar mandate, grounded in the Corridor Decisions. The TEN-T EA, whose mandate will be maintained and extended beyond 2015, will work together with the Coordinators in order to ensure added effectiveness in the development of project proposals along the corridor and in their implementation.

4.3.2. Comparison of content

As highlighted above, the two alternative (to the current approach) policy options are the result of a rigorous process of options generation and pre-selection. The aim was to identify those options that would, on stand-alone basis, be able to address with a significant degree of effectiveness all drivers to the current TEN-T fragmentation.

This effort to identify the most viable (and real) alternatives for TEN-T policy development has lead to options that share a number of characteristics. However, the options also differ in important respects, differences that lead to significantly distinct performance.

Thus, Option 1 shares with the current policy approach (Option 0) the same "soft" approach to coordination at EU level in planning the TEN-T, by means of a set of criteria for project content land-marking a primarily bottom-up approach to project development. Nevertheless, in policy Option 1, planning coordination is sought to be improved as much as the (shared) bottom-up approach allows it, i.e. by strengthened criteria for priority project selection that include more elements generating EU-value added. At the same time, the coordination in implementation is significantly strengthened at the level of PP through individual PP decisions compared to Option 0.

Whereas Options 1 and 2 share the same reinforced coordination approach to implementation, they substantially differ as far as their approach to planning is concerned. Coordination of planning at EU level is substantially strengthened, by pre-identifying the TEN-T configuration, and in particular of its strategic "core", by means of a coherent methodology to be consistently and transparently applied across the territory of all Member States.

The main content characteristics of the three alternative policy options are summarised in the table below, in order to better highlight their shared and, respectively, distinctive elements.

Content	Option 0	Option 1	Option 2
Planning	*Business as usual:* - wider TEN-T configuration as currently annexed to the Guidelines (maps and outline plans dating since 1996) - 30 PPs as specified in the list currently annexed to the Guidelines (PP proposals as approved in 2004).	*"Essen 2" approach:* - wider TEN-T map will be updated, to reflect evolutions in the developed and planned infrastructure in the MS; - new PPs will be identified; - revised criteria for PP selection will better specify the elements that would constitute the European added-value of priority projects (cross-border links, multimodal connecting links, links alleviating bottlenecks, links to neighbouring and third countries).	*"Core network" approach:* - wider TEN-T map will be updated to reflect evolutions in the developed and planned infrastructure and adjusted according to a specific methodology to ensure consistency across all MS; it will constitute the "comprehensive" network - a "core" network, overlaying the "comprehensive" network, will be identified, on the basis of a specific methodology, to: include the strategically most important parts of the TEN-T, cross all missing links, alleviate all major bottlenecks and ensure optimal multi-modal connections; - projects of key European interest will be situated on the pre-identified strategic network configuration thus optimised at the level of planning.
Implementation	*Business as usual:* - continuation of current range of implementation instruments (a) financial – the TEN-T Programme, the Cohesion Fund, EIB loans and grants); (b) coordination - TEN-T EA, European Coordinators, TENtec; - continuation of initiatives currently under way with regard to interoperability standards - the ERTMS corridors, the ITS Directives, the Single European Sky etc.[114]	*Reinforced coordination at PP level:* - individual PP Decisions will ensure a coordinated approach at PP level in the undertaking of infrastructural investments, the management of PP capacity, the deployment of interoperability standards and traffic management systems; - PP Decisions will place the overall management authority under the aegis of the European Coordinators;[115] - the TEN-T EA will continue in its role of support towards project preparation and implementation.	*Reinforced coordination at corridor level;* - individual Corridor Decisions will ensure a coordinated approach at Corridor level in the undertaking of infrastructural investments, the management of corridor capacity, the deployment of interoperability standards and traffic management systems; - Corridor Decisions will place the overall management authority under the aegis of the Corridor Coordinators; - the TEN-T EA will continue in its role of support towards project preparation and implementation.

Table 7: Comparison of Policy Options

[114] Should be noted that these standards are not specific to the TEN-T, nor is their implementation mandatory on all TEN-T projects of common interest (including the PPs).
[115] This would extend the scope of the European coordinators mandate over an entire PP, and all PPs will have a European Coordinator. Currently (i.e. and in a business-as-usual scenario), there are only 9 European Coordinators for 11 PPs.

5. IMPACT ANALYSIS OF POLICY OPTIONS

This section provides an assessment of the economic, social and environmental impacts that is proportionate to the nature and purpose of this Impact Assessment. The analysis of these impacts is mostly derived from a qualitative analysis of the policy options which is supported where possible by the conclusions of the qualitative assessment (see annex 6 for more details). The overall results of the analysis of impacts are summarised in the table 16 at the end of section 6.

Preliminary remarks on use of quantitative data[116]

Quantification of impacts, derived from modelling results of the TENconnect II study, commissioned by DG MOVE, and compared and contrasted, where available, with the results of relevant internal and external studies, are used to give an order of magnitude of the expected impacts of planning scenarios.

The results of the TENconnect II study represent the outcome of more than three years of modelling efforts undertaken by two groups of experts under the coordination of DG MOVE. Although a series of recalibration and other fine-tuning exercises have improved the accuracy of modelling results[117], the latter remain rather indicative due to the numerous uncertainties inherent to the modelling exercise (the uncertainties of some influential parameters being magnified given the long time horizon), undertaken over a long time horizon and with a large number of parameters that were difficult, when not impossible, to integrate in the model. Furthermore, the study focussed only on evolutions directly linked to infrastructure policy measures. Other transport-sector specific policy measures likely to have an important impact on how infrastructure will be used in the future (for instance pricing and other demand management measures), envisaged by the Commission in the White Paper on the future of transport as key to delivering an expected paradigm shift, have not been included in the model parameters either.

In addition, the policy options simulated in TENconnect II are not directly comparable to the policy options assessed in the Impact Assessment exercise, for two main reasons. First, TENconnect simulated the impacts of planning scenarios only, i.e. without an implementation dimension[118]. In other words, the modelling results do not take account of the effects of the different implementation strategies, of 'soft' measures such as the application of ITS and of the application of 'best practice.[119]

Moreover, as explained in the Annex 6, the scenarios of the TENconnect II study are not directly comparable with the Options used for the purpose of this document. Though some limited differences exist between the routes chosen, the scenarios of the TENconnect II study can be related to the planning scenarios discussed in part 4: the BAU scenario is comparable to scenario A1, the CORE scenario is comparable to scenario A4 and the COMP being comparable to scenario A5. For reasons of clarity, when referring to the TENconnect II study,

[116] Annex 6 gives the in-depth quantative evaluation of the planning scenario A4 that forms part of Option 2, the core network. It also quantifies the effect of planning scenarios A1(BAU) and, as an outliner, A5, the fully comprehensive network.

[117] Modelling results show 19 % deviation from real count values in the road network.

[118] The TENconnect simulation was not in fact intended to take into account the implementation dimension of the proposed TEN-T Guidelines policy revision. This was due to the fact that mathematic models could not readily translate in figures for instance the role of a European Coordinator, the level of Member States coordination or a Corridor agreement on train drivers licensing or signalling systems on the successful implementation of ITS on the TEN-T.

[119] See appendix 7.

the scenarios will be mentioned with their TENconnect II names, i.e. BAU, CORE, and COMP[120].

Second, the impacts of the planning scenario A3 (Essen II), which is one component of Policy Option 1 of the present IA report, could not be simulated given the high uncertainty surrounding the selection of Priority Projects by the Member States in a continuing bottom-up approach to planning of the TEN-T.

For these reasons, the modelling results could not be used as conclusive evidence to support the preferred option, but rather as orders of magnitude illustrating logical reasoning in a primarily qualitative assessment of policy alternatives. A number of empirical studies and theoretical research available in the field of transport have provided sufficient material to allow extrapolation for the assessment of impacts of the proposed Options and complement modelling results where necessary.

Given that Option 0 has been analysed in many studies and internal evaluations conducted or commissioned by the Commission (as quoted in section 2.4. of this report and listed in Annex 1), more data has been available for this Option than for the two other Options.

5.1. Economic impacts of the options

The economic impacts of the proposed options will be analysed in two parts. Firstly, the impacts on the Transport sector will be analysed. In a second step, the impact on the general EU economy will be assessed, focusing on the support to the Single Market, GDP growth and trade with neighbouring and 3rd countries.

5.1.1. Impact on transport sector

Modality and efficiency of the transport system

In Option 1, new Priority Projects proposals are likely to follow the tendency observed under the current policy approach (Option 0), i.e. a predominantly uni-modal focus. While revised criteria for priority projects selection will help foster more proposals that take into account the multi-modality dimension, co-modality is not likely to figure high among Member States' priorities and would therefore not develop significantly further. Nevertheless, as the road network is, by and large, already in place, the majority of the selected Projects will likely focus on rail or inland waterways development, favouring a certain modal shift: from road to rail for passenger transport, and from road to rail and inland navigation for freight. This is likely to alleviate congestion on the road network and improve its efficiency. The development of new infrastructure for rail and inland waterways is also likely to favour the efficiency of those modes across countries. This efficiency will be increased by the application of the reinforced coordination approach to the implementation of the selected Priority Projects, fostering the development of common rules and standards for interoperability along the individual projects. The improved governance of the reinforced coordination approach to implementation should also accelerate the realisation of complex cross-border infrastructure and therefore help complete the network by 2030.

In Option 2, the methodology used to define the core network would favour more adequate transport infrastructure coverage of the Union, modal-shift and co-modality. It should thus support a concentration of trans-national traffic and long-distance flows – both for freight and passengers – and, as a result, a higher resource efficiency of infrastructure use. Innovative information and management systems, that will form part of the network, would provide support for logistic functions, inter-modal integration and sustainable operation in order to

[120] The results for the COMP scenario are sometimes given as a basis for comparison

establish competitive door-to-door (or, at least, terminal-to-terminal) transport chains, according to the needs of the users.

The efficiency of the whole transport system would be, as a result, improved. The reinforced coordination approach to implementation, as in Option 1, would further enhance overall efficiency. Moreover, as it would be applied on corridors selected according to the methodology of the core network, the positive effect would likely concern a larger share of traffic flows than in Option 1.

Administrative burden

In Option 1, the reinforced coordination approach to implementation on the selected Priority Projects should foster the reduction of administrative burden. This should prove to be especially the case for rail Projects, for which cooperation between national authorities and infrastructure managers would likely increase. However, with no coordination between Priority Projects and modes, the impact will not be optimal.

The reinforced coordination approach to implementation in Option 2 ensure common operational procedures (or at least compatible procedures) and similar quality standards of operation over the core. This will include smart information and communication technologies such as eFreight[121], a system designed to facilitate common communication along and across the freight supply chain. However, as the methodology used for selection in Option 2 is likely to ensure that more traffic flows would be tackled in the selected Corridors as compared to Priority Projects in Option 1, lower administrative costs per unit would ensure in Option 2 than in Option 1. Essentially, Option 2 would provide the integrated infrastructure that would enable all businesses to benefit from good operational logistics, as well as for the travelling public, more effectively than Option 1.

TENconnect results on Transport activity

The following table from TENconnect II report gives an evolution of traffic activity and its modal organisation.[122]

		BAU	**CORE**	COMP
Passenger car vehicle KM (billion PKM)	Zone external	2,779	**2,814**	2,892
	Zone internal	3,034	**3,060**	3,086
Total passenger car PKM		5,813	5,874	5,978
Passenger rail KM (billion PKM)	Zone external	404	**398**	394
	Zone internal	119	**117**	115
Air PKM (billion PKM)	All	1,158	**1,137**	1,118
Freight truck VKM (billion HGV VKM)	All	266	**272**	277
Freight rail TONKM (billion TONKM)	All	690	**649**	638

[121] www.eFreightproject.eu

[122] These results are further explained and qualified in the Annex 6

Table 10: TENConnect II Traffic flows impacts/ modal split (horizon 2030)

These figures show a slight increase of road traffic and a limited decrease of rail and air traffic. Since most of the road network already exists while a large share of the European rail network remains to be built, the results are counter-intuitive. This is due mainly to the particularities of the model parameters. Due to the assumed absence of congestion on the road network, the CORE road network becomes highly efficient, attracting increased traffic. . In addition, car ownership propensity and thereby car driving (especially outside the core where the saturation level is currently lower) are assumptions directly and iteratively linked in the model to levels of income growth. Hence, as the results concerning increased income growth were fed back into the model, passenger car traffic grew proportionally. . Finally, as pointed out earlier, assumptions concerning pricing and other measures of demand management, strongly envisaged to be promoted at EU level in the coming decades, have not been taken into account.

Indeed, the results are different in the case of the modelling tool used for the assessment of impacts in the IA report accompanying the Transport White Paper, which included among its parameters the entire array of policy measures envisaged at EU level to induce the needed transport system paradigm shift. A significant modal shift, particularly from road to (freight) rail, is expected. In particular, the preferred policy option, which later informed the proposals put forward by the Commission in the White Paper, indicates the "greatest changes…due to very intensive policies with the objective of managing demand and encouraging a shift in modal choices."[123]

Congestion & travel times

Traffic congestion emerges when transport infrastructure capacity approaches saturation. Congestion brings about an increase in travel times as well as increased unreliability of travel times. The impact on congestion levels is measured as the reduction of time losses for both passenger and freight transport caused by road congestion (in hours).[124]

In Option 1, the expected modal shift – from road to rail for passenger transport and from road to rail and inland navigation for freight – would have a positive effect on congestion levels and is likely to reduce societal costs compared to Policy Option 0. The implementation of the reinforced coordination approach to implementation and the related improvement in interoperability are likely to further reduce congestion on roads, as well as on railways, inland waterways, ports and at cross-border sections. However, as already pointed out above, the extent of congestion reduction would largely depend on the list of Projects selected and their relevance for traffic flows.

[123] SEC(2011) 358, pp. 58 -59.

[124] As explained in the OECD 2002 report on the Impact of Transport Infrastructure Investment on Regional development, the principle underlying the assessment of benefits associated with travel time is that transport system users' economic decisions regarding the location of their homes, businesses, mode choice or route followed to get to a specific destination and behaviour in traffic, reflect their valuation of travel time. In other words, users' willingness to pay in order to save time or the amount they would accept in compensation for losing time could be inferred from their behaviour. Time savings are benefits resulting from an improvement in the efficiency of the transport system (shortened routes, increased traffic fluidity, better access to connection services, etc.). For freight carriers, time savings will take the form of money savings given that reductions in travel time reduce hourly costs of transport services (e.g. drivers' wages, insurance, etc.) for shippers. For consignees, travel time savings may be converted into reduced inventory costs. Some analysts argue that the common practice in CBA of valuing commercial vehicle time savings on the basis on drivers' wage produces estimates for value of travel time that are too low, thus capturing only part of the true potential cost savings of freight carriers. The concern is that costs of capital equipment, benefits from accrued reliability and reduced delivery time of shipments are not explicitly accounted for. On the other hand, for passenger transportation, travel time savings normally bring no direct monetary reward.

Option 2 should have a greater positive impact on congestion than Option 1. As highlighted earlier, the multimodal dimension and the methodology to define the network and the corridors should lead to increased network use efficiency and interoperability in Option 2 as compared to Option 1, and therefore to higher positive effects on congestion.

The following table from the TENConnectII study gives the modelling results regarding time-saving, along two aspects, time-savings at local level (referred to as "Zone internal") and outside this zone (i.e. for medium to long distance transport, "Zone external").

Impact type	**Type**	**BAU**	**CORE**
Travel time car driver (billion hours)	Zone external	30.3	29.9
	Zone internal	39.0	37.6
Travel time car passenger (billion hours)	Zone external	18.1	17.8
	Zone internal	23.8	23.0
Travel time rail pass (billion hours)	Zone external	4.8	4.7
	Zone internal	2.2	2.2

Table 9: TENconnect II Travel time impacts (Figures are an estimate for the whole traffic in Europe, not only for the vehicles running on the TEN-T network defined, horizon 2030.)

The above data shows that, in the CORE scenario, European car drivers would save 0.4 billion hours when driving outside their region (30.3 – 29.9). In the same scenario, rail passengers would save 0.1 billion hours. In relative terms (taking into account their respective volume), the results indicate a 1.32% increase in time saving for car drivers and 2.08% time saving for rail passengers as opposed to a BAU scenario.

As a general comment, the TENconnect II study shows the positive economic impact of the CORE planning scenario compared to the Business-as-Usual. However, these results are based on a limited number of parameters (saving in time/increased road traffic) and do not take into account other measures such as the application of management and control measures facilitated through the application of ITS.

TENconnect II Consumer surplus as a derivation of time-saving

Economic growth and consumer surplus are closely related in the TENconnect II results. Consumer surplus is here understood as the summation of the benefit of time saved minus the total costs for the freight and passengers (tolls, fares, price of fuels…). The results give the following outcome regarding consumer surplus for the CORE network scenario and, by way of comparison, the COMP network scenario, both compared to the BAU scenario:

Impact type (billion euros)		CORE vs BAU	COMP vs BAU
Consumer surplus - passenger	Zone internal	44.8	130.7
Consumer surplus – freight	Zone internal	0.3	0.9
Consumer surplus - passenger	Zone external	25.5	94.1
Consumer surplus – freight	Zone external	7.1	18.4

Subtotal – direct benefits		**77.7**	**243.8**
Subtotal – 2nd order GDP effects[125]		**30.7**	**75.6**
Total		**108.4**	**319.4**

Table 8: TENconnect II Total socio-economic benefits (horizon 2030)

According to the study, compared to the BAU, the CORE brings by 2030 € 77.7 bln of direct benefits to the European Consumer. The COMP option triples this amount (including second order GDP effects adds some 40% benefit to the core and 31% benefit to the Comprehensive networks).

However, consumer surplus is calculated from the saving in time/increased road traffic caused by the network. It is therefore related to the numbers of billions of passenger car/km calculated by the model. This means in the end that each car/km generated by the network gives a benefit to the European economy. The benefits are calculated by distinguishing between business travel and various categories of leisure travel activities, hence acknowledge the difference in added value to the society.

5.1.2. General economic impacts

Support to the Single Market

The development of the wider TEN-T will have positive effects on the free movement of goods, market segmentation, accessibility, and territorial cohesion, especially at the level of NUTS2 regions in all the three options considered here.

Compared to Policy option 0, the development of new Priority Projects in Option 1 is likely to increase the level of interconnectivity between the European markets. However, the extent to which expected higher interconnectivity would be achieved would depend on the list of Priority Projects chosen. As highlighted earlier, experience so far has shown that the list of projects is more likely to reflect political choices rather than decisions based on economic assessments. The problem of fragmentation of the network, and therefore of the internal market, would not be adequately addressed.

Given that the core network is the top-layer of the wider/comprehensive network, Option 2 is likely to generate enhanced positive impacts as compared to Option 1, due to the synergic effects of the two networks. In Option 1, the positive impacts of the comprehensive network could be hampered due to continuing limited interconnectivity among the Priority Projects.

The implementation of the planned infrastructure could be however easier in some cases for Option 1 than for Option 2. Member States may be more willing in some cases to implement Projects that they have selected themselves rather than Projects that have been selected on the basis of a methodology, even if the latter is agreed at EU level and has been largely discussed and reviewed with Member States and stakeholders.

Economic growth

According to economic literature, investment in network infrastructure can boost long-term economic growth[126]. However, it has to be borne in mind that not all studies converged

[125] 2nd order GDP includes:
- lower goods prices through lower generalized freight costs (substitution effect)
- higher factor income because of higher demand from other regions for local goods (income effect)
- variety effect (utility from richer availability of goods)

towards this conclusion, since some are inconclusive[127]. This Impact Assessment assumed that infrastructure investment can have a positive effect on growth that goes beyond the effect of the capital stock, due to economies of scale, the existence of network externalities and competition enhancing effects.[128]Studies have shown that relatively large improvements in infrastructure (and accessibility) can translate into gains in economic performance, though limited.[129]

A more integrated and efficient transport system enabling the free movement of people and goods across the EU and with its neighbours is expected to contribute to economic growth, as it would allow for a more efficient use of resources. The EU economy should also benefit from the increase in the capacity and performance of the infrastructure resulting from the elimination of bottlenecks and addition of missing links. Moreover, the building of new infrastructure would have an important impact on the construction sector; some infrastructure projects like high-speed rail provide several years of works for building companies and related businesses. In addition, the promotion of intelligent transport systems and traffic management systems should foster research and innovation for new technologies and create new business cases. Finally, the improvement of the efficiency of the transport system and the reduction of related obstacles would improve the economic conditions for both transport businesses and enterprises heavily depending on transport for their activity.

Option 1 is likely to have a certain positive impact on EU economic performance thanks to increased connectivity, accessibility and connections with the neighbouring countries, as a consequence of building additional infrastructures. However, as argued earlier, the impact would depend on the list of Priority Projects to be adopted and may have an unbalanced effect between countries. The reinforced coordination approach in the implementation of the Priority Projects is likely to enable an increased deployment of intelligent transport systems. It is also likely to improve the efficiency of the transport system (see analysis below). It will accelerate the realisation of complex cross-border infrastructure and help thus complete the network by 2030. It will accelerate, as a consequence, also the cumulative effect of GDP growth. As a whole, Option 1 could have a positive effect on EU economic growth, but will risk being unbalanced.

Option 2 is likely to have an increased positive impact on EU growth compared to Options 0 and 1, due to its strong positive impact on interconnectivity and accessibility throughout Europe and consequently on the free movement of goods in the EU and with trading partners. Moreover, the reinforced coordination approach applied to core network planning should prove more efficient in implementing intelligent transport systems and in making transport systems more efficient than in Option 1. Option 2 is thus likely to be the option with highest positive impact for economic competitiveness.

GDP results of the TENconnect II study

The TENConnect II study gave comparisons (with business-as-usual/BAU) of GDP performance of both CORE network and COMP network at the planning level.[130]

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[126] See for example the World Bank Report—Connecting to Compete 2010 Trade Logistics in the Global Economy -The Logistical Performance Index and its Indicators

[127] See for instance the following summary of studies:
http://www.dtu.dk/upload/institutter/dtu%20transport/rapporter/rap_7_2010_infrastruktur%20og%20danmarks%20internationale%20konkurrenceevne.pdf

[128]Infrastructure and Growth: Empirical Evidence , OECD Economics Department Working Paper No. 685, March 2009

[129] As shown by the ECORYS report, using the SASI model.

[130] See Annex 6. for a more detailed critical analysis of the TENconnect results

In TENconnect II, the Economic growth (measured in induced GDP Growth) is related to traffic growth. Based on the 2nd GDP effects mentioned in table 8, the map below shows the growth induced by the Core Network in 2030 compared to the growth of the Business-as-usual scenario (with the completion of the current Priority Projects). This map the positive benefits of the CORE for regions situated along the eastern and southern shores of the EU. Regions that are already well connected (or that should be thanks to the completion of the current Priority Projects) do not gain much from the CORE, unlike regions that were not connected because of the political choices made when selecting the Priority Projects; this seems logical. However, while the general results seem coherent, results are sometimes incoherent for a limited number of regions.[131]

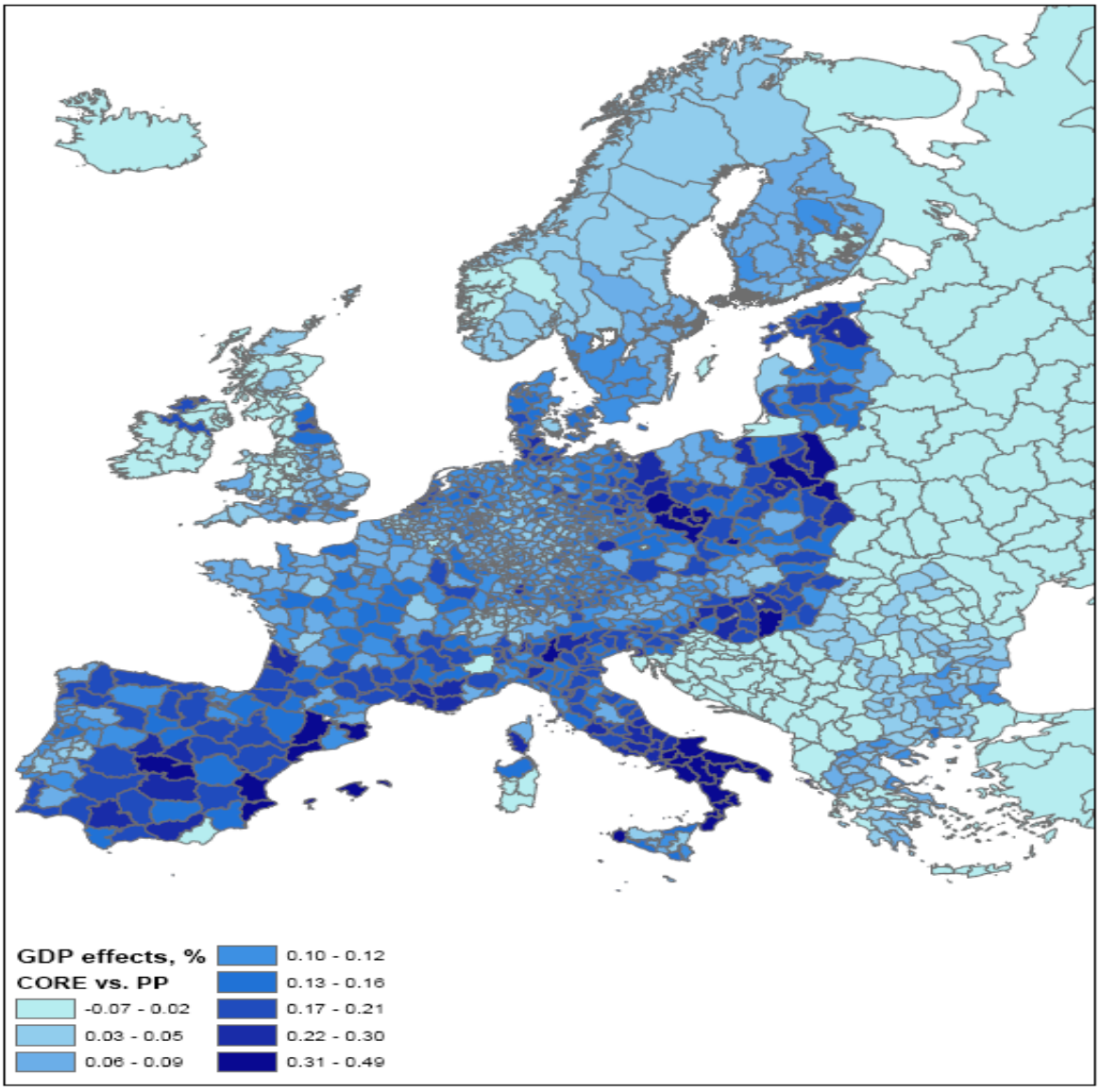

Figure 6: TENConnect II GDP effects (horizon 2030)

Trade with neighbouring and third countries

The lack of appropriate connections with neighbouring countries (mostly via cross-border connections) and third countries (via ports) is one of the obstacles to the development of trade, both for imports and exports. The impact of transport infrastructure and the related

[131] Ibid.

costs of transport on trade have been studied in the academic literature[132]. Studies by the World Bank on countries logistics performance show the correlation between economic growth and freight transport logistics effectiveness and efficiency.[133] This correlation is also supported by other studies[134].

In Option 1, it is likely that the political process leading to the selection of the new Priority Projects will limit the number of connections towards neighbours. In a bottom-up approach, Member States are more likely to propose projects providing for connections between themselves rather than connections with non-EU neighbours in order to get more immediate results. However, it is likely that Member States with a maritime interface will seek to connect their main ports in order to develop their hinterland and foster their competitiveness. Member States with existing important connecting platforms with neighbouring countries might also seek to connect those hubs.

Option 1 is therefore likely to improve connections with 3rd countries compared to the baseline scenario. Yet, this improvement would be highly dependent on the bottom-up selection of Priority Projects, which may result in omissions or inappropriate connections compared to the actual needs (as it is currently the case and has been pointed out in the problem definition).

In Option 2, the connection with neighbouring countries is included in the methodology that will help define the Core Network (see section 4 above).

Innovation[135]

Innovation in technology can improve the sustainability of transport without restricting economic growth. Innovation can reduce the adverse environmental impacts of transport operations by reducing emissions, noise levels, etc., and can improve their quality in terms of speed, comfort, as well as their safety. Similarly, by increasing the competitiveness of certain modes of transport, it can present them with new opportunities and can strengthen their position in relation to the other modes (for instance the TGV high-speed trains).

The ECORYS study explains that much of the technological innovation is undertaken by the private sector. The FREIGHTVISION study gives an inventory of probable technological developments and their likely contribution to reducing transports various 'externalities'. Also the Super Green[136], PROMIT and FREIGHTVISION Projects, give details of 'best practice' in rail freight transport—see annex 7. The main role of the EU is to regulate and stimulate innovation. Regulation consists in establishing interoperability and in promoting the introduction of useful technology which, although it is already fully developed, requires the imposition of more stringent rules to make it economically justifiable.

Many drivers can affect the level of innovation. For the purpose of this document, the impact of the Options on innovation will be considered through the level of implementation of horizontal activities, i.e. the implementation of traffic management systems and Information and Communication Technologies (ICT). Traffic management systems, by simplifying and speeding up the technical interoperability of cross-border transport, provide innovation

[132] See for example Limao and Venables (2001) and Radelet and Sachs (1998).

[133] World Bank Report—Connecting to Compete 2010 Trade Logistics in the Global Economy -The Logistical Performance Index and its Indicators

[134] Such as Limao and Venables (2001): studying the case of African countries for example they have shown that having an infrastructure in the top standards raises trade volumes by 68 percent, equivalent to being 2005 km closer to other countries. The deterioration of the infrastructure on the contrary reduces trade volumes by 28 percent, equivalent to being 1627 km further away from trading partners.

[135] Defined in the ECORYS study as the use of new ideas, processes, goods, services and practices in a more or less commercial way, based on any (new) application of science and/or technology.

[136] SuperGreen is a 7FP project that will define criterion for Green Corridors

opportunities, stimulating cross-border knowledge transfer on effective deployment, cross-fertilisation and novel add-on services. In addition, the ITS market itself will benefit from harmonisation and standardisation efforts, while synchronised actions will lead to coordinated deployment and shortening of time to market for new services (reducing the need for venture capital).[137] Moreover, the development of these systems in Europe thanks to the expanded deployment in the TEN-T would favour economies of scale and demonstration that can also turn them into innovative export successes for the European industry.

In the Baseline scenario interoperability will develop through enforcing the existing legislation on ERTMS[138] and Intelligent Transport Systems[139]. However, this development is likely to be hampered by the cooperation problems shown in part 2.4.2. Also the ITS Action Plan will attempt a role out of appropriate ITS and ICT technologies, but without certainty as to when such systems will be universally applied. The reinforced coordination approach to implementation in Options 1 and 2 is likely to accelerate the development of traffic management systems by improving governance and by potentially widening its use on new corridors. On the basis of the above, all three Options will have a positive effect on innovation, though in varying degrees - the impact is likely to be stronger for Options 1 and 2 than for Option 0.

Conclusion

Both Options 1 and 2 would have an overall positive economic impact, both at macroeconomic level and for the transport business. Option 2 should have a deeper positive impact than Option 1 due to the specific methodology for selection of the Core Network and Corridors, which should result in more traffic flows being affected by the improvements in infrastructure and soft measures.

5.2. Social impacts of the options

5.2.1. Employment and Jobs

Jobs related to infrastructure investments

Within the TENconnectII methodology, employment and jobs effects are integrated in the economic/GDP growth calculations above. Hence, as there are positive effects on GDP growth from a CORE network, then it is assumed that there will be positive effects on jobs, not just short term through construction, but long term through the enhanced efficiency that a true network would bring. This assumption comes with the caveat that it is possible to have growth without job creation.

According to the economic literature, infrastructure investments help boost economic growth, enhance trade and mobility of people and constitute a highly effective engine of job creation. One recent study in the US showed that infrastructure investment spending creates about 18,000 total jobs for every $1 billion in new investment spending, including direct, indirect

[137] From the Impact Assessment accompanying the Communication from the Commission, Action Plan for the Deployment of Intelligent Transport Systems in Europe and the Proposal for a Directive of the European Parliament and of the Council laying down the framework for the deployment of Intelligent Transport Systems in the field of road transport and for interfaces with other transport modes

[138] Commission Decision of 22 July 2009 amending Decision 2006/679/EC as regards the implementation of the technical specification for interoperability relating to the control-command and signalling subsystem of the trans-European conventional rail system [C(2009) 5607 final] (also referred to as "the European Deployment Plan")

[139] Directive 2010/40/EU of the European Parliament and of the Council of 7 July 2010 on the framework for the deployment of Intelligent Transport Systems in the field of road transport and for interfaces with other modes of transport

and induced jobs[140]. Job creation is mainly related to infrastructure works, but it is also induced by the indirect economic effect of the use of the new infrastructure. According to an impact assessment comparing different infrastructure investments scenarios in the U.S.A.[141] the highest proportion of new jobs would be in construction. For their baseline scenario ($54 billion baseline increase in public infrastructure investment), about 641,000 new construction jobs would be generated. Their high-end investment scenario ($93 billion high-end increase in public infrastructure investment) would generate about 1 million new construction jobs. Overall, about 40 percent of all new job creation through either investment programme—including direct, indirect, and induced jobs—would be in construction.

As pointed out in an ECORYS study,[142] construction jobs created by infrastructure investments are mostly temporary jobs. However, permanent indirect impacts on employment are related to the improved accessibility of a given region by reduced travel time and costs, thereby possibly attracting new enterprises and related socio-economic activities resulting in the creation of new jobs. The U.S. investments scenarios study shows that about 146,000 new manufacturing jobs will result through the baseline investment scenario and the high-end investment scenario will generate about 252,000 new jobs. About 10 percent of the overall new job creation will be in manufacturing.

Extrapolating the above calculation to the case of the European Union and taking into consideration the investments needs necessary for the chosen options, it can be estimated that the following number of jobs could be created by 2020 if the investments to implement the infrastructure needs identified are concretised:

	Investments needs estimates by 2020[143]	***Job creation estimates by 2020[144]***
Option 0	€ 150 billions	2.03 million jobs
Option 1	€ 200	2.72 million jobs
Option 2	€ 215	2.92 million jobs

It has to be noted here that this calculation assumes that all the investment needs identified (in cooperation with Member States via the TENtec system and the DG MOVE services) will be realised by 2030. However, this depends on the amount of budget allocated by the EU and Member States to infrastructure investments in the next decade. This question will be addressed in the Impact Assessment on the Financial Instruments in support of Transport Infrastructure and the Impact Assessment of the TEN-T Financial Regulation[145].

Moreover, a comprehensive OECD 2002 report[146] on transport infrastructure investment[147] analysed employment impacts and distinguished between first, second and third round effects. First round effects concern direct employment in construction and materials supplying

[140]How Infrastructure Investments Support the U.S. Economy: Employment, Productivity and Growth, Political Economy Research Institute, January 2009.
[141]Ibid.
[142]ECORYS, ibid, p102.
[143] Estimates based on Member States Infrastructure Investment plans (2014 – 2020) established by DG MOVE in cooperation with Member states via TENtec database and bilateral meetings in April 201. These figures have also been used for the White Paper.
[144] Euro on 2011 basis, 18,000 total jobs for every $1 billion investment, average exchange rate euro – dollar of January 2009 (date of the above mentioned study)
[145] N° Agenda planning : 2011/MOVE/019
[146] Impact of Transport Infrastructure Investment on Regional Development, OECD report, 2002: http://www.internationaltransportforum.org/Pub/pdf/02RTRinvestE.pdf
[147] This study is presented in more details in annex 7

industries. The study concluded that for $ 1 Bln investment, 572 million employment income has been calculated, resulting in almost 20 000 person-year of work.[148] A second round of employment and income effects occurs in the production sector in response to the demand for additional inputs required by construction materials supplying industries. The value of these first and second round of effects have a total multiplier effect of 2.34, meaning that $1 Bln investment results in 2.34 Bln output in goods and services. The same report presents a similar exercise for France. As shown in the table below, the ratio of direct and indirect jobs compared to investment is smaller but still significant.[149] A third round employment and income benefits occur in the guise of what is termed "induced" employment and reflects producers' response to an increase in the demand for all goods and services.[150] These are generally *short-term employment effects*, i.e. linked to the duration of the effective project infrastructure building.

	United States	*France*
Direct jobs	11 059	7 940
Indirect jobs	12 493	8 070
Induced jobs	18 694	5 250
Total	42 246	21 260

Table 11: Direct and indirect employment effect for the USA and France for EUR 1 billion (FRF 6.56 billion or USD 1.11 billion -at 2002 prices) (OECD 2002 Report)

With the projections for the annual cost of the TEN-T given as ranging from € 21.4 billion for BAU, through € 28.6 billion for the CORE and € 30.7 billion, based on the more conservative French data, the annual job creation would vary from 455000 for BAU to 608000 for the CORE.Based on the more conservative French data, the total cumulated job creation to implement the infrastructure needs would be the following for 2014 -2020:

	Investments needs estimates by 2020[151]	***Job creation in worker years estimates by 2020***[152]
Option 0	€ 150 billions	3.2 million
Option 1	€ 200	4.3 million
Option 2	€ 215	4.6 million

[148] As the report was written in 2002 the values should be seen as giving a general correlation and not an accurate representation of employment levels over the period to 2030.

[149] For example, the high-speed line Viller-les-Pots to Petit-Croix, counting 140 km and €2.312 billion investments, has generated about 6500 direct and indirect jobs during the five years of construction. http://est.lgvrhinrhone.com/medias/pdf/medias1177.pdf

[150] The OECD report explains that "it should be made very clear that the employment impacts considered here are not related to employment opportunities resulting from industrial restructuring or other types of economic spillover benefits due to highway investment. The income and employment effects considered here result from construction expenditures working their way through the economy, much as in the case of other types of exogenous spending. In fact, because the employment estimates considered here are based on fixed relationships describing the use of human resources, the possible productivity benefits of transportation improvements on the construction industry, materials supplying industries, or other sectors of the economy are not considered."

[151] Estimates based on Member States Infrastructure Investment plans (2014 – 2020) established by DG MOVE in cooperation with Member states via TENtec database and bilateral meetings in April 201. These figures have also been used for the White Paper.

[152] Explanation for the calculations: the ratio of direct and indirect employment compared to cost is 42246/billion Euro in the USA and 21260/billion in France. With the projections for the annual cost of the TEN-T given as ranging from € 21.4 billion for Option 0, through € 28.6 billion for Option 1 and € 30.7 billion for Option 2, the results give the following table. Given that the construction programme would last from 2013 until 2030, i.e. for a total period of 17 years, then the expected job creation could be as high as: BAU=7.74 million workers over 17 years; CORE=10.3 million worker years; COMP=11.1 million worker years

The two studies mentioned above therefore conclude with comparable results, showing an important impact of infrastructure investment on job creation, applying to a large category of jobs. Since the impact is correlated to the level of investments, Option 2 will have a slightly more important impact than Option 1.

Long-term employment effects of infrastructure development are not easy to calculate. However, studies have highlighted the long-term impacts of infrastructure development can have on the regional economy. For instance, the Severn Crossing bridge was opened in Wales in the 1966 with the view to improve communications between London and South-West Wales, towards Ireland. The ex-post assessment done by the Cambridge Economic Consultants' (CEC) in 1987 gave the following results in term of long-term job creation for the regional economy:

Table IV.4. **The impact of operation on the regional economy of South Wales**

	Number of jobs	
	Short-term impact (4-5 years)	Maximum impact (15-20 years)
Direct jobs in operation and maintenance of infrastructure	105	105
Jobs in local producers and suppliers	46	46
Displacement of other infrastructure projects and jobs	-50	-50
Net additional jobs in manufacturing industry (including linkages)	8 000 – 10 000	12 000 – 18 000
Net additional jobs in tourism	3 000 – 4 000	6 000 – 7 000
Changes in location of wholesale and retail distribution and other consumer services (net employment change)	-2 000 to -3 000	-4 000 to -5 000
Sub total (1+2+3+4+5+6)	9 100 to 11 100	18 300 to 26 100
Total after application of local income multiplier	11 800 to 14 400	18 300 to 26 100
Longer term impact on employment in house-building, public services and infrastructure and its local income multiplier effects		5 640 to 8 040
Total employment generated		23 940 to 34 140
Total additional houses built per annum (over 10 years)		6 128 to 8 739
Total additional population (all ages)		17 000 to 24 275
Total additional employment[1]		23 940 to 34 140

1. This represents an increase in economic activity and employment in industrial South Wales of about 4%.
Source: Cambridge Economic Consultants (1987).

Similar case studies are mentioned in the OECD report, showing the positive results of infrastructure development on long-term job creation. However, in the absence of clear parameters explaining these results, the impact of the proposed policy options on long-term employment effect cannot be compared for the purpose of this document.

Effects on employment in the transport sector

As demonstrated by the Impact Assessment accompanying the White Paper[153], in a no policy change scenario total employment in transport services is projected to roughly maintain its relative share by 2050, resulting in a lower level of absolute employment by the sector. With growing transport activity demand, this may negatively affect the workload and working conditions. Furthermore, scarcity of labour and skills due to ageing could further aggravate the shortage of labour already experienced in many segments of the transport sector before the crisis. In absence of innovative alternatives, this may also result in higher transport costs for society.

However, total employment in transport services is expected to grow if modal shift occurs, as the Impact Assessment of the White Paper shows, in light of the conclusions of various

[153] Annex 3

economic studies.[154] Employment effects from induced modal shift depend on the labour intensity of each mode: road transport and inland waterways are more labour intensive than maritime transport, railways or aviation. Amongst the labour-intensive modes, the largest employer is road freight transport, whose job losses due to modal shift may, in part be compensated by new jobs in multimodal transport services and logistics. It should be born in mind that prior to the recession there was a chronic shortage of jobs in road freight and so providing alternative transport in a more streamlined network should be seen as facilitating effective employment in all sectors.

It can also be noted that the maintenance and operation of the newly created infrastructure create jobs. The OECD report referred to earlier explains that for instance, a "motorway, analysed as a "company", "sells a service" and thus brings in revenue, provides jobs, generates substantial intermediary consumption (which may benefit the region served)". The Report explains that for the Motorway section Poitiers Bordeaux, more than 1200 jobs were created for the maintenance and operation of this 220 km-section. Most of these jobs are new jobs corresponding to a new service.

The effect of employment of the baseline scenario will be linked to the construction of the current TEN-T Priority Projects. The European parliament Report on Accessibility and Cohesion (Annex 2) does not prescribe much overall employment benefit, with winners and losers in equal measure.

The effects of Option 1 should be positive, regarding the economy overall, and there will be jobs facilitating co-modal transport and modal shift. More substantial, would be the overall economy employment gains that Option 2 would bring through facilitating effective transport operation.

5.2.2. Public Health and Safety

Safety & accidents

According to the TEN Connect I study, a business as usual (BAU) scenario would increase the external costs of accidents (road, rail and inland waterways combined) from €128.6 billion in 2007 to €144.3 billion in 2020—the increase mainly resulting in new Member States.

The TENConnect II study revisited the BAU scenario and compared it with the CORE network scenario.

Impact type (billion euro)	**BAU**	**CORE**	**CORE vs BAU**
Road safety	136.0	137.1	**+1.1**

Table 12: TENconnect II results for Road Safety impacts (External costs) (horizon 2030).

TENconnect simulation indicates a growth in total costs of accidents in the Core network planning scenario (Option 2) as opposed to the traffic forecast on the TEN-T in a continuing BAU scenario (Option 0). The growth of accident related costs in a CORE network planning scenario is a consequence of increased traffic thanks to improved system efficiency (i.e. the

[154] See for instance, "Climate Change and employment – Impact on employment in the European Union-25 of climate change and CO2 emission reduction measures by 2030", European Trade Union Confederation (ETUC), Instituto Sindical de Trabajo, Ambiente y Salud (ISTAS), Social Development Agency (SDA), Syndex, Wuppertal Institute (2007).

rebound[155] effect) as opposed to the BAU scenario. The data needs however to be read with the following two qualifications:

1) The relative overall increase in road safety costs (0.8%) that the TENconnectII modelling shows in a CORE network planning scenario should be seen in the overall context in the increase of traffic.

2) As a consequence of its exclusively planning starting point, as highlighted earlier, the TENconnectII model did not take into account a series of other implementation related factors that would contribute to mitigating the negative effects in two ways:

a) a likely increased modal shift in the actual Option 2 scenario, due to a series of non-infrastructural measures to be promoted in the context of the reinforced corridor coordination approach, that would lead to a shift away from road traffic, resulting in less traffic on road than estimated by the model and therefore less accidents;

b) a series of other measures that would contribute to increased safety on road, reducing thus the ratio of accidents/gravity of per unit of traffic volume (as opposed to the ratio used in the model), such as the use of intelligent traffic management systems and services and higher standards with regard to the construction of roads. (Notably, for example, the experience and results of Commission's Action Plan for road safety have not been taken into account in the TENconnectII simulation.)

Furthermore, as demonstrated by the evaluation of the EasyWay project[156], the coordinated deployment of ITS services on the trans-European road network) can have significant positive impacts. Thus, within the frame of EasyWay I, this has lead to injury accident savings of between 10% and 20%, depending on the particular application, rising to approximately 60% on some safety critical roads sections.

The results of the deployment of dynamic traffic and network management services in particular, successfully deployed by European road operators to tackle disrupted traffic flows on strategic and critical sections of the TEN-T, have proved significant on those parts of the network that suffer greater congestion and accident rates. Positive impacts include increased capacity rates of up to 9% and a reduction in accidents of typically between 20% and 30%, but as high as 63% on particular safety critical sections of the TEN-T.

Implementation of both ITS and state of the art technological standards on the physical infrastructure is envisaged in all three retained TEN-T policy options but, as argued in the IA Report, these are likely to be most effectively and widely deployed in Option 2 as opposed to BAU/Option 0 as well as Option 1, due to better and coordinated implementation and wider traffic volumes affected.

5.2.3 Accessibility and territorial cohesion

As with Option 0, Option 1 is likely to have an unbalanced effect on peripheral areas. As demonstrated in the ECORYS report[157], the Priority Projects approach is likely to give more weight to countries which are net-contributors to the EU Budget. The result might be a lower increase of accessibility for EU12 countries compared to EU15. While the level of accessibility for EU12 is already significantly lower than for EU15, differences will be further accentuated by the expected rise in fuel costs. Therefore, Option 1 is not expected to bring

[155] Rebound effects are indirect, second order effects of policy instruments, which are often unintended and have the potential to undermine the ultimate objective of the primary policy instrument.
[156] EasyWay – Synthesis of Project Evaluation Results 2007-2009, 15 February 2011.
[157] Ex ante evaluation of the TEN-T Multi Annual Programme 2007-2013, ECORYS, October 2007. Accessibility is measured in average speed of interregional road and rail trips (see Annex 2 of the present report)

general improvement to territorial cohesion, except for those few regions that are part of the new Priority Projects.[158]

In Option 2, the impact will be much higher since the network to be financed will be made up primarily of selected corridors on a Core Network identified on the basis of a transparent and coherent European planning methodology, purposely designed to ensure a balance geographical coverage. As a result, interconnectivity between national networks will be improved where it is necessary, as the planning methodology will allow for the identification of network development on the basis of traffic flows[159], transport demand as well as objectives of territorial cohesion and economic development.

It should be remembered that the Core Network will constitute the strategically most important parts of the TEN-T, as identified (on the basis of the above mentioned planning methodology) of the Comprehensive Network –the basic layer of the TEN-T. While the Core Network is specific to Option 2, the Comprehensive Network would, essentially, result from an updating and adjustment of the current TEN-T and directly reflect the relevant existing and planned infrastructure in Member States. It should ensure the accessibility of all regions of the Union. It is expected to include road, rail, inland waterways, maritime and air infrastructure network components, as well as the connecting points between the modes. It would feature minimum infrastructure standards, and aim at interoperability wherever necessary for seamless traffic flows across the network. All European citizens and economic operators should be able to access the Core Network, via the Comprehensive Network, on comparable terms.

In the TENconnect II study, the comparison of the Business-As-Usual scenario (seen on map as PP) with the proposed CORE network for Accessibility is given in the following map— hence the 'added value' of the CORE over-and-above the currently programmed, fragmented network is shown. The map is similar to that for GDP.

[158] According to the TENconnect I study, a policy is normally classified as pro-cohesive if it helps economically lagging regions grow faster than economically more advanced regions. The implications of European transport policy for the regional cohesion were analysed in a series of research projects funded by the EC, for example, ESPON 2.1.17, IASON8, and ASSESS9.

[159] The traffic flows were identified by the Member States via the TENtec system, used as a monitoring tool by DG MOVE, see Annex 5 of the present report.

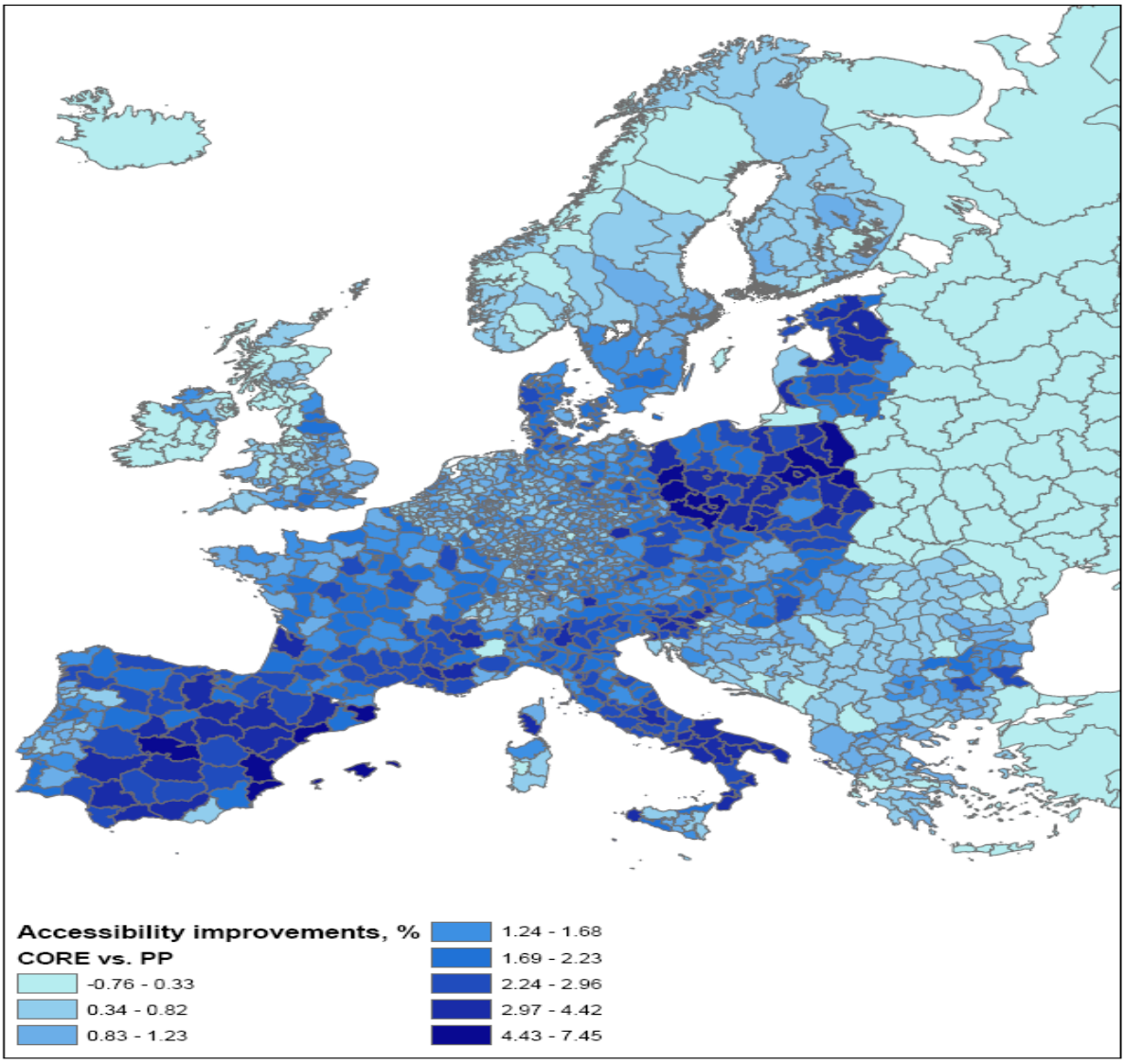

Figure 7: Comparison of BAU with the proposed CORE network for accessibility (horizon 2030)

5.3. Environmental impacts: Climate effects, Air pollution, Noise

The 'rebound effect' seen in increases in road and a decrease in rail traffic is the result of the assumption of an absence of congestion on the CORE network (see explanation in annex 6)—hence the CORE not only increases traffic on itself but alleviates congestion on the rest of the network and this creates demand. Again, it is the implementation measures that need to be applied hand-in-hand with network planning, so as to achieve significant sustainability improvements—see case studies report at annex 7.

5.3.1. Climate change

According to the business-as-usual scenario of the Commission Communication "A Roadmap for moving to a competitive low carbon economy in 2050", EU transport's GHG emissions will increase by 60% to 70% in 2050 in comparison to the 1990 levels. In addition, a 50% reduction of emissions in other sectors compared to 1990 would increase transport's share in total emissions from 20% (current state) to 50% by 2050.

The reinforced coordination approach to implementation of Options 1 and 2 would improve the efficiency of the transport system and promote more sustainable transports through the deployment of intelligent transport systems improving the efficiency of transport operations, innovative solutions to promote low carbon transport and other forms of "green" transport solutions, as well as through stimulating technological innovation in transport and infrastructure development. Again, due to the specific methodology selection of network and corridors, based on a multimodal and traffic-flow approach, the positive effects of Option 2 are likely to be significantly higher than those of Option 1.

5.3.2. Air pollution (NOx, PM, SOX, HCs)

Air pollution levels, as defined by the Directive 2008/50/EC of the European Parliament and the Council on ambient air quality and cleaner air for Europe, mostly depend on the vehicles' (including ship's) pollutant emissions performance and road traffic congestion in urban areas. To a large extent, the reduction of air pollution depends on the enforcement of the legislation concerning vehicles emissions[160].

Options 1 and 2 would contribute to further reduction in emissions thanks to their positive impact on congestion reduction, and as a result of induced modal shift. On the other hand, Options 1 and 2 would facilitate larger volumes of transport traffic flows, leading to an increase of energy and fuel consumption, the so-called rebound effect. Hence, whether on balance the overall impact will be positive or negative will depend on the extent to which cleaner vehicle technology is introduced. The reinforced coordination approach to implementation would further contribute to the reduction of vehicles emissions in both Options, as it enables better promotion of greener transport solutions, for example by fostering the replacement of diesel locomotives by electric ones and promoting cleaner road transport through technological innovation for both vehicles and the infrastructure. Due to its multi-modal and traffic flow based approach, the positive impact of Option 2 would be higher than that of Option 1.

5.3.3. Noise

According to one study,[161] road generally accounts for approximately 70% of total noise emissions by transportation, rail for 10% and air transport for 20%.

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[160] Such as Regulation (EC) No 715/2007 of the European Parliament and of the Council of 20 June 2007 on type approval of motor vehicles with respect to emissions from light passenger and commercial vehicles (Euro 5 and Euro 6) and on access to vehicle repair and maintenance information (Text with EEA relevance)

[161] Noise Pollution Emitted by Transportation Systems, Dr. Jean-Paul Rodrigue 2009

The reference scenario of the Impact assessment of the White Paper highlights that the forecasted increase in traffic would lead to roughly 20 bn € increase of noise related external costs by 2050. Option 0 would thus have a negative impact on noise emissions.

Option 1 and 2 are not likely to limit traffic growth. However, they will influence modal shift: mainly from road to rail and inland waterways for freight transport, and from road and aviation to rail for passenger traffic. In relative terms, road and air transport noise will decrease while rail transport will increase overall therefore, noise emissions should decrease.

Moreover, with the reinforced coordination approach to implementation, higher quality infrastructure will be promoted, therefore reducing noise emissions, particularly for rail, road, and multimodal platforms (for instance, the promotion of rail electrification will foster the replacement of heavy diesel locomotives by lighter electrified ones). In addition, as noise emissions reduction is likely to come mainly from changes in the motorisation of vehicles/rolling-stock, the promotion of more silent vehicles through the reinforced coordination approach to implementation will likely strengthen the overall positive impact on the reduction of noise emissions of Options 1 and 2. Option 2 is likely, however, to have a higher positive impact than Option 1, due to the overall higher volumes of traffic affected (as highlighted earlier).

Since the implementation of Priority Projects in Option 1 and of Corridors in Option 2 will be ensured under the legal format of Decisions, the social impacts of these PPs/Corridors will be studied in detail in the subsequent Impact Assessments necessary for the adoption of the Decisions.

Results of the TENConnect II on environmental impacts

For Noise, Air pollution and Climate effects the TENconnect II study gave the following results comparing the CORE & COMPREHENSIVE (For information) with the Business-as-usual:

	Scenario			
Impact type (€ billion)	**BAU**	**CORE**	**CORE vs BAU**	**COMP vs BAU**
Traffic noise	15.1	15.2	**+0.1**	+0.2
Air pollution (NOx, PM, SOX, HCs)	60.5	55.0	**-5.5**	-5.5
Climate effects *(CO2)*	94.4	95.5	**+1.1**	+1.6

Table 13: TENConnect II results on environmental impacts (External costs, horizon 2030)

The results of the TENconnectII simulation show a relative increase in the estimated costs of noise and CO2 emissions, but a decrease in those related to air pollution, in a policy scenario where the TEN-T is the result of coordinated EU-level planning (core network) as opposed to continuing with the current 30 Priority Projects (the result of a bottom-up approach) in a business-as-usual scenario. The increase in the costs related to noise and CO2 emissions reflect, as in the case of road safety data, the rebound effect of improved efficiency of traffic flows on an effective TEN-T network, most apparent in the COMPREHENSIVE Network scenario.

Yet, just as in the case of the road safety, the TENconnect II simulation does NOT reflect: a network where effects of multimodality (an in-built dimension of network planning and

implementation in Option 2) have been taken into account - i.e. a shift away from road to rail and air for passenger traffic, and to rail and inland waterways for freight; or the impact of coordinated infrastructural development that envisages the use of highest technological standards with regard to, for example, the motorisation of road vehicles, or the sources of electricity used in the power grids of rail on the CORE network;

A number of studies have however shown that the negative impacts of the rebound effect of traffic can be mitigated when measures to improve efficiency are taken in conjunction with a series of other measures meant to reduce the environmental impact of the transport sector.

Thus, the European Environmental Agency report on 2009 (TERN) for example starts from the premise that more efficient vehicles using less fuel may in the long run be cheaper to operate, lowering the general transport costs and leading, in turn, to more transport, as tasks that were earlier too costly to undertake could then be done at a reasonable price. While this entails added choice for consumers and thus added welfare, it also means that significant parts of the environmental benefits disappear in growing transport volumes. Nevertheless, the report shows, a set of measures including adoption of technological improvements (improved engine and vehicle design, use of electric cars, low carbon fuels, technologies encouraging behavioural change) and demand control can combine to support the achievement of a 60% reduction in CO2 emissions from transport by 2050.

The evaluation of the EasyWayI impacts provides another, though more limited in scope, example in this sense. Results have thus shown that the coordinated deployment of ITS on the TEN-T only has led to CO_2 savings of up to 4% (between 2007 and 2009), as a consequence of reduced congestion (due to increased capacity throughputs by up to 20% where lanes are managed dynamically) and reduced accidents. [162]

Last, but not least, the Transport White Paper IA Report shows that measures to modernise and increase the efficiency of transport infrastructures are essential for any efforts to achieve the 60% CO2 reduction target, but that a more comprehensive and combined set of measures is needed to insure the sustainability of the transport system. In particular, the projected modal shift to non-road modes will be relying on several measures. Firstly and very essentially, the capacity and quality of transport infrastructure of non-road modes will have to be increased with a view to carrying higher volumes with high degree of efficiency. However, as shown by the TEN-Connect II modelling results (see Table 10), building of infrastructure in isolation will not produce any noteworthy modal shift. Therefore - secondly, as foreseen in the preferred option of the White Paper, other measures such as internalisation of external costs for all modes, taxation of fuels and vehicles, internal marked measures to fully open markets and to widely deploy ITS systems, and research and innovation. Combining these measures is expected to lead to significant reduction in air and noise pollutants by 2050. Nitrogen oxides emissions would decline by about 50% relative to the baseline scenario, while particulate matter emissions by about 55%. Moreover, there will be a reduction in vehicle related noise pollution due to a decrease in the number of vehicles used and to a limited extent due to the gradual substitution of internal combustion engines for electric vehicles. External costs related to noise would decrease by as much as 46% relative to the baseline scenario by 2050. [163]

[162] Measures facilitated through a high ITS content that might be considered as ready for widespread deployment, include: cross border traffic management; dynamic lane management; variable speed limits / speed limit enforcement; co-ordinated data exchange / real time traffic information provision. A number of other measures show potential and after further evaluation by the EasyWay II programme should be reviewed and considered for mainstreaming. These include: co-modal information / journey planning; freight specific information / parking guidance.

[163] SEC (2011) 358, p. 74. See also the reference to the WP IA report in subsection 5.1.1 above.

5.3.4. Energy use

The energy use of the transport sector mostly depends on the source of energy used by transport operators to cover their needs, on the one hand, and on the energy efficiency of the vehicles used, on the other. Increased use of renewable energy sources to power vehicles would be facilitated by the development of supporting infrastructure, such as electrified railways and power supply stations (e.g. electricity/battery and hydrogen) along the road infrastructure. Increased use of biofuels is also important for the further decarbonisation of transport, mostly in aviation and waterborne transport, where electrification is not really an option.[164]

Energy efficiency is the other major contributor to the decarbonisation of transport, as the technology scenario from the Impact Assessment on "Low-carbon economy 2050 roadmap" shows.[165] Transport infrastructure can contribute to increased energy efficiency of the transport system by reducing congestion, encouraging modal shift and co-modality towards more energy efficient transport modes/solutions[166] as well as supporting the development of innovative transport solutions. Nevertheless, as pointed out above, the impact of greener/more efficient infrastructure development depends to an important extent also on external factors, such as the growth of the share of renewable energy used to produce electricity[167] and the rhythm of development and adoption of new technologies.[168]

Option 1 and 2 should have an overall positive impact, due to their positive impact on the energy efficiency and through facilitating the deployment of alternative fuels by the provision of recharging and refuelling infrastructure. Option 2 should lead to a higher positive impact as compared to Option 1, due to its enhanced planning aspects.

5.3.5. Land-use & biodiversity

As explained in the Impact Assessment of the White Paper, the greatest impact on other environmental resources would be caused by an increase in land use for infrastructure, generating increased pressure on biodiversity and ecosystem services, due to direct damage linked to construction, habitat fragmentation and degradation, and disturbance.

It must be noted here that, according to relevant Union legislation,[169] all three Options would include the assessment of the strategic environmental impact at the level of relevant plans and programmes by MS, as well as the assessment of environmental effects at the level of individual projects of common interest (see Annex 4).

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[164] Impact Assessment accompanying the "Low-carbon economy 2050 roadmap", SEC(2011) 288 final.

[165] SEC(2011) 288 final

[166] For instance by promoting electrified high-speed rail for passenger transport instead of aviation or by promoting electrified rail freight transport instead of road transport.

[167] The pathways for the decarbonisation of power generation will be analysed in the forthcoming Energy Roadmap 2050.

[168] For instance, the average energy efficiency of passenger cars in 1990 was 43.9 toe/Mpkm. By 2050, this improves to 23.9 in the reference scenario and it is further reduced to 13.6 toe/Mpkm in the Effective Technology scenario. This is achieved through gradual efficiency improvements of internal combustion engines and subsequently gradual hybridisation leading eventually to high penetration rates for electric propulsion vehicles (such as for example plug-in hybrids and electric vehicles).

[169] Pursuant to Council Directive 85/337/EEC, environmental impact assessments of projects of common interest which are to be implemented and by applying Council Directives 79/409/EEC (Birds Directive) and 92/43/EEC (Habitats Directive). Moreover as from 21 July 2004 an environmental assessment of the plans and programmes leading to such projects, especially where they concern new routes or other important nodal infrastructure development, shall be carried out by MS pursuant to Directive 2001/42/EC on the assessment of the effects of certain plans and programmes on the environment (SEA Directive). MS shall take the results of this environmental assessment into account in the preparation of the plans and programmes concerned, in accordance with Article 8 of that Directive.

TEN-T projects may pose serious threats to biodiversity and Natura 2000 areas which were designated to protect the most endangered European species and habitat types. The negative impacts from transport projects might result from physical reduction of natural habitats, landscape fragmentation, migration barriers, collision of vehicles with animals, emissions of noise and air pollutants, changes to the water regime and others. It is therefore necessary that all projects undertaken as part of the TEN-Ts prove full compliance with EU environmental legislation, including Birds and Habitats Directives, before they are given a green light for implementation.

In addition, a multi-NGO study[170] on the potential conflicts between the TEN-T Priority Projects and the EU's Natura 2000 network of protected areas found that 379 sites that should be protected by the EU Birds Directive and 935 protected under the Habitats Directive are likely to be affected by the 21 TEN-T Priority Projects analysed. Watercourses and maritime areas merit particular attention (see Annex 4).

In Option 1, the impact on land-use and biodiversity is likely to be very negative since the selection of new Priority Projects would lead to the building of new infrastructure.

In Option 2, the impact will remain limited by the fact that the Core Network would be established mostly on existing infrastructure. However, missing geographical links, mostly cross-border between national networks and bottlenecks and new infrastructure in the new Member States, as well as missing modal links connecting modes of transport, would be built. Therefore, Option 2 would have a negative, though limited, impact.

5.4. The positive impact of implementation measures

The case studies of Annex 7 show how the application of today's 'best practice' will reduce transport externalities, to more than compensate for any increase in traffic volume resulting from the operation of an efficient CORE network (the rebound effect). These case studies show the needs for adequate implementation strategies in order to complement transport planning approaches

The rail freight studies show a selection of current 'best practice' and how they have managed to gain significant improvement in utilisation and modal shift from road to rail. For instance, the BRAVO project along the Brenner Corridor saw an increase in traffic volumes of about 57 percent over the last three years. The other studies focus on proposed networks, from the central network of NEWOPERA to the 'red banana' of FERRMED. The benefits of the corridors are given in terms of modal shift (up to a doubling of 'long distance' freight transport volume by rail) and CO2 reduction and the costs are a similar order of magnitude to that estimated in the IA for the freight orientated rail network regulation. All conclude that the cost of developing an entire network with a total length of about 25 000 km amounts to around €170 billion. NEWOPERA estimated that a quadrupling of the rail freight trains on the New Opera corridor would expand rail freight's market share from 6% (2006) to 16%. FERRMED gives estimates of 17% of all inland freight and 24% (more than 500 km) - 28% (more than 1,000km). But for these gains to be realised then all studies conclude for EU Railway Corridors Management.

The Ports study shows the likely future bottlenecks and congestion hotspots and the necessity for hinterland connections that shift freight from the ports as quickly and as cleanly as possible, especially so for the north-range ports. The study reinforces the growing need for effective and sufficient rail (and IWW) freight transport.

[170] TEN-T and Natura 2000: the way forward, an assessment of the potential impact of the TEN-T Priority Projects on Natura 2000, Final report – May 2008

The EASYWAY study on the application of ITS best practice shows how the 'rebound effect' resulting from the operation of an efficient CORE network does not need to lead to higher external costs. Their work has shown road accident savings of between 10% and 20%, depending on the particular application, rising to approximately 60% on some safety critical roads sections. Congestion is improved with capacity throughputs increased by up to 20% where lanes are managed dynamically; and for the environment, reduced congestion, along with reduced accidents, have resulted in CO_2 savings of up to 4%.

Finally, the EEA TERN study, FREIGHTVISION and the IA for the Climate Change Roadmap all support the notion of the Transport White Paper, that future sustainable mobility can only be achieved by the *Cumulative effect of a combination of 'improve', 'avoid' and 'shift' measures.*

5.5. Sensitivity analysis of the policy options

The sensitivity analysis of the underlying assumptions has been studied in part 2.4.3 and in the Impact Assessment accompanying the White Paper.

As concerns the main factors inherent to the policy options and affecting the options' impacts, they have been identified as:

a) possible changes regarding the network configuration, since the revised Guidelines will be adopted in the ordinary (co-decision) legislative procedure;

b) the impact of budgetary decisions at Union, Member States and regional level on the availability of funds for development of TEN-T projects.

Moreover, with Member States in charge of the majority of infrastructure investments, the impact of political cooperation and the impact of local political changes on the realisation of infrastructure could prove critical. The reinforced coordination approach to implementation in Options 1 and 2 should lead to better addressing cooperation issues, through binding commitments inscribed in corridor Decisions. Nevertheless, implementation will ultimately depend on Member States and regional and local authorities and, enforcement action at EU level would always be limited, in respect of Union procedures and the principles of subsidiarity and proportionality.

5.5.1 On the possible changes regarding the network configuration

In undertaking Option 2, the Commission would be in possession of a robust instrument for designing the network. As pointed out earlier, a methodology has been elaborated by a high-level group of external experts, which has been published in a report and submitted to a wide stakeholder consultation in 2010, and thereafter consolidated and submitted again to the Member States and the European Parliament. Bilateral discussions with the Member States have focused on fine-tuning certain alignments.

In the same discussions it became apparent that the Member States were interested in a number of projects that were rather political wishes than viable, EU-added value projects. Whereas in Option 2, on the basis of the methodology, these projects have been refused, the least exceptions would turn the coherent methodology application into cherry picking, in Option 1 that would not be possible. Such projects, in most cases, do not have a significant EU-added value, as these projects do not correspond to the economical reality, nor to traffic needs.

It is therefore unlikely that the Core Network of Option 2 will be prone to greater variations in the final lead up to the Commission proposal. This would not be however the case of Option 1, even if DG MOVE had a good knowledge of the projects intended to be proposed by the Member States.

As a consequence, impact and investment estimates are unlikely to vary to a large extent in Option 2. But they are likely to vary in Option 1, according to final Member States decision during discussions in the Council on the adoption of the new Priority Projects, as well as the amendments of the European Parliament.

With regard to the core network corridors in Option 2, these will be established along the core network configuration, based upon the criteria highlighted in chapter 4.2. As they correspond largely to parts of the Priority Projects and to the rail freight corridors, continuity of major investments and efforts made so far will be ensured, and at the same time bringing in the methodology and thus linking up the different transport modes, connecting ports, nodes and terminals.

5.5.2 On the consequences of decisions on the Multi-annual Financial Framework after 2013 and the budgetary constraints on Member states' budgets

The investments estimates for both Option 1 and Option 2 take into account the financial difficulties of the Member States, since the investments figures up to 2020 have been discussed with them. As regards Option 2, the sections included in the Core Network are based on the reality of investments capacities up to 2030. Some costly and unrealistic projects (such as the Odra-Elbe-Danube Canal) have been deleted from the map.

The Multi-annual Financial Framework (MFF) discussions and the future European budget available for transport investment will have an impact on both options with regard to the timing and the capacity of the EU to trigger the realisation of projects. The next MFF will cover only a period up to around 2020, while the Guidelines target a complete and integrated TEN-T by 2030. The higher the budget available for the next period, the more projects to be completed in the next 10 years, the earlier the positive impacts of the network effect will be. A reduced budget for transport infrastructure might lead to later implementation dates and hence delayed effects of the TEN-T positive impact. But it should not influence decisions as to whether projects are part of the network and would be implemented or not. Due to two decades of TEN-T policy and the decisions taken under the present MFF, the maturity of most projects still to be realised is generally high and the likelihood of them being realised until 2030 is good.

The Commission adopted its Multi-Annual Financial Framework proposal (COM 2011) 500 final) on 29 June 2011. This proposal includes a "Connecting Europe Facility" with the view to accelerate the infrastructure development that the EU needs. It covers infrastructures in the field of transport, energy, information and telecommunication technologies. € 21.7 bn are allocated to transport, with an additional €10 bn ring-fenced for related transport investment inside the Cohesion fund. These €31.7 bn should fund pre-identified transport infrastructures of EU interest, for which a preliminary list is proposed. This list covers 10 European Mobility Corridors and Transport Core Network projects, and is thereby fully in line with Option 2 proposing a Core Network with a reinforced approach to implementation by means of corridors. Should this Commission Proposal be agreed upon by the European Parliament and Member States, it would help accelerating the completion of EU added-value projects in the next 10 years, accelerating the expected positive impact presented in this document.

It should be also noted that the Guidelines are prescriptive, meaning that once adopted, they represent a commitment on the part of the Member States to complete the new Priority Projects, or their part of the Core Network respectively, before 2030.

5.6. Choice of the appropriate legal act

The current TEN-T Guidelines have been proposed and adopted as a **Decision** of the European Parliament and of the Council. The Decision is specifically addressed to the Member States, rendering the Guidelines binding in their entirety for all the Member States.

While the Member States have traditionally constituted the main actors involved in transport infrastructure development and management, developments suggest that the situation will be progressively changing within the coming decades. Attracting private capital in various forms of public-private partnerships is an increasingly sought for option, in particular in contexts such as the current one of increased strains put on public budgets (both of the Member States and of the Union).

The Commission has already undertaken in its 2010 Budget Review Communication to leverage investments from the EU budget by providing a framework to enable partnerships with banks and other private sector actors in using EU funds, by means of an increasing array of innovative financial instruments. Transport infrastructure is one of the areas where innovative financial instruments have been pioneered by the Commission, and for the next MFF the Commission intends to propose that a significant part of its transport infrastructure budget be managed by innovative financial instruments.[171]

With more actors besides the Member States becoming involved in TEN-T infrastructure development, it is important to ensure that the Guidelines be binding for all.[172] While a **decision**, as a legal instrument, may address also other actors than the Member States, these actors need to be clearly specified. As stipulated in Article 288 of the TFEU, a decision is binding only on those to whom it specifies that it will be addressed. However, given that the revised Guidelines are intended to cover the period up to 2030, it is difficult to anticipate at this point in time all the categories of actors that would become involved in TEN-T implementation projects over the next two decades.

The alternative available legal instruments are a regulation or a directive. According to Article 288 of the TFEU, a **regulation** shall have a general application, meaning it shall address all physical and legal persons concerned, and it shall be binding in its entirety and directly applicable in all Member States. As such, a regulation appears a more appropriate legal instrument, as it is more comprehensive, without having to be specific, and hence discriminating, in its coverage.

A **directive** shall be binding, as to the result to be achieved, upon each Member State to which it is addressed. However, Member States are free to decide on the choice of form and methods to achieve the prescribed results. This renders a directive an unsuitable choice as a legal instrument for the TEN-T Guidelines, since higher coordination among Member States, not least at implementation level, is one of the main objectives of the TEN-T policy revision initiative.

6. COMPARISON OF THE OPTIONS

6.1. Effectiveness

6.1.1. Improving EU-level coordination in planning the TEN-T configuration

Compared to the baseline scenario (Option 0), Option 1 should ensure, in a first place, better interconnectivity of networks across countries. Though it shares with Option 0 the current, predominantly bottom-up approach to planning, and hence could potentially inherit its predominantly uni-modal focus, a better definition of criteria for priority projects identification, drawing on current experience and assessment results, should support the development of project proposals with higher EU added-value on the TEN-T. The

[171] According to proposals currently discussed within the Commission in the context of developing the next MFF proposal.

[172] The Report on the "Consultation on the Future Trans-European Network Policy" mentioned that some contributors explained that the legal instrument framing the future TEN-T policy should be binding.

identification of new Priority Projects should thus allow building new/connecting infrastructure to fill in critical missing links, including improving East-West connections and connections with third countries. Nevertheless, insofar as at the level of planning a primarily bottom-up approach will prevail, experience suggests that the resulting configuration will remain suboptimal.[173]

Compared to Option 0, Option 2 is also likely to prove more effective in ensuring a coordinated approach to developing the TEN-T while addressing, at the same time, aspects such as missing cross-border links, multi-modal connecting infrastructure, links to third countries.

The difference between Options 1 and 2 lies primarily in the degree of coordination opted for in planning the TEN-T, where Option 2 will propose a stronger top-down coordination at EU level. This is particularly true with regard to the identification of the projects of key European interest:

- In Option 2, projects of key European interest will be situated on a pre-identified strategic network configuration (the "core network"), optimised at the level of planning by including missing cross-border links (including links with neighbouring states), multi-modal connection nodes and infrastructure to alleviate critical bottlenecks along major trans-European routes. – In Option 1, TEN-T configuration will continue to stem from Member States' project proposals. Even though better defined criteria for priority projects identification are expected to ensure higher converge in Option 1, as opposed to Option 0, towards achievement of EU-level strategic interests, insofar as at the level of planning a primarily bottom-up approach will prevail, as pointed out earlier, the resulting configuration is expected to remain suboptimal.

At the level of the wider (or "comprehensive") TEN-T, the difference is less marked, but still worth noting. While in Option 1 Member States will be asked to provide updated maps to take into account changes in completed and planned projects, in Option 2 the maps will also be adjusted according to a number of common principles/rules, ensuring thus a more coordinated approach also to the wider/comprehensive network identification.

6.1.2. Fostering the interoperability of national networks

The reinforced coordination approach to implementation, shared by both Option 1 and Option 2, provides for biding commitments on all actors involved (both public and private) to implement common technical and service standards along the selected Priority Projects or, respectively, Corridors. Interoperability issues are therefore likely to be addressed in a direct and comprehensive manner by means of Priority Project/Corridor Decisions in both Option 1 and Option 2 as compared to Option 0. Nevertheless, due to the higher degree of coordination at planning level in Option 2 than in Option 1, effectiveness in ensuring the objective of higher levels of interoperability on the TEN-T is expected to be higher in the former than in the latter.

In Option 2, it is worth recalling, projects will be financed with priority along multimodal Corridors that concern the most important cross-border traffic flows along the (core) network,

[173] Merely providing a better definition of priority projects criteria will not, in itself, lead to significantly improved coordination at EU level in planning the development of the TEN-T. It should provide a better EU level-steered approach to planning, by setting clearer defined and better focused landmarks *but* to what will remain nevertheless an essentially bottom-up process. Member States would still continue to consider and fund with priority achieving national objectives, whereby certain cross-border links or multi-modal network connections do not necessarily figure among the top of the list. At the other end, Member States are likely to promote cross-border projects with high political profile but less economic efficiency, such as the Via Carpathica or the Central Pyrenean crossing. (See also assessment of planning scenario A3 in Annex 3.)

cross at least two borders between three Member States, and involve at least three transport modes for at least half of the traffic volume along the Corridor. By committing all potential actors involved in the various projects along the Corridor to common technical and operational standards, interoperability among at least three national networks, inter-modal connection among at least three modes and a high threshold for traffic volumes concerned are thus ensured from the start.

In Option 1 however, interoperability standards are only effectively ensured along individual Priority Projects. Strengthened EU-added value criteria for Priority Projects should ensure that more projects are proposed that develop cross-border links, following most important traffic flows, or that involve development of multi-modal sections. Yet these criteria, it should be recalled, are not cumulative, lest the bar is set too high to be met by individual project consortia.[174] Hence, on average, less national networks, less modes and less traffic volumes are likely to be concerned by common interoperability standards along a Priority Project than along a Corridor. Consequently, it can be concluded, lower levels of interoperability are to be expected along a TEN-T of which core develops as the sum of Priority Projects, i.e. Option 1, than along a TEN-T that is developed by means of (priority) multimodal Corridors on an optimised network configuration, i.e. Option 2.

6.1.3. Enhancing Member States cooperation

With the reinforced coordination approach to implementation in both Option 1 and Option 2, Member States cooperation in developing projects along the TEN-T in both Option 1 and Option 2 is likely to be significantly enhanced as opposed to Option 0. The Priority Projects/Corridor Decisions in Option 1 and Option 2, respectively, provide for a coordinated approach to infrastructural investments by all actors involved. Both EU and Member States funding would be committed through the individual Priority Project/Corridor Decisions, which would also establish binding timelines for completion. Infrastructure improvements and transport policy measures would closely interact, and their realisation will be brought forward by appropriate coordination structures, under the aegis of a Priority Project /Corridor Coordinator.

Nevertheless, the overall impact of reinforced coordination is likely to be relatively higher in Option 2 than in Option 1, for the same reasons as argued in the case of the interoperability objective, achievement. More specifically, though specific effectiveness in improving Member States coordination is likely to be similar, insofar as more cross-border missing links and higher volumes of traffic are expected to be covered by individual Corridor Decisions than by individual Priority Project Decisions, the overall impact on improving TEN-T delivery is expected to be higher in Option 2 than in Option 1.

6.1.4. Ensuring highest EU added-value for the use of EU funds

As argued in section 2.3.4 above, the TEN-T Guidelines provide a framework for conditionality in allocating funds for TEN-T development by means of policy action at both planning and implementation level. At the level of planning, conditionality is indirect, but no less effective: the higher the coordination of planning towards meeting EU-wide priority objectives, the higher the percentage of funds that support EU-added value projects. In that respect, conditionality of use of EU funding is likely to be higher in both Option 1 and Option 2 as opposed to Option 0, due to expected higher coordination in TEN-T planning. By the same token, the effectiveness of policy measures in Option 2 is likely to be higher than in Option 1.

[174] Whereas, it might be worth underscoring, these criteria can be applied cumulatively at Corridor level, as they do not necessarily concern, cumulatively, single projects. Projects may develop only a single cross-border section, or an inter-modal connecting point, while respecting the common operability standards prescribed.

At implementation level, conditionality can be prescribed more directly. This is primarily done by means of the rules for awarding financial grants. Yet, as the financial rules for TEN-T funding will be dealt with in a separate legal document, accompanied by a distinct impact analysis, this aspect has not been dealt with here. Nevertheless, other implementation measures can also help ensure that funding is channelled towards projects with highest EU added value. It is the case for example of the TEN-T EA, which has an important support role in the development of project proposals "pipeline". When its work is supported by better planning coordination guidelines, as is the case in both Option 1 and Option 2, its effectiveness in steering Member States proposals towards higher EU added value projects is likely to be higher than in an Option 0 scenario. By the same token, Agency's activity is likely to be more effective in steering Member States' proposals towards higher EU-added value under Option 2 than under Option 1.

At the same time, by providing for a coordinated approach to investments and bindingly committing EU and Member States funds as well as agreed timelines for completion within the individual Priority Project/Corridor Decisions, the reinforced coordination approach to implementation in both Option 1 and Option 2 is likely to lead to higher effectiveness in delivering EU-funded projects than in Option 0, contributing thus to enhanced effectiveness of the use of EU funds. As argued earlier, increased effectiveness in implementation in a reinforced coordination approach is likely to concern TEN-T sections with higher volumes of traffic, and linking more national and modal networks in Option 2 than in Option 1. Consequently, effectiveness in increasing the efficiency of the use of EU funds supporting higher EU-added value projects is expected to also be higher in Option 2 than in Option 1.

	Option 0	**Option 1**	**Option 2**
Improve planning coordination by means of a coherent & transparent approach to define the network configuration, addressing aspects of network fragmentation linked to missing links, multimodal connections and connections to neighbouring and 3rd countries; adequate geographical coverage.	No	Low	Medium
Address the *lack of interoperability* by fostering the implementation of European *standards* for management systems and the development of harmonised operational *rules* on the TEN-T project of common interests	No	Medium	Medium
Enhance Member States cooperation in order to coordinate investments, timing, choice of the routes, environmental and cost-benefit assessments for projects of common interests.	Low	High	High
Ensure that the optimal network configuration is a key element in the allocation of EU funding allowing to focus on cross-border sections, missing-links and bottlenecks, in order to address the lack of sufficient conditionality of the TEN-T funding instruments.	No	Medium	High

Table 14: Effectiveness of envisaged policy options in light of objectives

Overall, it can be thus be concluded that Option 1 would ensure improved effectiveness, as compared to Option 0, in achieving the objectives of physical interconnectivity and interoperability of networks, Member States coordination in implementation of cross-border sections, timely delivery and, generally, in delivering Priority Projects with increased EU added-value. It would not however bring significant improvements in ensuring the multi-modality of the TEN-T, and the investments in enhancing effectiveness of implementation at Priority Project level will be diluted due to suboptimal coordination at the level of planning.

Compared to Option 0, Option 2 is also likely to better address interconnectivity and interoperability aspects as well as provide for improved Member States coordination in implementation of projects along the TEN-T. Compared to both baseline scenario and Option 1, it would also better ensure effective multimodality by *a priori* including multimodal nodes and providing for co-modal links on the TEN-T. Moreover, the application of the reinforced coordination approach to implementation at corridor rather than priority project level should lever the value added of this approach, as a corridor will include a number of current as well as future priority/key projects of European interest, ensuring, at the same time, their multi-modal and cross-border connectivity (and thus the EU added-value). Among the three options, it appears therefore as the one that is likely to ensure the highest degree of achievement of the specific objectives of the future TEN-T policy.

6.2. Efficiency

The argument in part 5 of this report has highlighted that the expected positive benefits on economic and social issues, as well as environmental aspects, are likely to be higher in both Option 1 and Option 2 when compared to a business-as-usual scenario in Option 0, and higher in Option 2 than in Option 1. In this section, an indicative assessment of costs of policy implementation in all options is provided.

Two types of costs can be considered for the assessment of the cost of each policy option: investments costs in infrastructure and administrative costs to implement the European TEN-T policy. The infrastructure investment needs can be estimated from the investments needed to complete the targeted network.

For the purpose of this document, in order to give an order of magnitude of the related costs of the policy options on the infrastructure side, the estimated costs of the policy options during the period 2014 – 2020 are provided. The figures in the table below constitute an estimation starting from the data provided by the Member States through the TENtec system and data from the Priority Project Detailed Analysis 2010. For Options 1 and 2, they were also adapted after discussions during bilateral meetings, including at director general level, between DG MOVE and representatives of the Ministries of Transport of the Member States.

The cost for the EU budget however cannot at this time be estimated, as it will depend on the co-funding rates and the geographical scope of the TEN-T Programme. These rates, which will be defined in the TEN Financial Regulation to be adopted in autumn 2011, together with the geographical scope of the TEN-T funds, will be strongly determined by the result of the process for the definition of the next EU multi-annual financial framework (MFF), for which the Commission proposal was adopted on 29th June 2011 (see above section 5.5.2).

The administrative costs are management and administrative costs for implementing the TEN-T, through the TEN-T EA and the European Coordinators. The reinforced coordination approach of Option 1 and 2 will require specific administrative and management costs compared to Option 0[175]. The table below summarizes the above mentioned elements:

yearly basis	**Option 0**	**Option 1**	**Option 2**
Investment needs*			

[175] These costs are related to the cost of the Secretariat that will be set up for each corridor, involving the Coordinators, DG MOVE, the TEN-T EA and the European Bank of Investments. They will also include the cost of meetings and other coordination means in order to involve National and local authorities, the Infrastructure managers of the countries involved, building companies and banks. In addition, the necessary studies will be financed from this budget to get the data (on traffic, investments, environmental studies…) required for the efficient management of the corridors. This could also include the financing of small infrastructure such as last miles connections and siding in order to increase the profitability and added-value of the Corridors.

-yearly Investments estimates *- for 2014 – 2020*[176]	€ 21.4 billion *€ 150 billion*	€ 28.6 billion *€ 200 billion*	€ 30.7 billion *€ 215 billion*
Administrative costs - TEN-T EA - Corridor Approach administration (for 10 Corridors)	€ 10 million	€ 10 million € 20 million	€ 10 million € 20 million
TENconnect II Benefits of CORE compared to Business-as-usual			
- direct economic benefits			€ 77.7 bln
- air pollution savings			€5.5 bln
TOTAL BENEFITS			**83.2 bln**
- rebound effect *road safety *noise *climate effects			 - € 1.1 bln - €0.1 bln - €1.1 bln

Table15: Efficiency of envisaged policy options

* Investments figures for the Core Network were discussed during bilateral meetings between DG MOVE and Member States representatives. Investment estimates for Option 1 came from the same source and were based on DG MOVE's knowledge of projects that Member States are likely to defend in political discussions (such as Via Carpathia, the Messina Bridge or the Botnian Corridor). Figures for Option 0 are based on the figures Members States provided via the TENtec database regarding the completion of priority projects.

As detailed in section 5, the economic, social and environmental benefits of both Option 1 and Option 2 are expected to be higher than in Option 0. At the same time, the expected benefits across all three domains in Option 2 are expected to be higher than in Option 1, while the costs of implementing the two options are similar. Therefore Option 2 has a better cost-benefit analysis than Option 1.

6.3. Coherence

As highlighted in the beginning of part 2 of this report, the renewed political context provided by the Europe 2020 Strategy and the main priorities it set, with the priorities set in the White Paper for transport and the budgetary principles set out in the EU Budget Review Communication, alongside the EU Treaty-mandated tasks to contribute to the objective of economic, social and territorial coherence, have provided the overall policy framework that guided the Commission during the TEN-T policy revision process and in developing the alternative policy options/scenarios in the first place. Moreover, coherence with overall EU objectives, strategies, priorities and principles, including subsidiarity and proportionality, has constituted also an important criterion in the process of policy options pre-selection. Both retained alternative policy options (Option 1 and Option 2), as well as the business-as-usual scenario (Option 0), seek to integrate and support therefore, and comply with, overarching EU policy objectives and principles.

With regard to trade-offs across the economic, social and environmental domain, the impact analysis presented in part 2 (for Option 0) and part 5 (for Options 1 and 2) of this report suggest the following conclusions:

- In a business-as-usual scenario, negative impacts will concern all three domains. In what concerns economic and social impacts, the most marked negative effect would be the increase of disparities at regional level, in terms of economic growth and jobs, as well as accessibility, between central and peripheral regions. As far as the environment is concerned, while a significant reduction in NOx particles is expected, CO2 emissions are likely to increase. A

[176] See footnote 84

positive trade-off could concern however land use, as with no new Priority Projects development and therefore EU funding support being envisaged, a number of large and complex infrastructural projects are less likely to be undertaken.

- In Option 1, the expected overall positive impact on EU economic competitiveness and job growth risks, as in the case of the baseline scenario, being unbalanced, with an increase in disparity between central and peripheral areas. As these positive impacts are the result of increased transport efficiency on the TEN-T, the downside of the latter is that it is accompanied by an increase in transport volumes and increased costs related to accidents and environmental impacts. These negative rebound effects are nevertheless likely to be compensated to a significant extent by higher quality infrastructure, more energy efficient engines and higher levels of renewable energy use, wider user of intelligent traffic management systems and modal shifts, particularly from road towards the other, comparatively less CO2-intensive and prone to high levels of accidents, modes.

- In Option 2, the results of the TENconnect study modelling support the (qualitatively derived) expectation that the stronger coordination at EU level in planning the TEN-T has positive impacts in terms of both economic growth and accessibility, as well as pollutant emissions. Negative impacts due to the rebound effect concern transport cost externalities in terms of road safety, noise and CO2 emissions. Nevertheless, the TENconnect projections indicate that these costs are well offset by the positive impacts. Moreover, when other transport policy related factors such as greener technology and energy use, use of ITS, induced modal shift, are also factored in, negative externalities are likely to be significantly reduced.

- The positive impacts of these latter measures – particularly ITS adoption and modal shift – are likely to be higher on an optimised (fully interconnected, multi-modal) Core network in Option 2 than on the sum of a number (not necessarily always connected or enabling co-modal transport) Priority Projects in Option 1. Moreover, as the overall positive impacts on EU economic competitiveness are likely to be higher in Option 2 than in Option 1, and accompanied by equally positive impacts in terms of accessibility and cohesion, it can be concluded that the policy approach in Option 2 is likely to be more effective than the one in Option 1 in limiting socio-economic and environmental trade-offs.

The table below, summarising the performance of each option with respect to economic, social and environmental impacts allows for an overview of the capacity of Option 1 and Option 2 to limit trade-offs across the three domains. (The impacts of Option 0, as the baseline scenario, are taken as base of reference for the comparative impacts of the two alternative policy options).

	Option 1	Option 2
Economic Impacts		
Impact on transport sector		
- Modality and efficiency of the Transport system	+	++
- Congestion & travel times	+	++
- Administrative burden	+	++
General economic impacts		
- Trade with Neighbouring and 3rd countries	+	++
- Economic growth	+	++
- Innovation	+	++
- EU competitiveness	+	++
Social impacts		

Employment and Jobs		
- Jobs related to infrastructure investments	++	++
-Effects on employment in the transport sector	+	++
Public Health and Safety		
- Road Safety	+	++
Accessibility & territorial cohesion	**+**	**++**
Environmental impacts		
Emissions		
- Climate change	=	+
- Air pollution	++	++
- Noise	=	+
Energy use	+	+
Land-use	-	-

Table 16: Summary table of impacts

Legend: = refers to a limited or neutral impact, - refers to a negative impact, + and ++ refer to different levels of positive impacts

6.4. Conclusion

In light of the above evaluation, Option 2 is identified as the preferred option. Option 2 has the maximum effectiveness on the drivers to the TEN-T fragmentation and has the most positive balance regarding economic, social and environmental impacts. It is therefore the most suitable option to address the objectives set out by the Treaty and by the Europe 2020 strategy. The conclusions of this Impact Assessment are also in line with the outcome of the TEN-T revision consultation process conducted by the European Commission between February 2009 and May 2010.

For the Guidelines that are being prepared in parallel with this impact assessment, a Regulation would be the appropriate instrument. Such a regulation would be 'binding in its entirety' and 'directly applicable'. The text must therefore be drafted in such a way that no further transposition is required and that the obligations from the regulation will directly apply.

The choice of the legal instrument is being left to the political level.

7. MONITORING AND EVALUATION

The Commission will properly evaluate and review the Progress of the implementation of the TEN-T policy through annual Progress Reports.

In addition, the Commission, its agencies, notably the TEN-T Executive Agency and the European Coordinators will constantly monitor a set of indicators.[177] These indicators will be used to measure to what extent the operational objectives set out in section 3 of this document are achieved or going towards achievement. The indicators, their related operational objectives and the reporting body are indicated in the table below:

Operational Objectives	**Indicators**	**Reporting body/mean**
Connect all main airports and seaports to	Share of Major European	• TENtec

[177] The role of the TEN-T Executive Agency, its management of the TEN-T Programme, the use of the Open-Method of Coordination through the TENtec system and the role of the EU Coordinators is described in Annex 5

other modes, especially (High-Speed) railways and inland waterway systems by 2050	airports and seaports connected with other modes	
Allow to shift 30% of road freight over 300 km to other modes such as rail or waterborne transport by 2030, and more than 50% by 2050.	Share of each mode of transport in total inland transport expressed in tonne-kilometres. It includes transport by road, rail and inland waterways.	• Eurostat • Alpine Traffic Observatory • Priority Projects/Corridors implementation Decisions • TEN-T EA
Ensuring by 2030 the deployment of European transport management systems (ERTMS, SESAR, ITS, RIS, SSN and LRIT)	Kilometres/share of infrastructure equipped with management systems.	• TENtec • Agencies Reports (TEN-T EA, ERA, EMSA, EASA) • Coordinators' report on the Priority Projects or Corridors
Ensuring by 2030 the commitments of Member States to agree on common operational rules for the projects of common interest	Number of memorandum of understanding, treaties and binding decisions adopted	• Agencies Reports (TEN-T EA, ERA, EMSA, EASA) • Coordinators' report on the Priority Projects or Corridors
Obtaining binding commitments by Member States for the implementation of essential cross-border projects with a binding timetable.	Number of memorandum of understanding, treaties and binding decisions adopted	• Coordinators' report on the Priority Projects or Corridors
Obtaining binding commitments by Member States for the implementation of bottlenecks and missing-links on their territory that have cross-border effects.	Number of memorandum of understanding, treaties and binding decisions adopted	• Coordinators' report on the Priority Projects or Corridors • Priority Projects/Corridors implementation Decisions
Ensuring priority of EU funding for projects that address cross-border projects, bottlenecks and missing-links.	Share of EU funding allocated to such projects and number of realised cross-border projects.	• TEN-T EA
Ensuring conditionality of EU funding upon compliance with EU environmental legislation (SEA, EIA & Natura 2000)	Absolute respect of no funding for projects not complying with EU Environmental	• TEN-T EA

Table 17: Monitoring indicators

ANNEX I

Documents and studies / Ex-post assessments and similar / Audits – assessments consulted:

Type	Document Name
Policy documents	White Paper: Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system, COM/2011/0144 final, 28th March 2011
	Commission Staff Working Document: Accompanying the White Paper - Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system, SEC/2011/0391 final, 28 March 2011
	White Paper Impact Assessment: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=SEC:2011:0358:FIN:EN:PDF
	Green Paper - TEN-T: A policy review - Towards a better integrated trans-European transport network at the service of the common transport policy, 4th February 2009
	Round table and workshop on the TEN-T policy review within the conference "TEN-T Days 2009: The future of Trans-European Transport Networks: building bridges between Europe and its neighbours" in Naples, 21-22 October 2009
	Commission Working Document "Consultation on the Future Trans-European Transport Network Policy", 4th May 2010
	Drawing up the EU Core network-Final report, Zaragoza, June 2010
	Commission Staff Working Document: "The New Trans-European Transport Network Policy Planning and implementation issues", 19th January 2011
Audits / assessment	The Impact of Trans-European Networks on Cohesion and Employment, European Parliament, June 2006
	Assessment on a Communication from the European Commission Designed to Promote the Development of a Rail Freight - Orientated network, Atkins, December 2006
	Ex-post/Final evaluation of the Trans-European Transport Network Multiannual Indicative Programme 2001-2006 Final Report, Deloitte consulting SCRL, November 2007
	Ex-ante evaluation and Impact Assessment of the TEN-T Multiannual Programme 2007-2013, ECORYS Transport Consultants, 22nd October 2007
	Ex-post evaluation of cohesion policy programmes 2000-2006. Work Package 5A: Transport– Steer Davies Gleave, August 2009
	Position Paper of the European Coordinators on the future of TEN-T Policy, 6th October 2009
	TEN-T Progress Report, Implementation of the Priority Projects, June 2010: http://ec.europa.eu/transport/infrastructure/european_coordinators/doc/2011_02_02_progress_report_june_2010.pdf

Audits / assessment	TEN-T Priority Projects 2010: A Detailed analysis, December 2010: http://ec.europa.eu/transport/infrastructure/european_coordinators/doc/progress_report_longer_version_18jan2011_final2.pdf
	Final Report of the TEN-T Review Expert Groups, June 2010: http://ec.europa.eu/transport/infrastructure/tent_policy_review/expert_groups/doc/ten-t_policy_review-report_of_the_expert_groups.pdf
	Special Report No 8: "Improving transport performance on trans-European rail axes: have EU rail infrastructure investment been effective?", European Court of Auditors, October 2010
	Mid-Term Review of the 2007-2013 TEN-T Multi-Annual Work Programme Project Portfolio (MAP Review), TEN-T Executive Agency, October 2010
	Assessment of TEN-T Programme Implementation, TEN-T Executive Agency, December 2010
	Mid-term evaluation of the TEN-T Programme (2007-2013) -Final Report, Steer Davies Consultancy, March 2011
EU Legislation	Decision No 661/2010/EU of the European Parliament and of the Council of 7 July 2010 on Union guidelines for the development of the trans-European transport network (recast) http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32004D0884:EN :NOT
	Regulation (EC) No 680/2007 of the European Parliament and of the Council of 20 June 2007 laying down general rules for the granting of Community financial aid in the field of the trans-European transport and energy networks: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2007:162:0001:0010:EN:PDF
	Commission Decision of 22.7.2009 amending Decision 2006/679/EC as regards the implementation of the technical specification for interoperability relating to the control-command and signalling subsystem of the trans-European conventional rail system (European Deployment Plan for ERTMS): http://ec.europa.eu/transport/rail/interoperability/ertms/edp_map_en.htm
	Regulation (EU) No 913/2010 of the European parliament and Council of 22 September 2010 concerning a European rail network for competitive freight: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2010:276:0022:0032:EN:PDF
	Impact Assessment on a Communication from the European Commission Designed to Promote the Development of a Rail Freight - Orientated network, Atkins, 2005
Environmental studies	EEA Report No 2/2010: Towards a resource-efficient transport system - TERM 2009: indicators tracking transport and environment in the European Union, April 2010
	Estimated Carbon Impact of a New North-South Line for UK DfT, Booz Allen Hamilton, July 2007
	Climate change impacts in Europe - Final report of the PESETA research project, 2009: http://ftp.jrc.es/EURdoc/JRC55391.pdf

Environmental studies	EU Transport GHG: Routes to 2050, a Railway Perspective, the International Union of Railways and The Voice of European Railways, January 2010
	Retailers' Association Environmental Action Programme, Retail Forum for sustainability, March 2009: http://ec.europa.eu/environment/industry/retail/pdf/reap.pdf
	Measuring and Managing CO2 Emissions of European Chemical Transport, Prof. Alan McKinnon Logistics Research Centre Heriot-Watt University
	'Railistics' Project report: Benchmark of Environmental Emission for Railway Hinterland Transport from the Port of Hamburg, Report for Hamburg Port Authority, Railistics GmbH, June 2010
	"Climate Change Impacts on International Transport Networks" Note by the United Nations Economic Commission for Europe and United Nations Conference on Trade and Development secretariats, September 2010: http://www.unece.org/trans/doc/2010/wp5/ECE-TRANS-WP5-2010-03e.pdf
	TEN-T assessment, European Environmental Agency, 2009
Economics/ trends / trade flow studies	Ports and their connections within TEN-T, NEA, December 2010: http://ec.europa.eu/transport/infrastructure/studies/doc/2010_12_ports_and_their_connections_within_the_ten-t.pdf
	Study of Maritime Traffic Flows in the Mediterranean Sea, Lloyd's Marine Intelligence Unit report for REMPEC, July 2008: http://www.maritime-connector.com/ContentDetails/1391/gcgid/186/lang/English/SAFEMED---REMPEC-Study-of-Maritime-Traffic-Flows-in-the-Mediterranean-Sea.wshtml
	European Energy and Transport Trends to 2030, National Technical University of Athens (NTUA), January 2003 (update 2007): http://ec.europa.eu/dgs/energy_transport/figures/trends_2030/1_pref_en.pdf
	Economic Activities and Development Sustainability Maritime transport of goods: A Mediterranean integration driver?, Blue Plan Notes, March 2010: http://www.planbleu.org/publications/4p_transport_maritime14_EN.pdf
	Freightvision - 7FP project on long distance freight transport futures (policy, demand and technology scenarios), December 2010: http://www.freightvision.eu
	Statistical coverage and economic analysis of the logistics sector (SEALS), ProgTrans AG, ECORYS, Fraunhofer ATL, TCI Röhling, Final Report December 2008: http://www.scs.fraunhofer.de/Images/Statistical%20coverage%20and%20economic%20analysis_tcm128-77369.pdf
	Economics of Trans-European Networks: where to go? Stef Proost (corresponding author) et al, Centre for Economic Studies, KULeuven, August 2009

Economics/ trends / trade flow studies	Update of Selected Potential Accessibility Indicators - Final Report, Spiekermann & Wegener Urban and Regional Research (S&W) RRG Spatial Planning and Geoinformation, February 2007: http://www.espon.eu/export/sites/default/Documents/Projects/ESPON2006Projects/ScientificBriefingNetworking/UpdateOnAccessibilityMaps/espon_accessibility_update_2006_fr_070207.pdf
	Towards a European Peripherality Index Final Report, Carsten Schürmann, Ahmed Talaat, November 2000: http://ec.europa.eu/regional_policy/sources/docgener/studies/pdf/periph_1.pdf
	Scenarios, Traffic Forecasts and analysis of Corridors on the trans-european network (TEN-STAC), NEA Transport research and training BV, September 2004: http://ec.europa.eu/transport/infrastructure/studies/ten_t_en.htm
	Impact of Transport Infrastructure Investment on Regional Development, OECD report, 2002: http://www.internationaltransportforum.org/Pub/pdf/02RTRinvestE.pdf
Freight transport / logistics	FREIGHTWISE and eFreight 6th and 7th FP projects on ICT in freight logistics, April 2010: http://www.freightwise.info/cms/
	Connecting to Compete 2010 Trade Logistics in the Global Economy - The Logistics Performance Index and Its Indicators, World Bank Report, 2010: http://siteresources.worldbank.org/INTTLF/Resources/LPI2010_for_web.pdf
	Competition Report, Deutsche Bahn AG, March 2010: http://www.deutschebahn.com/site/shared/en/file__attachements/reports/competition__report__2010.pdf
	Politikbrief, VDA, January 2010: http://www.vda.de/en/publikationen/publikationen_downloads/detail.php?id=743&PHPSESSID=elnj86q3aho3je7p4stb9igtu0
	The DIOMIS study on rail freight combined transport operations and future projections, UIC, October 2006: http://www.uic.org/diomis
	European Union Road Federation reports for 2010: http://www.erf.be/
	Deutsche Post DHL "Yellow Paper", Setting the right objectives: Efficient Logistics increases sustainability and competitiveness, October 2010
	Intermodal yearbook - 2010, EIA
	Annual reports: UIRR (2009), CER (2009-2010), EBU (2009-2010)
	Position Paper: Issues of Rail Infrastructure, International Union of Road-Rail Combined Transport Companies (UIRR), July 2010: http://www.uirr.com/en/media-centre/press-releases-and-position-papers/2010/mediacentre/287-position-paper-on-issues-of-rail-infrastructure.html

Freight transport / logistics	The BE LOGIC 7FP project and web-site
	Intermodal Freight Transport & Logistics Best Practices - Final reports from the 6FP Project PROMIT, EIA: http://www.eia-ngo.com/promit.html
	Transport Infrastructure Investment. Options for Efficiency, OECD Report, February 2008
	Integrated Services in the Intermodal Chain (ISIC) Final Promotion of intermodal transport, ECORYS, Nov 2005: http://ec.europa.eu/transport/logistics/consultations/2006_04_26/doc/2006_03_31_logistics_consultation_task_f_en.pdf
	Long life surfaces for busy roads, OECD Report, May 2008: http://www.internationaltransportforum.org/jtrc/infrastructure/pavements/07LongLifeSummary.pdf
	Benchmarking Intermodal Freight Transport, OECD Report, 2002
	Combined Transport Operations – A book by Dr. Christoph Seidelmann, 2009
	Great Axis Rail Freight Network and its area of influence, FERRMED, October 2009: http://www.vialibre-ffe.com/PDF/FERRMED_GLOBAL_STUDY_BOOK.pdf2
	The Rail Sector's Supply Potential - Presentation by Enrico Pastori, Trasporti e Territorio Srl via Rutilia (TRT), September 2010
	Monitraf Synthesis Report - activities and out come, Editorship: J. Ryan, H. Lückge, J. Heldstab, M. Maibach, February 2008
	Rotterdam – Genoa Corridor, IQ-C Action plan 2006-2010, June 2008
	REORIENT Study - Implementing Change in the European Railway System, The REORIENT, August 2007 **...**
	Definition of Benchmark Indicators and Methodology, SuperGreen 7FP project Supporting EU's Freight Transport Logistics Action Plan on Green Corridor issues

ANNEX II

Ex-Post evaluation of the TEN-T network policy

During the past years, an impressive number of TEN-T evaluation reports and studies have been conducted, including:

- the Mid-term evaluation of the TEN-T Programme (2007-2013) (doc 1),
- the Assessment of TEN-T Programme Implementation, done by the TEN-T Executive Agency (doc 2),
- the ex-ante assessment of the 2007-2013 Priority Projects used for the 2008 TEN-T financial regulations (doc 3),
- the ex-post/final evaluation of the Trans-European Transport Network Multi-annual Indicative Programme 2001-2006 (doc 4),
- the ex-ante evaluation and Impact Assessments of the TEN-T Multi Annual Programme 2007-2013 (doc 5),
- the "Progress Report 2010" and the "Priority Projects 2010: a detailed analysis" (doc 6),
- the position paper of the European Coordinators on the future of TEN-T policy (doc 7),
- the report by the European Court of Auditors, “Improving transport performance on trans-European rail axes: have EU rail infrastructure investment been effective?” (doc 8).

Other related reports/studies include the ex-ante evaluation of the rail freight corridors (doc 9), the European parliament's report on the effect of Priority Projects on cohesion and accessibility (doc 10), the corresponding EPSON report on TEN-T's effect on accessibility (doc 11) and the final report of the TEN-T Review by the appointed Expert Groups (doc 12).

All the above evaluations and reports throw a similar light on the current TEN-T policy and how it should change for the future. They highlight the success stories that have been achieved today and also describe the difficulties that the current Priority Projects have had in meeting their scheduled completion dates, especially for projects that cross borders.

The 2007 ex-post assessment (doc 4) gave recommendations for increasing community contributions for cross-border projects (reinforcing the recommendations of the ex-ante for the current financial perspectives - doc 3), and this has been taken forward in the subsequent TEN-T financial regulations. The establishment of corridor coordinators, the enhanced work of the TEN-T Agency and the monitoring methodology and Member State liaison done by the open method of coordination through the TENtec system, has all been identified as necessary by the earlier studies and given merit in all the more recent evaluations as making a significant contribution to project progress.

Whereas, the management and control systems for Priority Project completion are making substantial gains, there is still criticism as to the scope and range of the TEN-T with questionable cost-effectiveness for some projects (see rail audit report, doc 7) and a not always adequate improvement in accessibility and employment (see docs 9 and 10) as a result of completing the current TEN-T projects. But most of all, criticism is that the TEN-T policy to date has not produced a multi-modal network that can meet projected demand and enable the Community's sustainability goals to be met. To do this, the studies argue for a core network that is multi-modal, that carries the most long distance transport and is capable of contributing to the Community's sustainable transport goals.

1. **Mid-term evaluation of the TEN-T Programme (2007-2013) - final Report, Steer Davies Gleave, March 2011**

Steer Davies Gleave was appointed to conduct a Mid-term evaluation of the trans-European Network transport Programme (2007-2013). The objective of this evaluation was described by the Terms of Reference as to evaluate the methods of carrying out projects, as well as the impacts of their implementation taking into consideration the stated objectives of the TEN-T Programme. The report formulates overall conclusions and possible recommendations on the implementation of the TEN-T Programme with a view to providing input to the revision of the TEN-T Programme and policy, both under the responsibility of DG MOVE.

The report is the most up-to-date assessment and is substantiating the shortcomings of the existing TEN-T system especially regarding the lack of an overall, high quality, smart and green core network that would be capable of carrying most long distance traffic.

The mid-term evaluation of the Programme found that since the start of the current financial perspective (2007-2013) the Programme governance has improved: the TEN-T Executive Agency is providing more control over the public money that is spent, the selection of projects through proposal calls is more rigorous and leads to better project delivery. More than 90% of the Programme funds have been allocated and where the earliest projects since 2007 did not perform as required the funds have already been reallocated. Moreover the Programme's cost effectiveness is good: its structure is such that in the case of costs overruns, it is not the EU that bears them but the Member States. The European Coordinators and the Agency which have been funded as part of the financial envelope of the TEN-T Programme also offer an efficient management tool and have adequately assisted the Commission to the delivery of the projects selected.

However, the evaluation recognises that the Programme is behind schedule on completion: a significant number of the largest projects in the Multi-Annual Programme will be completed after 2013, by 2015. The projects that have been completed to date tend to be projects of common interest because they are shorter and because they are less complex than the Priority Projects. A number of the recent EERP projects are already late whereas they had been specifically selected to be completed over a short period. This will mean that there is little chance that the TEN-T network can be ready by 2020.

The report comments that a few Priority Projects are completed and numerous sections are finalised but some key parts – such as cross-border sections - are missing and this explains why the TEN-T network is an assembly of largely national sections, often poorly interlinked, rather than a proper physical and interoperable network. Most Priority Projects focus on rail: eighteen address rail and two address inland waterways, without achieving a coherent network. In spite of the focus given to rail, these projects have not resulted in a Single European Railway Area and are still experiencing bottlenecks and significant interoperable obstacles.

The main conclusions and recommendations of the report are as follows:

- "The European Union Guidelines on the TEN-T Programme appear to present two key issues. The first one is that the objectives of the Programme are very broad, they cover persons and goods, all EU-27 Member States, national and cross-border sections, all transport modes including interoperability, existing infrastructure and

future infrastructure, interoperability, links with other States outside the Union. The aims of the Programme cover such a range of transport issues that it has been recognised in the Green Paper that it "*made it virtually impossible to meet them in full with the instruments available*" (€8 billion of EU funding in 2007-2013)."

- " Thirdly the TEN-T network appears to be the sum of a TEN-T road network, rail network, water network, etc without a lot of specific consideration or focus given on co-modality: it is an assembly of sections that are only partially interlinked. For instance connections between the rail network and some important sea ports are not included in the Priority Projects or projects of "common interest" or large airports are not particularly well interconnected either to the long-distance rail network, which goes against the objective of establishing a sustainable mobility of goods and persons. Achieving uninterrupted passenger and freight transport chains requires that that the biggest sea ports, inland ports, dry ports, airports are linked into the TEN-T network especially to the more environmentally friendly modes."
- "In this case, where the European Union is truly adding value and justifying its use of funds is in the areas that Member States are not prioritising or considering a large extent, namely:
  1. Cross-border sections;
  2. Interoperability and practical constraints; and
  3. Co-modality.

2. Assessment of TEN-T Programme Implementation, TEN-T EA, December 2010

Following Regulation 680/2007, otherwise known as the TEN-T Financial Regulation, the TEN-T Programme is to be submitted to regular evaluation (article 16). A first mid-term report relating to the financial perspective 2007-2013 was due at the end of 2010 (article 19). The overall objective was to evaluate the methods and procedures for granting financial aid to projects of common interest in the field of the trans-European transport networks and to formulate overall conclusions and recommendations on the further implementation of the TEN-T Programme.

The assessment concludes that the decision in 2006 to entrust the management of the TEN-T Programme to the newly created TEN-T Executive Agency has already proven its worth in delivering a full lifecycle grant management process from Calls for Proposals through the adoption of the decision, rigorous project management and a tightly managed payments procedure. The structured, transparent and comprehensive procedures adopted by the Agency have facilitated the targeting of TEN-T funding to EU transport policy priorities such as the Priority Projects, traffic management systems, environmentally-friendly initiatives and modes as well as cross border projects. This was acknowledged by the Court of Auditors in the recent report on the effectiveness of EU railway investment policy (doc 8). The present report documents the achievements of the TEN-T Programme in the fields of project evaluation and selection, with respect to project monitoring, as well as overall programme design and management.

The assessment is that the overall success of the TEN-T Programme in the period 2007-2010 is very important and must be credited. At the same time, the lessons learned during the last four years deserve highlighting so that the TEN-T Programme can be further enhanced—still during this financial perspective, to the extent possible, and certainly as of 2014 onwards when the new financial perspective is launched.

The assessment highlights areas that need improvement towards the better customization of procedures, on the one hand, and effective policy implementation, on the other. A strategic reflection on the orientation of TEN-T policy and, at the same time, the structure of the TEN-T Programme, in conjunction with small-scale adjustments at the level of operational management promise a further significant enhancement in terms of both efficiency and effectiveness.

Of particular relevance was the need to address the issue of the overall financing of the TEN-T Programme. Under the current financial perspective, the TEN-T Programme represents the smallest endowment to the TEN-T network next to the funds made available through the ERDF and the Cohesion Fund in the form of grants, and the loans granted by the EIB. This is surprising considering that the TEN-T Programme is the one which encapsulates the essence of what represents EU added-value, which, after all, is what drives, or should drive, the development of the TEN-T network. That the TEN-T Programme budget is not enough is shown by the low retention rates of proposals (despite the evaluations) and the frequent failure to meet the maximum co-funding rates as foreseen by the TEN-T Regulation. Improving the efficiency and effectiveness of the TEN-T Programme will be strongly facilitated by the increase of its budget during the next financial perspective.

3. Mid-Term Review of the 2007-2013 TEN-T Multi-Annual Work Programme-Project Portfolio (MAP Review), October 2010

The mid-term review of the 2007-2013 multi-annual work programme (MAP), the so-called MAP project portfolio review, was undertaken to assess the extent to which the MAP is achieving its objectives, based on a review of the progress of individual projects. The MAP portfolio includes some of the most ambitious and complex projects across Europe as well as projects with specific and exceptional difficulties and a long term perspective. A large number of the projects concern cross-border sections which face additional coordination, management and funding difficulties in comparison with similar national projects. The main aim of the review was to assess the progress made in the implementation of the projects selected under the MAP as well as their future implementation plans. On this basis, the Commission was able to analyse to what extent and under what conditions the MAP is expected to achieve its stated objectives and to propose possible improvements.

The budget for the MAP represented 80-85% of the total available EU budget for the granting of aid in the field of the TEN-T for the period 2007-2013 through the TEN-T Programme. The review covers 92 projects selected under the 2007 calls for proposals which were launched to meet the objectives of the MAP. All projects were initially planned to be implemented during the 2007-2013 programming period. The 92 projects account for approximately two-thirds of the total TEN-T budget (€5.301 billion out of a total €8.013 billion) and 78% of the total MAP for the entire 2007-2013 period. The total budgeted cost of these projects is €32.647 billion. Therefore, the TEN-T budget accounts for approximately 16% of the projects' budgeted costs.

For the assessment, review panels composed of external experts and internal experts from Commission services evaluated individual project assessments and arrived at consensus views for each project, in terms of the actual status of the project and its future implementation plans. An internal review panel was established to analyse these findings.

The report concluded that projects should be allowed to run their course with a cut-off date on 31 December 2015, but subject to certain well-defined conditions based on both political and technical/financial milestones. This allowed critical support to be maintained without rewarding poor performance or requiring additional funding commitments. The review recommended the redirection of around €311 million which is to be re-injected into new annual/multi-annual calls under the current Programme.

The overall outcome of the MAP review can be summarised as follows:
• Confirmation of EU support to the most critical and complex projects within the TEN-T
• Prolongation of the eligibility period for a maximum of two more years (to the end of 2015), subject to specific political, technical and financial conditions
• Cancellation of projects that have not started within the first two years after adoption of the Commission Decision

4. European Commission-DG TREN Contract-Ex-post/Final evaluation of the Trans-European Transport Network Multiannual Indicative Programme 2001-2006 Final Report, Deloitte consulting SCRL, November 2007

The objective of this evaluation was to assist the European Commission in assessing the appropriateness and the effectiveness of the Multi-annual Indicative Programme (MIP) 2001-2006 in the context of the Trans-European Transport Networks (TEN-T).

The evaluation concluded that the 2001-2006 MIP was seen as effective, efficient and relevant in many respects. Predictability combined with flexibility where overriding success factors even if procedural issues were seen as cumbersome.

According to the study, the downside was the tendency of mature projects with high national commitment to self-select. These were frequently projects which would often have proceeded in any event, though not necessarily quite as fast. The report concluded that the Commission could reduce the rate of funding for such projects and still retain political leverage, while at the same time freeing funds for projects where the European interest is greater than the national interest. These are typically cross-border projects in the broadest sense of the word. This recommendation formed a key component of the revised financial regulations where greater emphasis is place on cross-border funding (and was supported in doc. 4 below).

Also, the report identified that the MIP was not effective in achieving its objective of encouraging public-private partnerships. It sited the instability of the management procedures over the life of the MIP that affected the effectiveness, efficiency and relevance of the programme. Minimising the administrative burden and the need to demand accountability and transparency were also key recommendations. Nevertheless, the report did conclude that the MIP funding did go to projects which had a socio-economic impact, particularly at national level.

The main recommendations for maximising effectiveness, efficiency, relevance and impact of the MIP included:

Regarding objectives and funding rates:

- The primary objective of the MIP should be to fund projects of high European interest, which will fill missing links or eliminate bottlenecks;
- the rate at which studies for projects of high European interest and low national interest is funded be increased;
- the rates at which investment projects are funded be modified, with projects of high European interest and low national commitment being eligible for grants of 30% and other projects be restricted to grants of 5% of total eligible cost;
- the TEN-T coordinators be asked to define which are the projects of high European interest and low national commitment.

Regarding PPPs:

- Encouragement of Public-Private Partnerships (PPP) should continue to be an objective, and;
- the European Commission should collect and disseminate in a structured manner information on best practice in transport infrastructure PPP or other instruments designed in order to facilitate access to private sources of financing, such as the EIB loan guarantee or the risk capital facility;
- the financing rate be increased for studies on the suitability of investment projects for PPP;
- the financing rate be 30% for any project financed by a PPP.

Regarding Procedures:

- A revision of the MIP Framework Decision in order to redistribute funds likely to be underutilised be made automatic after four years, and that any other revisions be announced six months in advance.

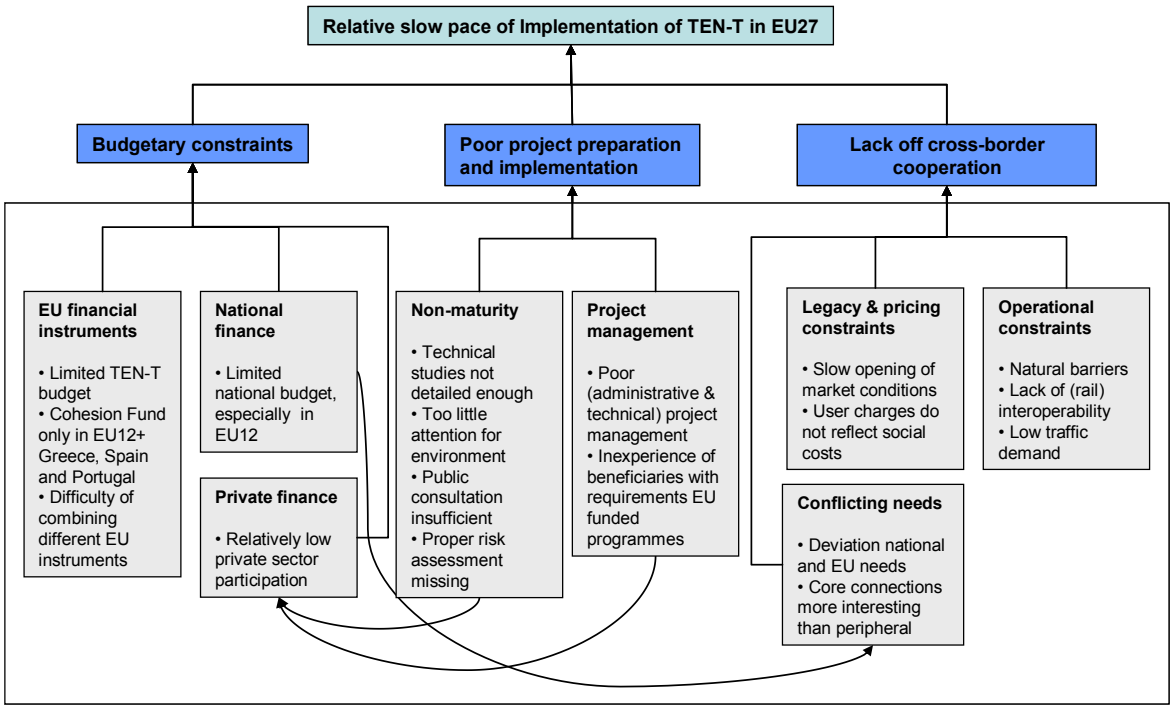
5. Ex-ante evaluation and Impact Assessments of the TEN-T Multi Annual Programme 2007-2013, ECORYS Transport Consultants, October 2007

The proposal for the renewed Community multi-annual (MAP) TEN-T programme for the period 2007-2013 prepared by the Directorate General for Energy and Transport (DG TREN) required the undertaking of an ex-ante evaluation. The ex-ante evaluation had two objectives: (a) to provide factual support for the selection of projects, and (b) to kick-start the TEN-T mid-term review.

The report expected that concentrating the MAP TEN-T budget on completing the pan-European corridors, by a mix of cross-border and bottleneck projects situated on the predefined priority axes/projects ("Corridor concept"), would accelerate the overall implementation of the TEN-T. And that this, in turn, would have a positive impact on the EU's economy as the benefits from having a more efficient transport system will occur sooner and these benefits outweigh the costs. The evaluation calculated the Benefit Cost Ratio to equal 1.6, meaning that every Euro spent generates a socio-economic benefit of 1.6 euros to the EU.

The report also concluded that the MAP TEN-T budget for works in the period 2007-2013 is insufficient to cover the actual estimated need in this period and any increase would have a net positive socio-economic effect for the EU+27.

The primary objective of this study was to assess how the relatively small (relative to other financing sources) budget of the MAP TEN-T can both accelerate the realisation of TEN-T while providing European Added Value.



This evaluation, as with all others identified the lack of cross border cooperation as a main problem resulting from differences in EU and national needs. The European TEN-T axes do not always contribute sufficiently to a single country to outweigh the costs that this country has to bear. Not surprisingly, countries that do not benefit from the TEN-T projects are reluctant to invest in these projects. Natural barriers, lack of rail interoperability and low traffic demands further undermine cross border cooperation.

6. "Progress Report 2010" and the "Priority Projects 2010: a detailed analysis"

The main conclusion of both reports directly reflects the Impact Assessment's problem definition. It concludes that today's TEN-T network mainly consists of an assembly of national sections that are not yet or only partially interlinked. Chosen for their high relevance to trans-national traffic flows, cohesion and sustainable development objectives, the current Priority Projects have been subjected to a socio-economic evaluation. Their selection reflects an approach focussed on major traffic flows between a starting and an end point, but without taking account of their continuity – i.e. the potential for interconnection and extension (both geographically and modally). Moreover, the range of projects reflects, to a great extent, the financing priorities of the Member States, where the tendency is to give priority to national transport sections linking up centres of national interest rather than fund investment in cross-border sections. As a result, important links were not integrated, even though they bore major traffic flows.

The 2010 TEN-T review highlighted the planned priority projects where there are still cross-border sections and their access routes that are significantly behind schedule.

It concludes that transport infrastructure has been historically designed to serve national rather than European goals and cross border links constitute bottlenecks that are likely to become increasingly costly as the EU economy continues integrating.

During the next financial perspectives (2014-2020), numerous cross-border sections will be in construction or completed. Therefore, the decisions for concentrating financing here, and the obvious need to continue to do so, will be an essential centrepiece for linking up national networks into a European network and thereby contributing directly to the realisation of the internal market, reaping the benefits of years of investment.

7. Position Paper of the EU Coordinators on the future of TEN-T policy—Brussels, October 2009

The European Coordinators have been appointed to follow projects that present severe difficulties and lag significantly behind in completion compared with their initial schedule. One of the common features of these projects is that they involve several Member States, which renders coordination between the project countries especially difficult and stunts progress on the terrain. Most of the projects are rail projects, but the Danube and Seine – Scheldt projects and the Motorways of the Sea are at least as challenging. The main issue at stake for the Coordinators is to ensure that with their efforts of coordination, they can contribute to giving Europe the opportunity to endow it with the infrastructure it needs to sustain the internal market. The Coordinators' vision is one of enabling a door-to-door logistics chain that is economically and environmentally efficient.

Despite the differences in the nature of the coordinated projects, their experiences during their first mandate (2005-2009) has led to common views on objectives of TEN-T policy and on financing and governance of TEN-T projects.

8. Special Report No 8, European Court of Auditors, “Improving transport performance on trans-European rail axes: have EU rail infrastructure investment been effective?”, October 2010

The report observed that 19 (of the 30) TEN-T Priority Projects defined in 2004 relate to railways. The Court examined in detail 8 of the rail axes covered by the Priority Projects involving a sample of 21 specific sections in 8 Member States covering 8.6 billion euros of EU investment up to 2006. The report identified that overall transport volumes in Europe are expected to continue rising in the next decades, however, Europe’s railways would account for only a small part of this growth.

The report's main conclusions were as follows:

European rail transport faces important obstacles

- Rail infrastructure is not well adapted for modern trans-European services;
- a competitive market for European rail services has yet to fully emerge;

- trans-European rail services have to overcome a range of interoperability problems;
- Although through co-financing the development of rail infrastructure, the EU has contributed to providing new possibilities for trans-European rail transport, the value for EU money could be improved.

The audit concluded that the performance on sections dedicated to high-speed passenger services is in line with expectations with significant impacts in target markets as predicted. However, for sections used by conventional freight or mixed traffic, performance has not yet met expectations as rail network system constraints have an important effect.

The audit made the following recommendations:

The Commission should:
- place increased emphasis on alleviating practical constraints for cross-border rail transport that are not per se related to infrastructure;
- encourage and facilitate collaboration amongst Member States rail institutions to achieve this.

The audit identified weaknesses in the procedure to define the Priority Projects, specifically there was:

- no clear understanding of what constituted a major European rail axis;
- variable quality and quantity of analysis to support proposal from Member States.

Also, the Priority Projects could not be regarded as definitive descriptions of the main trans-European rail axes, given that:

- robust analysis of traffic flows were not available;
- connections to some important ports were not included;
- there are different definitions of the main axes in some locations .

The audit recommended that the Commission should, for future considerations of the definition of the TEN-T Priority Projects:

- identify those trans-European rail corridors for which there is significant actual or anticipated demand;
- strengthen the European-level knowledge and analytical bases.

Whereas, the audit recognised that the concentration of TEN-T co-financing at cross-border locations has improved since 2006 where the European co-ordinators have had a positive influence in concentrating and facilitating developments on the Priority Projects, much remains to be achieved such as the identification of bottlenecks could be improved as could then selection and approval procedures at the Commission.

Overall, the audit recommended that the Commission should:

- build on the roles played to date by the European co-ordinators;
- make sure that procedures for approving projects under Cohesion Policy are robust;
- ensure that decisions about the targeting of TEN-T funds are supported by robust analysis of important bottlenecks;

- improve the quality of cost-benefit analysis for TEN-T selection procedures;
- take the lead in facilitating the exchange of knowledge and experience about rail infrastructure development amongst project promoters.

In summary, the audit recognised that through co-financing the development of rail infrastructure, the EU has contributed to providing new possibilities for trans-European rail transport but value for EU money could be improved.

And the audit urged the Commission, Parliament and Council to take account of the Court's findings when revising the existing TEN-T Guidelines and consider ways to enhance value for EU money.

Other related evaluations

9. Ex-ante Evaluations and Impact Assessments Framework Contract TREN/A1/46-2005-Impact Assessment on a Communication from the European Commission Designed to Promote the Development of a Rail Freight - Orientated network

The report, published in December 2006 starts with the sentence: "The movement of freight is integral to economic growth. Nevertheless the movement of freight by road is harmful to the environment. Hence if there is to be environmentally sustained economic growth the use of rail freight will be integral to the meeting of the Lisbon agenda."

The objective of this Impact Assessment (IA) was to consider the practical (on the ground) implications of possible measures and actions to aid the development of rail freight within the European Union.

The report recognised that while EU reforms in rail freight liberalisation were clearly progressing in the right direction, certain countries have not fully implemented the directives to date and hence there is regulatory disparity. Consequently, the EC should seek to ensure that its directives are fully implemented.

In terms of investment appraisal, the report saw there to be a clear need to avoid the one size fits all solutions instead pragmatic solutions must be identified with the involvement of stakeholders on a corridor basis. Also, on the regulatory side the European rail industry was seen as clearly at different levels of development and for this reason a one size approach was felt to be also inappropriate. Nevertheless the report emphasised that there is no historical or geographical reason why the regulatory framework should not be synonymous across Europe. The report argued that such a harmonised framework would enhance the rail freight industry and is another reason why member countries must implement in full the EC directives.

The report observed that international rail freight is impaired by three major factors: the slowing-down of traffic at bottlenecks (generally in the vicinity of built-up areas); border crossings, during which considerable time may be lost due to administrative or technical constraints; and delays in access to railway services (terminals, marshalling yards). Average commercial speeds are significantly affected by these factors and, as they concern the infrastructure, they also have an impact on freight capacities and reliability.

The subsequent regulation took forward the report's recommendations and the prescribed rail freight corridors are now seen as integral parts of the core network.

10. The European Parliament (EP) report of 2006 on the cohesion and employment effects of the TEN-T 30 priority projects[178]

The aim of this study was to assess the territorial aspects of the Trans-European Networks (TENs) impacts in terms of employment and demographic change at different, future time horizons. The study was carried out, considering primarily the two main types of impacts expected from large transport infrastructure investments:
a) "macroeconomic" impacts, focused on direct investment impacts on GDP and employment;
b) "microeconomic" impacts, explained in terms of changes of relative accessibility of regions.

This study dealt with the impacts of TEN-Ts infrastructures in terms of difference compared to a 'no-TEN-Ts' case, all other things being equal. The main conclusion of the study was that the extent of the impacts produced by the TEN-Ts infrastructure investments is generally low. The magnitude of the changes in per capita GDP and employment does not exceed 2% of the reference values, with only very few regions showing over 3% increases. From this result, it can be implied that the implementation of the TENs networks is not enough to ensure relevant improvement in the economic performance of an EU region.

In terms of cohesion, two distinct effects were calculated. On the one hand, the regions of the central EU25 (France, Benelux, Germany), which are still among the most developed EU regions, are generally boosted by the TENs networks while, at the same time, some peripheral areas in Finland, Sweden and Italy gain no real advantage from the implementation of TENs networks and most of them are currently among the less developed areas (at least within EU15). Therefore, from this point of view, cohesion is not improved. On the other hand, however, in the longer period (2030), the positive impact of TENs networks on several other peripheral and currently not highly developed areas in Eastern Europe, Greece and Ireland improves the level of cohesion of the Union.

Generally, for regions in the European core with all the benefits of a central geographical location plus an already highly developed transport and telecommunications infrastructure, additional gains in accessibility through even larger airports or even more motorways or high-speed trains will bring additional incentives for economic growth. However, for regions at the European periphery or in the new EU Member States which suffer from the remote geographical location and an underdeveloped transport infrastructure, a gain in accessibility through a new motorway or rail line may bring significant progress in economic development. The opposite may happen too, if the new connection opens a formerly isolated region to the competition of more efficient and cheaper suppliers in other regions.

The report stated that the investments in the TEN-T networks so far planned (30 PPs) do not give rise to large additional effects in terms of cohesion although it recognised that there will be a positive impact on relatively under-developed areas in Eastern Europe and Greece so that more and less positive effects will co-exist. Nevertheless, overall the "European Added Value" for most Priority Projects was considered to be limited.

178 European parliament Report-The impact of the Trans-European Network on cohesion and employment: http://www.ipolnet.ep.parl.union.eu/ipolnet/cms/lang/en/pid/

11. Update of Selected Potential Accessibility Indicators--European Spacial Planning Observation Network (EPSON)

The report was coincident with the EP report above.
It made a number of observations based on the spatial distribution of potential accessibility by road and rail.

Those observations were:
- Large disparities of accessibility by both, road and rail continue to exist in the European Union. Regional deficits in competitiveness based on poor location remain.
- The transport infrastructure development of the past years was not able to change the overall European spatial pattern of regions with good, moderate and low accessibility. And this cannot be expected in the future because central regions will remain central and peripheral regions peripheral.
- However, transport infrastructure projects can have substantial impacts on potential accessibility of individual regions. In particular, high-speed rail is able to reshape the European continent in terms of accessibility by bringing high accessibility to regions outside the European core.
- Due to the specific characteristics of road and rail networks, the resulting spatial patterns of regions with highest accessibility differ. Whereas road leads to a plateau of high accessibility, high accessibility by rail is much more concentrated around nodes and along corridors of high-speed rail lines.
- The process of EU enlargement had its impact on potential accessibility. In particular for road transport, the combined working of reduced border waiting times and infrastructure development has improved the situation in several regions of the new member states.
- The development of the accessibility indicators between 2001 and 2006 shows also the focus of the new member states on prioritising road infrastructure development at the expense of rail infrastructure and services. Whereas for potential accessibility by road, most regions in the new member states improved their relative position within the European Union, the opposite is true for accessibility by rail. Here, most regions that already belong to the group of peripheral regions even increase their distance to the European average of potential accessibility by rail.

12. Expert Group report

The expert group identified the inadequacy of the TEN-T guidelines and its legal framework.
The report concludes that:

The Guidelines are too broad in scope- the criteria to identify priorities are mainly qualitative and provide little guidance in terms of what is of European importance;

The concept of common/European interest as expressed in the Guidelines is vague and not operational and does not sufficiently emphasise European added value;

The current network is mainly identified in a bottom-up approach. In addition, projects also lack focus which leads to dilution of resources, this in turn results in a failure to achieve a “network” perspective;

In addition, TEN-T projects are not always focussing on areas with the highest transport demand and are not always based upon reliable traffic forecasts;

The Guidelines treat transport policy on a mode per mode basis and do not significantly contribute to the objective of co-modality; indeed, both the geographical references (comprehensive network and the priority projects) and the qualitative criteria (sections 2 to 9 of the Guidelines) are to a large extent single mode based;

The function of seaports and hinterland hubs as nodal points for all the modes of transports is not addressed. In the absence of a common infrastructure concept for these nodes across modes, they have no policy basis and have to be integrated through a mode-by-mode policy approach;

As the lion's share of investment (73% between 2007-2013) has come from national budgets or private financing, public budget restrictions and inappropriate prioritisation lead to project delays and sub-optimal investments;

The TEN-T Guidelines have shown in practise to provide little help in prioritising TEN-T investments. Their added value is even further reduced as they are not effectively used in mechanisms for regional and cohesion funds to implement European transport infrastructure projects;

The current Guidelines are unable to focus on chronic bottlenecks in cross-border areas, which prevent network optimisation.[179]

Also, a downside relating to "foreseeability" was the tendency only to submit mature projects in order to be sure not to lose the MIP funding as a result of delays. While maturity was one of the selection criteria, this raises the issue of whether these projects would not have gone ahead anyway albeit rather more slowly and possibly without the latest technology in terms of traffic management and signalling, for example.

[179] 2009 and 2010 Review of TEN-T priority project progress

ANNEX III

PRE-SCREENEING OF POLICY OPTIONS

This Annex details the assessment of each planning and implementation scenario with regard to their effectiveness in addressing current drivers of TEN-T fragmentation and to their likely compliance with the principles of subsidiarity and proportionality. This assessment laid at the basis of the pre-screening process of the initial array of available policy options, the outcome of which is presented in part 4 of the Report.

- **Planning scenarios (A scenarios)**

An insufficient level of coordination at EU-level in planning the network, it has been argued in the problem definition section of the IA, has resulted in a TEN-T that does not, as yet, present itself as a network. It is missing a number of essential links, particularly cross-border, but not only, and modal interconnection nodes. The network planning scenarios have been therefore assessed mainly on their comparative capacity to address this planning related insufficiency and achieve the TEN-T policy objective of an interconnected, multimodal network that adequately covers the entire territory of the Union and adequately connects it to the neighbouring countries and the rest of the world.

A1/Business as usual

This scenario consists of the continuing application of the current Guidelines, unrevised. In planning terms, it means that the current Guidelines' criteria for wider TEN-T identification and selection of projects of European interests (or Priority Projects/PPs) will continue to apply. As the Guidelines are accompanied by a definitive list of 30 PPs, no new PPs will be identified and funded with EU budget support. MS however will be free to continue using the criteria as reference for guiding them in the future in developing transport infrastructure.

Impact on TEN-T planning coordination at EU level: [0]

The continuing primarily bottom-up approach to network development is not likely to lead to significant improvements in Member States planning coordination. As highlighted in the problem description in the report, Member States are prone to give priority to national objectives in building infrastructure, not least due to the fact that they also provide the lion's share of investments. Therefore, left on their own, they are not likely to consider as a priority developing infrastructure of common European interest unless it serves also a national priority objective. Nevertheless, whenever the latter would be the case, the common framework for the identification of the TEN-T provided by the Guidelines could provide the basis of planning development of new projects. Overall however, fragmentation issues due to missing cross-border links, including connections with neighbouring countries, are likely to remain inadequately addressed. Similarly, in the absence of a change in the current European framework conditions (be them of policy or other nature), other current trends in planning such as the primarily uni-modal focus are likely to endure, leaving also current issues of intermodality unaddressed.

Impact on subsidiarity and proportionality: [0]

Since no changes are brought to the Guidelines, current compliance with the subsidiarity and proportionality principles will not be affected.

A2/Guidelines discarded

This scenario assumes that the Guidelines will be eventually discarded. In order to complete current undertakings, the funding already allocated to current PPs will continue and,

following revision of their capacity to be effectively completed, continuing financial support under the next MFF could be considered. Yet, as there would no longer be an EU TEN-T policy framework, there would be no TEN-T budget line in the upcoming MFF either. Without criteria for TEN-T configuration, planning of infrastructural projects would be left entirely for Member States to decide.

Note. Without guiding at EU level in planning TEN-T configuration, no further implementation support action at EU level would be justifiable either.

Impact on TEN-T planning coordination at EU level: [-]

Without binding Guidelines, Member States would have complete discretion in selecting and implementing infrastructural projects. Consequently, they would have even less incentives (than in the current situation) to address with any degree of priority projects of common European interest. Ensuring the infrastructure needed for improving cross-border traffic flows, including connections with neighbouring countries, as well as aspects of multimodality would be addressed with a degree of priority even lower than under the current policy. The impact on EU-level coordination among the MS would therefore be negative.*Subsidiarity and proportionality compliance*: [No]

The Treaty gives the Union a clear mandate with regard to supporting, by means of Guidelines, the development of the TEN-T. Discarding the Guidelines would be justified only insofar as the Commission could demonstrate that progress in the development of the network will allow for effective TEN-T completion without any further EU level support, but just by mere Member States's intergovernmental coordination, at their own initiative. As highlighted earlier, continuation of current trends suggests that this is not likely to occur.

A3/MSs Selection of new PPs (Essen 2)

In this scenario, the current, primarily bottom-up approach to TEN-T configuration development will be continued. The Guidelines' will be revised, to allow the adoption of a supplementary list of PPs. The (wider) TEN-T map will also be updated, to reflect evolutions in Member States' developed and planned infrastructure.

The process of selection of TEN-T projects will remain largely unchanged. MS will continue to be responsible for developing project proposals and their eventual implementation, while the Commission will select the projects that will be financially supported from the EU TEN-T budget, based on the extent to which they fulfil the criteria set out in the Guidelines.

Drawing on lessons learnt, the definition of current criteria for identification and selection of priority projects/projects of European interests will be nevertheless refined, to better specify the elements that would constitute the European added-value of projects. In particular, references to multi-modality aspects and links to third countries will be added.

The PPs included on the current list will continue to be developed according to current plans.

Impact on TEN-T planning coordination at EU level: [+]

The added value of this scenario is that it would address to an important extent the physical fragmentation problems of the TEN-T. New PP proposals could draw on the experience of more than 20 years of TEN-T development, and particularly on current identification of missing links and multi-modal nodes along major European traffic flows, would contribute to filling many of these gaps. Strengthened definition of criteria should help ensure that new PPs will address many of these missing links.

A better EU-steered process of developing the TEN-T configuration should thus ensue, but it will nevertheless remain primarily a bottom up (and thus inherently fragmented) approach. Member States would still continue to consider and fund with priority achieving national objectives. In many cases, cross-border links, both to other Member States (noticeably, particularly to their East) and non-EU Member States neighbours, do not feature on top of their priority list. Nor would multi-modal connection points feature there often, as supporting modal shift is currently not necessarily a priority for many Member States.

In the absence of other incentives, depending on the costs incurred by adding the infrastructure enabling intermodal connections or building cross-border links, on the one hand, and the funding received from EU sources, on the other, Member States might decide to renounce to the latter rather than build the infrastructure with EU requirements. It would be, nevertheless, an issue that could be addressed jointly with targeted implementation measures.

Finally, as priority projects will always be co-financed, disparity in terms of infrastructure endowment (both in terms of availability and quality) between the East and the West of the continent will endure.

It can be concluded that, while it is likely to improve the extent to which problems of physical fragmentation will be addressed, this planning scenario will not, in itself, lead to significantly improved coordination at EU level in planning the development of the TEN-T. While selecting and supporting new TEN-T projects would allow filling in geographical missing links, insofar as they will still reflect predominantly national objectives, the resulting priority projects would not necessarily be the ones that make most sense when the overall European network efficiency is taken into consideration. In other words, the TEN-T could eventually emerge as an effectively interconnected network, but it would not necessarily be the most efficient one. Nor would the fully interconnected multi-modal TEN-T aimed for be achieved within the desired year 2030 horizon.

Subsidiarity and proportionality compliance: [Yes]

As no major changes in terms of approach to planning the TEN-T would be brought, compliance with the principles of subsidiarity and proportionality would not be affected.

A4/ Core Network approach

In this scenario, the Guidelines are revised in order to support a new dual-layer planning approach. The configuration of the first, basic layer will result from the updating and adjustment of the current (wider) TEN-T (as comprised in the Member States maps and outline plans annexed to the current Guidelines) on the basis of a transparent methodological approach, consistently applied across all Member States' territories. This will constitute the "comprehensive" TEN-T. The second layer, overlaying the first and constituted of its strategically most important parts, will constitute the core TEN-T. It will be identified on the basis of a specifically designed methodology, that will be equally consistently and transparently applied for all Member States.

The methodologies developed for the identification of the configuration of both networks will ensure: balanced geographical coverage; linking up of all major EU nodes as well as peripheral regions following the most economically viable, socially beneficial and environmentally sustainable route possible; multi-modality objectives, including through the incorporation of current rail freight corridors, ERTMS corridors and "green corridors"; connections with neighbouring countries and the rest of the world. The core network will be designed to attract major long-distance and transnational traffic flows, both for freight and passengers, and connect major nodes throughout the Union in a geographically balanced way.

The comprehensive network will be so configured to ensure access to the core network and allow the spatial distribution of traffic in all regions.

While the comprehensive/basic layer of the TEN-T will constitute the object of general support at EU level (including financially, especially in the less endowed regions in the East of the Union), the main focus will be placed on the development, with priority, of the multimodal core layer, by 2030.

Impact on TEN-T planning coordination at EU level: [++]

During the public consultation process, this scenario has been identified as the one that best addresses the physical fragmentation problem of the TEN-T. It proposes an enhanced top-down, multi-modal approach to planning that would allow addressing current aspects of physical fragmentation of the TEN-T in a systematic and comprehensive fashion. By identifying a core network of highest strategic common interest, it will enable the prioritisation of projects in the process of selection (as well as provide orientation for future project development) to ensure that the network fragmentation problems identified (both across countries and modes) are primarily addressed.

While building of new infrastructure will be supported where needed, the planning will focus on developing the network configuration (both the comprehensive and the core layer) starting from the existing and planned infrastructure in each Member State. It will seek to make maximum use of current Priority Projects as well as other comprehensive network projects undertaken so far. The focus will be thus placed on identifying and developing the links necessary to connect existing and planned Member States infrastructures into a coherent, multimodal and thus more efficient (not least resource-efficient) network.

High coordination in planning the TEN-T will be ensured, in particular with regard to the core layer. The common planning methodology, applied transparently and coherently to all Member States shall ensure that missing cross-border links (including with neighbouring and third countries), co-modal transport routes and their necessary interconnecting points, as well as new links to alleviate major bottlenecks, are identified and addressed. At the comprehensive network level, active coordination at EU level with regard to planning the TEN-T configuration will be limited to ensuring that loose ends and discarded projects are taken off the current TEN-T map while new planned infrastructure added, and that accessibility to the core network and spatial distribution of traffic are adequately provided.

During the (extensive) process of stakeholder consultation, the envisaged methodologies for both the core network and the comprehensive network have been submitted to stakeholder opinion. In particular, Member States have been actively involved in identifying the updated comprehensive TEN-T – which is shared, at least with regard to updating the TEN-T map with discarded and planned infrastructure, by all planning scenarios – as well as the possible core network.[180] A series of bilateral meetings have been conducted by the Commission with the Member States in order to identify their national network component on both the comprehensive and the core TEN-T. The bilateral consultations have also revealed that the construction of the future core network thus identified could be ensured by 2030.

As the methodology for network identification will focus on supporting both major long-distance and transnational traffic flows and connecting major nodes throughout the Union in a geographically balanced way, on the core network, as well as ensure access to the core network and spatial distribution of traffic in all regions (the comprehensive network), the

[180] As a consequence of this process, the Member States actually endorsed the dual-layer network approach, including the proposed draft methodology, during the Informal Transport Council in Godolo in February 2011, as the preferred approach to planning the TEN-T under the revised TEN-T policy.

approach to planning in this scenario should also ensure a fine balance between the objectives of contributing to the Union's economic competitiveness, on the one hand, and its economic and territorial cohesion, on the other.

Subsidiarity and proportionality compliance: [Yes]

The Commission will not step beyond its powers as long as it acts in fulfilment of its Treaty mandate to support the development of the TEN-T. The degree of EU level governance necessary to achieve the core network on time could nevertheless be questioned by Member States on grounds of subsidiarity and proportionality. Insofar as the process of network planning/identification has been undertaken and will continue to be done in full consultation with the Member States, this issue should not arise. Last but not least, during the legislative process of adoption of the revised Guidelines, the Member States will be required to discuss and approve the core network (as well as comprehensive network) plan, as annex to the Guidelines. The specific requirements of Art. 172 TFEU that all planned projects along the TEN-T be approved by all the Member States concerned will thus also be fully complied with.

A5/Dense comprehensive network approach (TENCONNECT)

This scenario consists of revised Guidelines aiming at supporting the development of the entire TEN-T rather than a strategic core network as a high-standard, fully integrated, multimodal trans-European network. As in the previous scenario, the network configuration will also be identified on the basis of a transparent methodology to be applied consistently across the entire territory of the Union.

Impact on TEN-T planning coordination at EU level: [+++]

As with the previous, A4 scenario, this scenario would ensure the identification of a network configuration that specifically targets the related TEN-T policy objective, by means of a tailor-made methodology. The difference lies in that, while in the previous scenario EU action is primarily focussed on the development of the strategic core, this scenario treats the development of the entire comprehensive TEN-T as a EU priority. The resulting planning coordination among Member States would thus be highest of all scenarios, and the objective of interconnectivity of national networks, multimodality and adequate geographical coverage would be pursued in the highest degree.

Subsidiarity and proportionality compliance: [No]

Such an approach would be prone to justified challenges on the part of Member States, particularly on grounds of proportionality. The Commission would have a very difficult task justifying why most of the transport infrastructure of all Member States should be treated as a EU priority, and why its development could be best addressed only at EU level.

- **Implementation scenarios (B scenarios)**

These scenarios concern the level of governance the EU exercises over the implementation of the planning scenarios. They range from business as usual (i.e. the current Guidelines) through an enhancement of current EU powers that would aim at conformity with standards and coordination, to the Commission adopting full powers of control regarding the network's operation. Their preliminary assessment has focused therefore particularly on their impacts on the drivers relating to delivering interoperability, enhanced Member States cooperation in project implementation and the focusing of EU funding instruments (and, consequently, the

corresponding TEN-T policy objectives). In addition, as in the case of network planning scenarios, implementation scenarios have also been assessed for their impact on the subsidiarity and proportionality principles.

B1/Business-as-usual

This is the reference scenario, whereby the current implementation approach, as provided in the Guidelines in force, is maintained unchanged. This includes both specific TEN-T instruments, as well as other instruments of EU transport policy implementation that support the achievement of the specific TEN-T objectives. Current TEN-T implementation instruments include both financial instruments – the TEN-T Programme, the Cohesion Fund and EIB loans and grants; and coordination ones – the TEN-T European Agency (TEN-T EA), the European Coordinators, the Open Method of Coordination and the TENtec database that was developed as a result of the latter. Among the more general EU transport policy implementation instruments, most relevant for supporting TEN-T development are: the innovative transport technologies or Intelligent Transport Systems (ITS), the European Rail Transport Management System (ERTMS), the River Information System (RIS), the European air traffic control infrastructure modernisation programme (SESAR).

Impact on interoperability [0]

As far as the interoperability of networks is concerned, a certain progress will be achieved, particularly in the deployment of common traffic management systems (ERTMS, RIS, SESAR). But overall, the impact on TEN-T efficiency would be too little, too late.

The introduction of ERTMS on the European interoperable network provides a good example for an indicator of progress towards interoperability. Currently, around 4000 kilometres of lines for commercial services are in service in ten Member States[181], in particular high speed lines, and by the end of 2015, and respectively 2020, this should grow to 11 500 km and 23 000, respectively.[182] In addition, a binding European Deployment Plan (EDP), adopted on 22 July 2009, aims at a swift and coordinated deployment by 2015 of ERTMS on 6 Corridors.

Nevertheless, even if these objectives are reached by 2020, the interoperable section of the TEN-T will not constitute an interoperable European-wide network.[183] The six corridors of the EDP represent only 6 % of the Trans-European Network track length, even though they do carry 20% of the rail freight traffic. In addition, as European Coordinator K. Vinck has noted, "from an implementation point of view, delays are noticed on nearly all corridors with the exception of specific sections such as the Betuwe Line in The Netherlands or the Swiss transit sections of the Lötschberg and the Gotthard-Ceneri"[184].

At the same time, much progress regarding interoperability in operational rules is not to be expected either, since the different barriers to interoperability (administrative requirements, cross acceptance of vehicles, certification of vehicles operators, technical and commercial controls) will not be tackled together. Without increased top-down coordination between Member States, the situation is not likely to improve, despite the involvement of the European Coordinators.

[181] From the Annual Activity Report of Coordinator Karel Vinck on ERTMS, Brussels, 20 July 2010

[182] According to the figures in the ERTMS contracts signed recently and the national deployment plans submitted by Member States.

[183] Commission Staff Working Document accompanying the Communication from the Commisssion to the Council and the European Parliament, COM(2009) 464 final. Progress report on the implementation of the Railway Safety Directive (Directive 2004/49/EC) and of the Railway Interoperability Directives (Directives 96/48/EC and 2001/16/EC). See also figure on ERTMS Corridor in the Report, p. 20.

[184] Annual Activity Report of Coordinator Karel Vinck on ERTMS, Brussels, 20 July 2010

Impact on Member States cooperation in project implementation: [+]

With the continuous involvement of the Coordinators and the use of the Open-Method of Coordination, intergovernmental cooperation is likely to improve. The European Coordinators in particular have proven an effective mechanism for addressing the political sensitivities inherent in cross-border projects as well as for providing visible coordination enhancement. The results of these efforts are confirmed by the fact that so far there have been no cross-border project cancellations among the projects assessed in the 2007-2013 MAP portfolio.[185] However, in the absence of further legal and political commitments, it is unlikely that new large and complex cross-border projects will be completed.

Thus, the 2010 detailed analysis of the Priority Projects[186] shows that by 2020, according to current planning, a number of major projects will have been completed: the rail parts of PP8 and PP12; the PP13 UK/Ireland/Benelux road axis; PP17 Paris-Bratislava; PP20 Fehmarn Belt; PP23 railway axis Gdańsk-Warszawa-Brno/Bratislava-Wien; and PP25 road axis Gdańsk-Warszawa-Brno/Bratislava-Vienna. The implementation of three PPs however would still be running beyond 2020: PP1 Berlin-Verona/Milano-Bologna-Napoli-Messina-Palermo; PP3 high speed railway axis of Southwest Europe and PP6 railway axis Lyon-Trieste-Divača/Koper-Divača-Ljubljana-Budapest-Ukrainian border. All three cases involve large and complex infrastructure projects, among which not least the Brenner and the Lyon-Turin base tunnels.

Impact on focusing of EU funding instruments: [0]

Focusing of EU funding has significantly improved since the first programme in 1996, and in particular following the 2004 TEN-T Guidelines revision, the adoption of the 2007-2013 MFF, and the establishment of the TEN-T EA. Nevertheless, as highlighted in the problem description section of the IA, the capacity of current instruments to achieve a better focus of EU funding conditionality remains limited. At the same time, the co-funding within the TEN-T budget may remain too limited to kick off works on major cross-border sections or important bottlenecks with cross-border effects, due to the limited budget and the limited support rates. For e.g., the Mid-term review reports (2010 and 2011)[187] point out that the seemingly higher co-funding rate of 30% for cross-border sections is, in practice, not higher than 21% in average. As these difficult cross-border projects often run across several MFF, the final contribution from the TEN-T budget may be as low as 5 to 10%.

Upcoming foreseen changes in the regulatory framework – the establishment of a common/coordinated funding framework with the cohesion policy funds with enhanced conditionality or the establishment of an Infrastructure Fund – could address issues of EU funding focusing to a certain extent.[188] But in the absence of a revision of the Guidelines,

[185] Mid-Term Review of the 2007-2013 TEN-T Multi-Annual Work Programme Project Portfolio (MAP Review), TEN-T Executive Agency, October 2010

[186] TEN-T Priority Projects 2010: A Detailed analysis, December 2010.

[187] MAP review, 2010 (cited above) and Mid-term evaluation of the TEN-T Programme (2007-2013)-Final Report, Steer Davies Consultancy, March 2011.

[188] TEN-T projects are currently funded either through the TEN-T Programme (PPs in convergence countries) or the Cohesion Fund (PPs or other TEN-T projects in the cohesion countries). While conditions for TEN-T infrastructure projects from the Cohesion Fund are currently observing TEN-T Guidelines criteria, the generally weak conditionality attached to Cohesion Fund support so far has failed to focus EU funding towards delivering projects of highest EU added-value (see also point 2.3.4 of the IA). DG REGIO is currently undertaking a large consultation process in view of strengthening conditionality. The new framework would more clearly link funding to compliance with TEN-T policy objectives and project criteria. If the current proposal for an Infrastructure Fund will be adopted by the Commission, then the new fund will incorporate both the TEN-T Programme funding and part of the Cohesion Funds dedicated to infrastructure development, including transport infrastructure.

providing for stricter conditionality of EU funding[189] as well as a better definition of what constitutes projects of key interest for TEN-T development (and what constitutes their EU added value in particular), the TEN-T would fail to fully profit from these directly relevant changes of the EU regulatory framework.

Subsidiarity and proportionality compliance: [Yes]

Since no changes are brought to the Guidelines, current compliance with the subsidiarity and proportionality principles will not be affected.

B2/Guidelines implementation provisions discarded

As with A2, this scenario considers the possibility of "no (longer) EU action". Nevertheless, Guidelines could still be envisioned to provide criteria for TEN-T and projects of common European interest; but at the end of the current MFF no EU level TEN-T implementation support activities will be foreseen or financed. That includes renouncing to the work of the European Coordinators and dissolving the TEN-T EA at the end of its mandate in 2015.

Impact on interoperability: [0/-]

Without TEN-T Guidelines and the work of European Coordinators to provide for the adoption of common standards of interoperability, the rhythm of their adoption will depend on the rhythm of implementation of other EU transport policy instruments in this regard (such as ERTMS, ITS, RIS, SESAR). While certainly not envisaging support for common standards adoption but, on the contrary, discarding current instruments that have proven particularly beneficial in this sense, the impact of this option is likely to prove negative in the long run.

Impact on Member States cooperation in project implementation: [-]

As pointed out earlier, the work of the European Coordinators has proved instrumental in improving Member States cooperation in PP implementation, especially as concerns cross-border section. Similarly, the work of the TEN-T EA has been evaluated as bringing particular added value as regards preparation of projects proposals and follow-up on PP implementation. Hence, renouncing to these instruments would most likely have a negative impact on continuing Member State cooperation.

Impact on the conditionality/focus of EU funding instruments: [-]

Left alone, Member States will be even more prone to choose which projects serves best their own national interests while still fulfilling the TEN-T criteria defined in the Guidelines.

Impact on subsidiarity and proportionality: [0]
This option will not have any significant impact. It could be, on the contrary, appreciated by the Member States being left alone.

B3/ Regulatory approach only

This scenario consists of a TEN-T financial instrument that will strictly define the projects/network map to be funded and their timetable for completion, as well as prescribe interoperability standards and timetables for adoption. Member States will be left to their own devices to carry out the requirements by the agreed date. The role of the Commission would be restricted to monitoring and making any necessary legal challenges in case of infringements. There would be no EU coordination or other implementation tools.

[189] The rules and conditions of disbursing TEN-T Programme funds are set in a distinct legal document, the Financial Regulations accompanying the TEN-T Guidelines. But a revision of the former may prove not have sufficient force in the absence of a revision of the latter – for e.g. in order to better define the type of projects that can be funded in order to better ensure their EUadded-value.

Impact on adoption of common interoperability standards: [0/+]

By prescribing interoperability standards over the entire range of PPs or core and comprehensive networks, depending on the planning scenario chosen, this approach would ensure an eventual harmonisation of standards across the TEN-T. Nevertheless, the only tool the Commission would have to "stimulate" Member States to ensure speedy and effective implementation would be by means of taking them to the European Court of Justice (ECJ). Hence, as long as, from the Member States perspective (including, it should not be ignored, the national operators and "soft" infrastructure providers), it is more profitable not to adopt the common standards prescribed, they will postpone doing so. Even the threats of ECJ sanctions might prove little effective, since the costs of sanctions might still be outweighed by other national interest considerations. Hence, the impact of this option towards addressing current interoperability problems and achieving the corresponding objective of a fully interoperable TEN-T could prove positive, but it could require considerable time, beyond the 2030 objective.

Impact on Member States cooperation in project implementation: [+]

The reasoning developed earlier equally applies. Obligations deriving from the EU *acquis* would eventually render Member States to enhance their cross-border cooperation and coordination. Yet, the speed and effectiveness in delivery of projects could not be fully guaranteed, and might well prove to depend on the cost-benefits calculations made by MS from the perspective of their national interest. As argued earlier, being taken to Court the Commission might prove to provide a certain "stimulus" to Member States to seek and enhance cooperation and coordination in order to deliver cross-border project/sections; but it would not necessarily deliver the full expected outcome, nor in the timeframe the Commission would like to see. Moreover, the role of the severe guardian with the stick is not the one that the Commission seeks to play, nor to be perceived in, with predilection.

Impact on conditionality of EU funding instruments: [0/ +]

The effectiveness in focusing in EU funding depends on the extent to which the projects supported are implemented, delivering the inherent EU added value. Hence, insofar Member States would not prove perfect good will from the start in complying with the Guidelines requirements, and which is likely to be the case for at least some of them, the effectiveness in delivery and meeting the established targets/objectives will also suffer.

Impact on subsidiarity and proportionality: [-]

The main shortcoming of this approach however could prove to be that it is an approach that is overly top-down, that could be easily challenged on grounds of subsidiarity. In the course of the consideration of the text by the Member States and the EP, these issues could be eventually addressed. Nevertheless, two negative implications could still foreseen. First, the Commission's image could be seriously affected by being seen as a problem setter, not a problem solver. Second, the provisions of the text might result so much water downed, to suit the various Member States interests, that it would weaken any effectiveness in achieving the TEN-T policy objectives within the envisaged time horizon.

B4/Reinforced coordination

This scenario envisages strengthened provisions in the TEN-T Guidelines concerning the TEN-T implementation instruments (the TEN-T Programme, the European Coordinators, the TEN-T EA), by means of specific legal instruments – Decisions – governing the implementation of specific projects/corridors. In the case of the A1 or A2 planning scenarios, they would concern the individual PPs, whereas in the case of the A3 and A4 scenarios, they

would concern specific corridors along the core network, and the comprehensive TEN-T respectively.

The individual PP/Corridor Decisions will provide for a coordinated approach to infrastructural investments, management of PP axis/corridor capacity, in building and coordinating transhipment facilities, the optimisation of the use of each transport mode (or multi-modality), the comprehensive deployment of interoperable traffic management systems and the harmonisation of operational rules along the PP/corridor. Both EU and Member States funding would be committed through the individual PP/Corridor Decisions, which would also establish binding timelines for completion. Infrastructure improvements and transport policy measures would closely interact, and their realisation will be brought forward by appropriate coordination structures, under the aegis of a PP/Corridor Coordinator.

The European/Corridor Coordinators will continue with mandates similar to the current ones and relatively enhanced powers, grounded in the PP/Corridor Decisions. The Decisions will not be addressed only to Member States, but also to the other actors involved in the respective PP/corridor implementation. The mandate of the TEN-T EA will be maintained and extended beyond 2015, to help ensure, alongside the Coordinators, to add effectiveness in implementation, not least by encouraging the development of project proposals with high EU added-value.

Impact on adoption of common standards of interoperability: [++]

As the PP/Corridor Decisions would provide for common technical and service standards along the respective PP/corridor, interoperability issues will be addressed in a direct and comprehensive manner at PP/corridor level.

Impact on Member States cooperation in project implementation: [+++]

The primary focus put in this scenario on coordination, combined with the effect of binding Member States financial commitments, will enable the speeding up of effective implementation within a binding timetable.

4.2.1 ***BRAVO Project: an example of a successful corridor approach***

The Brenner corridor is one of the busiest European freight corridors both by road and rail, which is transiting the sensitive Alpine region. With an objective to raise the volume of environment-friendly combined rail-road transport and increase rail's market share on the Brenner corridor, in 2002, all relevant stakeholders from Austria, Germany and Italy committed themselves to the "Action Plan Brenner 2005".

Brenner Corridor (Source: KombiConsult)

This plan contains a list of measures required to organize and ensure the short- to medium-term upgrading of the level of service provided in combined transport on this corridor. It takes up existing measures and projects improving the competitiveness of rail freight. It consolidates these approaches, supplements them by additional actions, and supports them by means of an implementation plan that is aimed at bringing about a modal shift.

BRAVO's main objective was to develop of a coherent corridor management scheme including: (1) improvement and intensification of cooperation between the railway undertakings and infrastructure managers, (2) improvement of communication and data exchange to optimize the interfaces between parties involved (3) introduction of an overall quality system and a removal of operational bottlenecks and (4) apply interoperable rail traction involving multi-current locomotives and including train path rescheduling, simplification and harmonization of locomotive approval procedures (certification).

The implemented measures of the project exhibit very positive results:
-Increase of traffic on railway within the corridor (+16% p.a.).
- Modal shift: 5.92 to 6.86 million gross tonnes from 2005 to 2006.
- Quality improvements in terms of reliability, flexibility, enhanced customer satisfaction and reliability of transport documents.
- Benefits for environment and traffic on Brenner road.

The project results offer many transferability opportunities, as the project was designed to function as a blueprint applicable to other European corridors as well.

An increase in traffic volumes of about 57 percent in unaccompanied combined transport (CT) on the Brenner axis has been reported by the operators and railways, which have been participating in the BRAVO project over the last three years.

Source: http://www.bravo-project.com/home/index.shtml

Impact on conditionality/focus of EU funding instruments: [+++]

PP/Corridor Decisions will identify major investments and smaller scale short term improvements necessary on the individual PPs or corridors and condition funding on their

implementation. Priority for the realisation of those projects identified as being of highest EU interest will be thus insured. Moreover, this approach would also allow for coordination and even synchronisation of EU and national funding, thus leading to further enhanced focusing of funding on key priorities across the PPs/core/comprehensive TEN-T. At the same time, improved effectiveness in implementation would also result in more value being generated in return for EU funding.

Subsidiarity and proportionality compliance: [Yes]

While the reinforced coordination approach is an enhanced top-down approach, the Member States will be directly involved in the drafting of the individual PP/Corridor Decisions and the common standards (technical, service, investment) provided and financial commitments assumed. The principles of subsidiarity and proportionality will thus be preserved. The scenario presupposes intense dialogue and cooperation between the EU and the Member States involved in order to adopt the necessary PP/Corridor Decisions.

B5/ EU full operational management

This scenario consists of a TEN-T Framework Regulation that would provide for complete management of the planned network via the EU agencies (ERA, EASA, TEN-T EA), under the coordination of the Commission. Whereas the definition of EU standards for interoperability is a necessary process that is ongoing, the definition of a whole series of operational rules, of delicate issues such as the final selection of the alignment, of cost-benefit analysis and environmental impact assessment, would almost certainly take the EU intervention too far.

This scenario would insure an effective implementation of TEN-T development plans by means of strong coordination at the European level.

Impact on adoption of common standards of interoperability: [++]

The integration and interoperability of the network with common standards, similar traffic management rules and systems along the selected network would be insured along the entire TEN-T. Nevertheless, given that development and deployment of the common standard will have to be managed by single agencies at EU level, their capacity to do so within reasonable delays is likely to be severely strained.

Impact on Member States cooperation in project implementation: [-]

This scenario does not provide for any significant support for enhanced Member States cooperation and coordination on project delivery. It will be a primarily top-down approach. On the contrary, in this scenario Member States are liable to divert attention from cooperating with each other since their primary partners would be the central EU implementation agencies. Moreover, this extreme top-down approach could lead to resistance to implementation on the part of the Member States, as they would no longer perceive themselves as equal partners/owners of the TEN-T project.

Impact on conditionality/focus of EU funding instruments: [+]

Since management of EU funding will be fully centralised at EU level, focusing of funding on the identified priorities would be ensured in theory. In practice, they could easily lead to mismatches due to the overly top-down approach, as certain issues are likely to be dealt with better at local/regional/national level.

Subsidiarity and proportionality compliance: [No]

The responsibility for implementation and operation of the network would be completely taken away from Member States and shifted on to the Commission. This full top-down

approach to implementation would go beyond treaty provisions on EU competences as delimited by the subsidiarity and proportionality principles.

ANNEX IV

TEN-T and Environmental Legislation

Introduction

The TEN-T Policy Review requires a strict monitoring of the compliance with the EU environmental legislation. This annex introduces the subject by highlighting the new policy framework, in particular the recently adopted Transport White Paper which placed an important focus on environmental sustainability and resource efficiency (Transport 2050 - Roadmap to a Single European Transport Area). Thereafter, this annex describes the relationship between TEN-T and the environmental legislation. It then deals in particular with the implementation of the Directive 2001/42/EC (Directive on the assessment of the effects of certain plans and programmes on the environment or Strategic Environmental Assessment or SEA Directive) in the Member States as well as with the implementation of further environmental legislation.

I. White Paper

The central challenge of the modern transport and environment policies is to shape an environmentally sustainable mobility that fulfils also social demands. Transport is of particular significance in our everyday live and at the same time it can have harmful environmental impacts. This supposed dilemma has been taken seriously by both policies at European level: many laws and decrees ensure safeguarding of the natural habitat of animals and plants; minimization of possible impacts on the environment of infrastructure construction; reduction of emissions etc.

On 28 March 2011, the European Commission adopted a comprehensive strategy for a competitive transport system that will increase mobility, remove major barriers in key areas and fuel growth and employment. The aim is to create a Single European Transport Area with more competition and a fully integrated transport network which links the different modes and allows for a profound shift in transport patterns for passengers and freight. At the same time the roadmap defines ambitious environmental goals that should mitigate the climate change:

- No more conventionally-fuelled cars in cities.
- 40% use of sustainable low carbon fuels in aviation; at least 40% cut in shipping emissions.
- A 50% shift of medium distance intercity passenger and freight journeys from road to rail and waterborne transport.
- All of which will contribute to a 60% cut in transport emissions by the middle of the century.

The crucial point is to break the transport system's dependence on oil without sacrificing its efficiency and compromising mobility. In line with the flagship initiative "Resource efficient Europe" set up in the Europe 2020 Strategy and the new Energy Efficiency Plan 2011, the paramount goal of European transport policy is to help establish a system that underpins European economic progress, enhances competitiveness and offers high quality mobility services while using resources more efficiently. In practice, transport has to use less and

cleaner energy, better exploit the existing infrastructure and reduce its negative impact on the environment and key natural assets like water, land and ecosystems.

II. TEN-T

In order to establish a single, multimodal network that integrates land, sea and air transport networks throughout the Community, the European policymakers decided to establish the Trans-European transport network (TEN-T), allowing goods and people to circulate quickly and easily between Member States and assuring international connexions. Establishing an efficient TEN-T network is a key element also in the relaunched Lisbon strategy for competitiveness and employment in Europe. It is also a crucial part of the Single Market Act aiming at exploiting fully the benefits from the Internal Market. If Europe is to fulfil its economic and social potential, it is essential to build the missing links and remove the bottlenecks in our transport infrastructure, as well as to ensure the sustainability of our transport networks into the future. Furthermore, it integrates environmental protection requirements with a view to promoting sustainable development.

III. TEN-T Policy and Environmental Policy

The environmental impacts of transport are varied; they can be not only direct by using the different transport modes (emissions, climate change at local level etc.), but also indirect by the existence of the infrastructure itself (losing surface area, surface alterations, separation of different habitats etc.). In addition, a continuous growth of the transport can be observed.

For the TEN-T Policy relevant EU Directives are the following:

- Directive 85/337/EEC – Environmental Impact Assessment or EIA Directive
- Directive 92/43/EEC – Directive on the conservation of natural habitats and of wild fauna and flora or Habitats Directive
- Directive 2001/42/EC – Directive on the assessment of the effects of certain plans and programmes on the environment or Strategic Environmental Assessment or SEA Directive
- Directive 2009/147/EC – Directive on the conservation of wild birds or Birds Directive

The Habitats Directive together with the Birds Directive forms the cornerstone of Europe's nature conservation policy. It is built around two pillars: the Natura 2000 network of protected sites and the strict system of species protection. All in all the directive protects over 1.000 animals and plant species and over 200 so called "habitat types" (e.g. special types of forests, meadows, wetlands, etc.), which are of European importance.

Environmental assessment is a procedure that ensures that the environmental implications of decisions are taken into account before the decisions are made. Environmental assessment can be undertaken for individual projects, such as a dam, motorway, airport or factory, on the basis of the EIA Directive or for public plans or programmes on the basis of the SEA Directive. The common principle of both Directives is to ensure that plans, programmes and projects likely to have significant effects on the environment are made subject to an environmental assessment, prior to their approval or authorisation. Consultation with the public is a key feature of environmental assessment procedures.

The Directives on Environmental Assessment aim to provide a high level of protection of the environment and to contribute to the integration of environmental considerations into the preparation of projects, plans and programmes with a view to reduce their environmental impact. They ensure public participation in decision-making and thereby strengthen the quality of decisions. The projects and programmes co-financed by the EU have to comply with the EIA and SEA Directives to receive approval for financial assistance.

Environmental impacts are important also for the resource efficiency flagship. Pollution is in most cases affecting the re-productive capacities of renewable resources such as forest, fisheries and water and therefore undermining our resource base. Such environmental impact indicators can be related to GDP or added value in a sector and thereby produce "eco-efficiency indicators".

IV. Compliance of the TEN-T Network with the SEA Directive

In the framework of the ongoing revision process of the TEN-T Guidelines, Member States may introduce proposals for modification and additions to comprehensive network components on their respective territory. As a first step, this requires the submission of documents substantiating the compliance of these proposals with the SEA Directive, to be taken into account by the Commission in elaborating its proposal for new TEN-T Guidelines. The Member States were asked to provide the Commission these documents.

The SEA Directive stipulates that SEA has to be carried out on "plans and programmes of which the first formal preparatory act is subsequent to" 21 July 2004. In addition "Plans and programmes of which the first formal preparatory act is before that date and which are adopted or submitted to the legislative procedure more than 24 months thereafter, shall be made subject to the obligation" of the completion of a SEA. This implies that no SEA needs to be carried out on plans and programmes that were adopted before 21 July 2004 or plans and programmes of which the first formal preparatory act is before that date and which are adopted before 21 July 2006.

Accordingly, the compliance with this Directive can be demonstrated as follows:

- the Member State provides a confirmation that it is not obliged to carry out a SEA (explaining the reason of the exemption from the obligation)

- if a SEA has been carried out, the Member State provides a summary regarding the procedure (preparation of an environmental report, alternatives identified and analysed, consultations with the public and other authorities, results/conclusions of the final decision);

- and finally if a SEA will have to be carried out or it is ongoing, it provides an explanation how the application of the SEA will be ensured.

All Member States have provided information concerning the application with the SEA Directive; this information is being evaluated in cooperation with Directorate General for Environment. The present report provides an overview, how the Member States' apply in practice the SEA Directive within the TEN-T Policy review process (see the attached table). Overall, it can be concluded that the SEA Directive contributes to the systematic and structured consideration of environmental concerns in planning processes and better integration of environmental considerations upstream. In addition, by means of its

requirements (environmental report, consultation and information of the authorities and public concerned etc.) it ensures better and harmonized planning procedures, and contributes to transparent and participatory decision making processes.

V. Compliance of the TEN-T Policy with the EIA Directive

The 30 Priority Projects for the trans-European transport network are mostly projects which promote the most environmentally friendly transport modes and which consume less energy, such as the railways and waterways. The completion of the trans-European transport network will have a positive impact on the environment. If transport-generated CO2 emissions continue to increase at the present rate, by 2020 they will be 38% above present levels. Completing the 30 Priority Projects will slow down this rise by about 4%, equivalent to reducing CO2 emissions by 6.3 million tonnes a year.

Community environmental protection legislation provides a clear framework in which these major projects have to be implemented. The Community guidelines for the development of the trans-European transport network refer to it explicitly. Each new infrastructure programme has to undergo a strategic environmental assessment and each project has to be assessed on an individual basis. This double obligation makes it possible to optimise the implementation of the major infrastructure projects from the environmental angle.

Apart from these environmental assessments, each individual project has to comply with Community legislation on noise, water and the protection of flora and fauna. If an impact is found on any of these aspects, alternatives will have to be looked for in order to guarantee that environmental legislation is complied with as far as possible. If none of the alternatives to a project declared to be in the public interest is considered to be an optimum solution and in line with Community legislation, compensatory measures may be adopted which will allow the project to be carried out while at the same time compensating for any negative impact.

New transport infrastructure can lead to further fragmentation of the territory, which can have adverse effects on biodiversity and certain endangered species. It should, however, be noted that land fragmentation depends appreciably on population density and that transport investments can thus be said to have only an indirect influence on fragmentation. It is important to note also at this juncture that several EC directives require Member States to carry out environmental impact assessments at project level and to pay particular attention to the protection of legally recognised natural sites. Such developments help to minimise environmental nuisances and to take appropriate mitigation measures. Moreover, the consultation procedure and access to justice regarding the development consent envisaged under the EIA Directive enables involvement of the public in the decision-making process.

As described above, the guidelines obliges the Member States to carry out environmental impact assessments for all TEN-T projects, as well as implementing the Habitats Directive and the Birds Directive. Member States also have to implement, from July 2004 onwards, the Directive on the assessment of the effects of certain plans and programmes on the environment and therefore assess the environmental impacts of their plans and programmes leading in a subsequent phase to transport projects, including TEN-T projects. It allows environmental considerations to be integrated upstream in the planning process before any firmer projects are planned. It is worth noting that, although this document presents only a broad-brush analysis, it is an integrated analysis at European level. It should therefore be emphasised again that despite positive environmental developments at the European level, air quality, noise or other environmental problems may occur at the local level. Therefore, as

mentioned earlier, each individual project should undergo a detailed environmental assessment according to existing EU legislation before financing decisions are taken.

Currently the Commission is looking to streamline procedures for the various environmental impacts by introducing a 'one-stop-shop' for information provision and dissemination—following an Impact Assessment, a the proposal to this end maybe presented during 2012/2013. Something in the order of 30% of the land area in new Member States are covered by Natura 2000 biodiversity sights, a far greater proportion of land area than in EU 15. Generally, in case of transport projects the most problematic issue was and still is (because of the collision with Natura 2000 sites) the compliance with the Habitats Directive, which requires proper assessment of plans and projects which are likely to have significant impacts on Natura 2000 sites.

A multi-NGO study[190] in 2008 on the potential conflicts between the TEN-T Priority Projects and the EU's Natura 2000 network of protected areas found that 379 sites that should be protected by the EU Birds Directive and 935 protected under the Habitats Directive are likely to be affected by the 21 TEN-T Priority Projects analysed. Watercourses and maritime areas merit particular attention.

Conclusion

Analysis has shown that TEN-T projects may pose serious threats to biodiversity and Natura 2000 areas which were designated to protect the most endangered European species and habitat types. The negative impacts from transport projects might result from physical reduction of natural habitats, landscape fragmentation, migration barriers, collision of vehicles with animals, emissions of noise and air pollutants, changes to the water regime and others. It is therefore necessary that all projects undertaken as part of the TEN-Ts prove full compliance with EU environmental legislation, including Birds and Habitats Directives, before they are given a green light for implementation.

National and regional transport infrastructure development plans must undergo a SEA on the strategic level and the individual projects must be subject to the EIA assessments. Their impacts on nature must be fully analysed and alternatives with least negative effects should be given preference. In this regard, routings which allow bypassing the Natura 2000 sites should be prioritised. If transecting protected areas is unavoidable impacts must be mitigated and when it is not fully possible compensatory measures to safeguard the coherence of the Natura 2000 network must be implemented. The Water Framework Directive must also be respected, including carrying assessments on plans, programmes and projects.

Coordinated strategic planning with early stakeholder consultation should be promoted as it is the best way to avoid conflicts at the later stages of projects implementation, as proposed in the recent White Paper on Transport, Action 36[191]. Requirements of nature protection need to be factored in already at the initial stages of the planning process to minimise impacts on

190 *TEN-T and Natura 2000: the way forward*, An assessment of the potential impact of the TEN-T Priority Projects on Natura 2000, Final report – May 2008, By Helen Byron & Lucy Arnold, RSPB

191 Ex-ante project evaluation criteria

- Introduce ex-ante project evaluation criteria ensuring that infrastructure projects duly demonstrate the EU added value or are based on 'services rendered' and generate sufficient revenue.
- Streamline procedures for projects of overriding European interest, in order to ensure (i) reasonable time limits for completing the whole cycle of procedures; (ii) a communication framework that is in line with the project implementation; and (iii) integrated planning which takes environmental issues into account in early stages of the planning procedure.
- Introduce PPP-screening to the ex-ante evaluation process to ensure that the option of PPP has been carefully analysed before a request for EU funding is being asked.

environment. Mitigation and compensatory measures are eligible for the EU co-financing, so the project promoters should be encouraged to make use of these possibilities.

ANNEX V

Monitoring and Evaluation

In this annex, the role of the TEN-T Executive Agency, its management of the TEN-T Programme, the use of the Open-Method of Coordination through the TENtec system and the role of the EU Coordinators will be described. This annex comes as a supplement to Part 7 of the Impact Assessment.

1. Commission monitoring, evaluation and coordination

1.1. Open Method of Coordination (OMC) – TENtec Information System

The Open Method of Coordination (OMC) – an intergovernmental method of "soft coordination" – has been re-launched by the Lisbon strategy and provides the political frame for all TENtec developments. The Directorate in the Commission responsible for TEN-T programmes, DG MOVE, is developing an Information System (TENtec) to store and manage technical, financial and historical data for the analysis, management and political decision making concerning the TEN-T programmes. This includes support for briefings, modelling of future policy/budgetary scenarios, interfacing to GIS (Geographical Information System), monitoring and reporting, electronic submission of applications and conducting online surveys. Additionally, the system manages the necessary workflows, issuing of Commission decisions, complete selection cycle for new projects including proposal submission and evaluation, and the required web interfaces (Private Portal and Public Outreach module as well as general web services to connect external data sources). Finally, interactive maps and satellite overlays (e.g. Google Earth) are supported with the seamless inclusion of GIS. The entire software development is based on the SMART-IT principle, making TENtec a user-driven application.

1.2. Respect of budget and timetable

Current evaluation indicators in relation to project performance are based on a number of parameters, including fulfilment of project objectives, cost and time related aspects, funding and project management aspects, in particular risk factors. However, these indicators and accompanying statistical information should be interpreted in light of the fact that most of TEN-T funded projects are challenging and face a high degree of complexity and a multiplicity of factors that can influence different aspects of their performance. It is therefore inevitable that some of the projects have budget deviations and delays in implementation.

On average, for investment projects, the support corresponding to the MAP selection in 2007 (accounting for approximately two-thirds of the total TEN-T budget) equals 16% of the total project budgeted costs. Most of the remaining funding is financed by the Member States. With this low MAP co-financing, the EU "additionality" and thus the accountability that it could create in the Member States, is naturally limited. The national political decision to support the project until completion is much more important than the fact that the project receives EU co-financing. Nevertheless, the political context created around the TEN-T and its Priority Projects, as well as the peer pressure from other participants in European meetings, were important factors in influencing national level decisions.

The planning of infrastructure projects throws up difficulties in respecting the yearly timetables. Technical problems do occur and budgets and timetables still appear to be underestimated. Recent studies have analysed this phenomenon by explaining why the costs of large-scale projects, such as High Speed Rail projects, new motorways, and the Channel Tunnel, systematically turn out to be higher than what was forecast. It is clear that up to the final building consent, factors such a policy decisions, environmental impact and local implementation of a project may have significant influence on the final costs and timetable. However, as soon as construction starts, risks should have been calculated upfront and costs and timetable be respected within the risks identified upfront.

DG MOVE, in cooperation with the TEN-T EA have analysed in detail the respect of budget and timetable in the mid term review of the project portfolio[192].

1.3. EU Coordinators and core network corridors

The implementation of the revised TEN-T Strategy is to be monitored using current techniques including expanding the role of the TEN-T Coordinators. The role of the EU Coordinators has proven to be an effective mechanism to address the political sensitivities inherent in cross-border projects as well as provide visible coordination enhancement. The results of these efforts are confirmed by the fact that so far there have been no cross-border project cancellations in the 2007-2013 MAP portfolio.

TEN-T coordinators draw up annual activity reports and have provided the European Commission with advice on progress of projects with a view to funding decisions.In their analysis of the progress of projects, they report on the extent to which progress will be partially or totally negated by the absence of or delays in crucial flanking activity, such as interoperable signalling, operational rules, the necessary rolling stock, the coordinated timing of construction in various MS, the solidity of financial constructions for the projects involved, etc. This facilitates the task for the European Commission when arbitrating between project applications which otherwise would have equal merit.

It is clear that the Commission needs to play a greater role in ensuring that more attention is paid to monitoring and evaluation through developing basic indicators and criteria which will give it a much enhanced ability to compare different projects, and thus significantly improve its ability to be sure ex ante that it has selected the projects which will make the best use of the future funds. Standardised definitions for indicators, including net present value, cost-benefit analysis and internal rate of return should be further developed.

The setting up of corridors will allow to coordinate for the entirety of a main traffic flow such determining factors as capacity, travel time, coordinated project implementation, interoperability, enhanced intermodality and capacity in the intermodal nodes and so forth. This will allow to evaluate and monitor the needs to establish to what extent funding has contributed to the achievement of the TEN-T Guidelines' priorities, to improve interoperability, to give access to outlying areas, to promote multi-modality and, above all, to identify the Community added value of the programme at national and EU level. The TEN-T

[192] It appears that the delays are "reasonable" in light of the above conclusion (before versus after building consent). Cost overruns appeared to be limited in this review. A further review of this Economic Recovery Plan of the TEN-T is foreseen to be conducted in 2011. This regular review of the portfolio is a constant factor based upon the obligatory annual "Action Status Reports" for each proposal.

EA and the regulatory agencies cited below will play an enhanced role in monitoring such progress.

1.4. Inter-institutional coordination

Within the institutional framework, the Commission will enforce the Guidelines in accordance with its role given by the Treaty. It will survey the implementation of the TEN-T, mainly through the new coordination mechanisms and the awarding of funding (for both studies and works). The role of the TEN-T agency will need extending but will continue to focus on the implementation of projects and project monitoring. Its role could be reinforced with regard to the Corridor Approach in which individual projects will be embedded and project pipelines will be prepared. The expertise thus gained will give the grounds for a knowledge based management of the future Programme while placing the Agency at the centre of inter institutional coordination in the area of EU funded transport infrastructure.

Through the annual reporting of the European Coordinators, the European Commission, the European Parliament and the Council are informed about the progress achieved for particular Priority Projects. Furthermore, the yearly Progress Reports and regular reviews such as the MTR contribute to the monitoring of the TEN-T

2. TEN-T Executive Agency - An efficient component to centralised management

Since 2006 the implementation of the TEN-T Programme is under the mandate of the TEN-T Executive Agency[193] and a mandate stretching for a period of nine years from November 2006 to December 2015[194] has been decided. The main tasks of the Agency are specified as follows: (a) provision of assistance to EC during the programming and selection of projects of common interest and their monitoring, (b) coordination with other financial instruments also engaged in the provision of support to projects of common interest in the transport sector, such as EIB, Structural Funds and Cohesion Fund, (c) provision of technical assistance to project promoters regarding financial engineering, and (d) the administration of the budget for the TEN-T Programme.[195]

The main objective in creating the Agency was to increase the efficiency and improve the management of the TEN-T Programme through a better follow-up of the preparation and subsequent implementation of projects selected under the TEN-T calls for proposals. Assisted by the Agency, the Commission remains responsible for the annual work programmes, the selection of the projects and for adopting the project funding Decisions.

Since its inception, the Agency has focused on measures to familiarise the beneficiaries with the new administrative and reporting requirements, as well as to streamline and simplify, to the greatest extent possible, various procedures. These measures include developing a series of models and guidelines for the preparation of various documents, reports and payments;

[193] Council Regulation 58/2003 of 19 December 2002, OJ L 11/1

[194] See Commission Decision of 26 October 2006 establishing the Trans-European Transport Network Executive Agency pursuant to Council Regulation (EC) No 58/2003 (2007/60/EC) (OJ J 32/88), amended by Decision 2008/593/EC of 11 July 2008 (OJ L 190/35).

[195] The Agency's tasks are further specified in annual work programmes. Three work programmes have so far been published: (1) 2008 Work Programme—Commission Decision C(2009)1394 of 6 March 2009 approving the 2008 work programme of the TEN-T EA; (2) 2009 Work Programme—Commission Decision C(2009)7027 of 23 September 2009 approving the 2009 work programme of the TEN-T EA; (3) 2010 Work Programme—Commission Decision C(2010)3277 of 7 June 2010 approving the 2010 work programme of the TEN-T EA

hosting regular workshops that attract a large population of stakeholders and address common issues relating to the technical and financial aspects of project management; as well as establishing improvements to the call for proposal texts and guidelines to applicants. Improvements in the communication mechanisms, regular contacts and systematic exchange of information have been conducive to a successful trust-building strategy with beneficiaries. As a direct result, response times applicable to all administrative aspects of project management have been dramatically reduced. At the same time, visibility of EU funding as well as institutional accountability have significantly increased. Expertise provided in areas such as public procurement and environmental issues has improved the alignment of the projects implementation with EU law. Many of these issues are in line with the objectives of the creation of the Agency following the recommendations of the European Court of Auditors[196] and the mid-term review of the previous Multi-Annual Indicative Programme[197].

In the framework of its mandate the Agency is responsible for the collection, analysis and transmission to the Commission of all information required by the Commission for the implementation of the trans-European transport network, in particular carrying out studies and evaluations such as annual or mid-term evaluation of the implementation of the TEN-T programmes including necessary follow-up measures after prior agreement with the Commission. It is also required to prepare recommendations to the Commission on the implementation of the programme and its future development. It is in this context that the Agency has carried out in 2010 the review of the individual MAP projects in close co-operation with DG MOVE.

The decision to centralise the management of the TEN-T Programme through the creation of the TEN-T Executive Agency has already proven its worth in delivering a full lifecycle grant management process from Calls for Proposals through the adoption of the decision and a tightly managed payments procedure. The structured, transparent and comprehensive procedures adopted by the Agency have facilitated the targeting of TEN-T funding to EU transport policy priorities such as the Priority Projects, traffic management systems, environmentally-friendly initiatives and modes as well as cross border projects. This was acknowledged by the Court of Auditors in a recent report on the effectiveness of EU railway investment policy.[198] The knowledge and expertise gained by this dedicated structure in centralised management, have significantly contributed to the better use of TEN-T funds and ultimately to the maximisation of the TEN-T Programme efficiency.

3. Sector specific Agencies

In the following sections the role of the European Railway Agency (ERA), the European Maritime Safety Agency (EMSA) and the European Aviation Safety Agency (EASA) is going to be discussed.

3.1. European Railway Agency (ERA)

The construction of a safe, modern integrated railway network is one of the EU's major priorities. Railways must become more competitive and offer high-quality, end-to-end services without being restricted by national borders.

[196] Special Report N° 6/2005 on the TEN-T of 21/4/2006 OJ C/94/1

[197] Technical Assistance Consultancy Contract for the MIP Revision, volume I: Main Findings and Recommendations, Issue 4: 18 December 2003, EVAMONTEN-T

[198] Special Report N° 8/2010 'Improving transport performance on Trans-European rail axis : Have EU rail infrastructure investments been effective?', Luxembourg, European Court of Auditors

The European Railway Agency was set up to help create this integrated railway area by reinforcing safety and interoperability. The Agency also acts as the system authority for the European Rail Traffic Management System (ERTMS) project, which has been set up to create unique signalling standards throughout Europe.

The main task is to prepare new and updated legislative acts for adoption by the Commission, after a positive opinion from the Committee of Member States, and to give other technical support to the Commission. The activities carried out by the Agency aim at:

- Developing a common approach to safety, safety regulation and accident investigation, in particular by harmonization of safety assessment methods, safety targets and safety certification conditions
- Improving the interoperability of the European rail system by developing the conditions for the free and uninterrupted movement of trains through technical and operational harmonization, including conditions for mutual acceptance of railway vehicles
- Facilitating the exchange of information within the railway sector by networking with national bodies, providing registers and databases and giving guidance on the implementation of the regulatory framework

It is the role of the transverse functions of the Agency (Administration, etc.) to support and facilitate the operational functions in their achievement of the organization's mission whilst at the same time maintaining compliance with the Community regulation and internal control requirements.

The Mission of the Agency in the field of interoperability is to support on technical matters the implementation of the European Community legislation on Railways. In particular, the main tasks of the Agency in terms of interoperability are the following:

- Produce proposals for Technical Specifications for Interoperability (TSIs) related to subsystems like Infrastructure, Energy, Rolling Stock, Telematic Applications and Operation in accordance with mandates given by the Commission
- Coordination of TSIs related activities with the standardisation bodies, the notified bodies and NSAs
- Setting up and maintenance of registers which contain information related to interoperability and insure transparency in railway field
- Activities related to vocational competences on common uniform criteria and the assessment of staff involved in the operation and the maintenance
- Decision on National vehicle registers
- Amendment of Wagon TSIStudy on extension of TSI scopeStudy on 1520/1524 railway systemDraft TSIs on Energy, Infrastructure, Locomotive and passenger carriages, Telematic applicationsRevise TSIs on Operational and Management, Rolling stock – freight wagons, NoiseRecommendation on modules for the conformity assessmentRecommendations on registers (European register of authorised vehicles, Registers of infrastructure)

3.2. European Maritime Safety Agency (EMSA)

The European Maritime Safety Agency, created in the aftermath of the *Erika* disaster, will contribute to the enhancement of the overall maritime safety system in the Community. Its goals are, through its tasks, to reduce the risk of maritime accidents, marine pollution from ships and the loss of human lives at sea.

In general terms, the Agency will provide technical and scientific advice to the Commission in the field of maritime safety and prevention of pollution by ships in the continuous process of updating and developing new legislation, monitoring its implementation and evaluating the effectiveness of the measures in place.

Some of the key areas where the Agency is active, are: strengthening of the Port State Control regime; auditing of the Community-recognised classification societies; development of a common methodology for the investigation of maritime accidents and; the establishment of a Community vessel traffic monitoring and information system.

The Agency works closely with Member States. It responds to their specific requests in relation to the practical implementation of Community legislation, such as the recently adopted directive on traffic monitoring, and organises appropriate training activities. The Agency facilitates co-operation between the Member States and disseminates best practices in the Community. The Agency also assists the accession countries in the implementation of Community legislation on maritime safety and the prevention of pollution by ships.

The Agency contributes to the process of evaluating the effectiveness of Community legislation by providing the Commission and the Member states with objective, reliable and comparable information and data on maritime safety and on ship pollution.

3.3. European Aviation Safety Agency (EASA)

The European Aviation Safety Agency promotes the highest common standards of safety and environmental protection in civil aviation in Europe and worldwide. It is the centrepiece of a new regulatory system which provides for a single European market in the aviation industry.

The agency's responsibilities include:

- expert advice to the EU for drafting new legislation;
- implementing and monitoring safety rules, including inspections in the Member States;
- type-certification of aircraft and components, as well as the approval of organisations involved in the design, manufacture and maintenance of aeronautical products;
- authorization of third-country (non EU) operators;
- safety analysis and research.

ANNEX VI

Socio/Economic data including a description and analysis of the modelling work for the TEN-T Guidelines

The following is an analysis done by the TENConnectII consortium on data that emanates from the TRANSTOOLS model. Also included are extracts from OECD report[1] on the Impact of Transport Infrastructure Investment on Regional Development[199] and the data on job creation compliments that given in the IA Report.

TENconnect II data are the outcome of a long series of modelling activities undertaken by DG MOVE that are described in part 1 of this document. The data received support in general the logical reasoning of the IA report but need to be qualified for a number of reasons detailed below (in Part 2).

1. SUMMARY OF STUDIES AND MODELLING ACTIVITIES FOR THE TEN-T GUIDELINES

1.1. TRANS-TOOLS

TRANS-TOOLS is a European Transport Network model covering all modes of transport for passenger and freight. The purpose of the model is to determine equilibrium traffic flows and to assess the level of congestion, accessibility and the impact of transport infrastructure. TRANS-TOOLS estimates equilibrium transport costs (travel time and monetary travel costs) as a function of policy measures and thereby simulates impacts on demand for transport services by mode, on network links and corridors, for origin-destination pairs, commodity type, on emissions and other externalities, regional GDP and welfare. TRANS-TOOLS estimates transport demand for each NUTS 3 zone and distributes it on the networks of the various modes available. The main steps of the approach include the estimation of: the trip generation and the combined mode and destination choice as well as the route choice.

The trip generation represents the transport demand that each zone generates and depends on the socio-economic characteristics of each zone, as well as on the economic and industrial structure. The mode and destination choice reflects the demand for transport between the origin zone and all possible destination zones and by all available modes. This model depends on trade and travel patterns, as well as on the availability, costs of transport between the zones and the modes. The latter reflect relative costs differences that may be due to road pricing schemes as well as speed limits and capacity constraints in the network. The route assignment gives within each mode, the links of the network where transport demand will be distributed.

TRANS-TOOLS has been constantly further developed in cooperation with DG TREN, then DG MOVE. The version used for the purpose of the TEN-T Impact Assessment Report is TRANS-TOOLS version 2. It has focused on improving the model along several dimensions.

[199] Impact of Transport Infrastructure Investment on Regional Development, OECD report, 2002: http://www.internationaltransportforum.org/Pub/pdf/02RTRinvestE.pdf

The improvements can be decomposed into two parts; data improvements and structural model improvements.

Data improvements:

Improve the geographical coverage of the TRANS-TOOLS model, by

• Disaggregating of the zone system in some new Member States and neighbouring countries

Updating and improve trip matrices, by

• Compiling more traffic counts in order to improve the car matrix estimation by mean of MPME (Multiple Path Matrix Estimation)

• Adding more traffic counts for air traffic by using the leg-database in EUROSTAT for EU27 and compiling additional counts for the remaining countries, thus enabling an MPME matrix fitting.

• Re-estimating rail matrices based on national statistics

• Transforming from Origin - Destination to a Generation - Attraction representation

Update and improve the networks within the core area, in order to:

• Reflect networks in year 2005, rather than 2000

• Upgrade networks in new Member States as well as include a more detailed network structure in the core modelling area

• Selected extensions needed to enlarge the coverage area

Model improvements

Update a number of the sub-models of the TRANS-TOOLS model, thus

• Improving and extending CGEurope (Spatial Computable Generalized Equilibrium model by Bröcker and Korzhenevych) in the version used in TRANS-TOOLS

• Replacing the existing trade model with the above mentioned improved version of CGEurope

• Replacing the existing passenger demand model

• Improving the existing assignment model, especially for air traffic.

The studies financed by DG MOVE in order to help plan its transport policy used TRANS-TOOLS as the main model to help designing the European Transport Infrastructure. With the recent improvements, TRANS-TOOLS reacts in the right way to changes in infrastructure, transport cost and legal framework, so that comparing different scenarios in a relative way is possible with sufficient reliability, however the model still does not perform as it would be needed in terms of absolute figures and spatial resolution. Against this background the development of TRANS-TOOLS version 3 has already started.

1.2. TENconnect I[200]

As a first supporting step in the preparation of the current TEN-T policy review, the study was to deal with many aspects of the TEN-T, from analysis of the existing (2005) traffic flows, traffic forecasts for 2020 and 2030, and identification of major axes taking into account

[200] The duration of the study was from 01.01.2008 to 30.11.2009. The study is available here: http://ec.europa.eu/transport/wcm/infrastructure/studies/2009_12_ten_connect_final_report.pdf

cohesion, internal market and access to neighbouring countries, however based on assumptions made by the contractor. Both passenger and freight transport were considered. The forecasts were carried out for a "business as usual" and a "sustainable economic development" scenario. A bottleneck analysis was carried out, with the aim of identifying improvement projects of common interest. Furthermore, the study included an investigation of transport costs between South and East Asia and Europe.

The study included also a few substantial improvements of TRANSTOOLS 2 (updating to 2005 as base year, increasing the number of traffic zones, extension of number of transport modes and trip purposes, improving of passenger and freight matrices, including a new trade model based on an improved economic model and considering national differences in mobility and values of time).

The results showed clearly that the model was not yet mature as a basis for decision-making at TEN-T level.

1.3. TENconnect II[201]

The detailed resolution of the model was insufficient and considerable deviations from real traffic flows were experienced. Therefore, the selection of scenarios within TENconnect 1 did not reflect the needs of the impact assessment for the current TEN-T policy review.

Based on this situation, a continuation of the study seemed to be necessary, in order to improve the spatial resolution and accuracy of TRANSTOOLS by a re-calibration, to calculate traffic flows for 2030 to support the routing of the Core Network links, as postulated in the methodology, and to deliver global figures characterising the individual scenarios for the impact assessment.

Actually, these goals were achieved only partly. A considerable improvement of the accuracy was reached on average (deviation from real count values in the road network went down from 35 to 19 %), however with deviations even considerably higher at the level of individual links, the traffic flows were still not reliable enough to form the base of decisions on the Core Network.

At global level, the accuracy of the results is much closer to what would be needed; however, against the order of differences between the individual scenarios, they might not display sufficient significance and transparency.

1.4. Recent developments in TENconnect II – recalibrations – coordination with the Impact Assessment Team

The re-calibration of TRANS-TOOLS v.2 took place during the first weeks of 2011. It was delayed due to late supply or even lack of supply of data from a number of Member States, which also affected the quality of the results. While the results in many cases corresponded much better with real traffic patterns, there were still certain links which showed traffic flows which were completely wrong. After some minor amendments, this problem could be defused, but still there are considerable deviations between calculation and reality.

[201] The duration of the study has been from 22 December 2009 to end of May 2011. The Final report will be made available on the website of DG MOVE.

With these inaccuracies in the base year 2005 calculation, even greater deviations may be expected for the traffic forecasts, so that the results cannot be used for the identification of an optimal routing of Core Network links. However, they give sufficient indication regarding the impacts of the different scenarios on economy, social life and environment to compare them on a relative but not absolute base. Hence, the modified model has been applied for assessing three different options for the future development of the Trans European Network, namely Implementation of the present priority projects up to 2030, implementation of an idealised comprehensive network up to 2030 and development of an improved core network on top of the proposed comprehensive network. The following gives details of the recalibration.

1.4.1 Recalibration

The analysis of the 2005 results of the TRANS-TOOLS model has primarily focused on road and rail link loads. In a number of cases the link loads were far from observed traffic levels, and in order to improve this both data and model have been improved.

New 2005 data have been collected for all the 1441 NUTS3 zones in the model. In many cases data were improved because EUROSTAT in particular had new data available for population and GDP per NUTS3 zones in many countries. Most effort has been made in order to improve the network and the matrices for passenger and freight transport.

Some elements in the passenger matrices, particular for zones comprising an island, showed too much traffic leaving and entering these zones. Therefore, these matrix elements were adjusted in order to avoid inexplicable high loads on ferry lines connecting these islands. The matrices were also checked for other large elements, and if found unreasonable these were also adjusted.

The freight transport module of the TRANS-TOOLS model was exchanged with a new freight module stemming from the WORLDNET project. Freight matrices in this project were evaluated to be of a higher quality, thus providing better results, than the former freight module. The drawback was that the WORLDNET model could not be integrated in the TRANS-TOOLS model, thus results were communicated between the two models, because the Level-of Service files were created in TRANS-TOOLS, the freight demand and modal spilt was created in WORLDNET and the assignment of freight transport to the road and rail network were carried out in TRANS-TOOLS. This obviously made the use of the model slower and more complicated, introducing new possibilities for errors.

The networks for road, rail and inland waterways form the basis for the Level-of Service files for passenger and freight transport and these files are used in the demand and modal split models. Therefore, the networks should be as accurate as possible in order to obtain reasonable time and cost data for these calculations. The networks are also the basis for the assignment of road and rail transport, and here it is also of major importance that the networks are as accurate as possible.

Analysis of the results indicated that particular the road network included too many links. An assignment showed that more than 8000 links were not used. Therefore links with no traffic and not part of any main road system were removed. Further it showed that speed applied on main roads and secondary roads had too little difference, which meant that traffic loads on secondary roads were too high compared to the level on the main road system. Therefore, design speeds on the secondary road network were lowered. It was also necessary to introduce a possibility of making certain roads, particularly in the mountainous regions impassable for trucks.

However, analysis of the results also showed that assignment needed to be improved. The assignment method included an error term which made the choice of route stochastic. However, the stochastic choice was too wide, and therefore it was decided to reduce the error term considerably. This gave much more likely route choices for long distance international traffic.

Assignment of traffic to the road network depends on the speed and the flow. Therefore, as flows increase the speed decreases. In urban areas, however, the levels of traffic are too high for the number of roads included. Therefore, it was seen that traffic flows often switched between two roads. In order to avoid this, and thus increase convergence of the assignment model it was decided to abandon capacity constraints in the urban areas.

In the former TRANS-TOOLS model iterations in route choice were determined based on a run-time of 36 hours. Too few iterations could be accomplished for route choice in the road network. Therefore, an effort was made to create faster convergence for less computing time. This has been achieved using an intelligent assignment procedure. The objective has been to improve convergence by increasing number of iterations. For road the number of iterations has increased from 20 to 500 and convergence has improved very much. More iterations in rail passenger and rail freight have also improved link load convergence (iterations increase from 200 to 500), but not as much as for road.

2. ANALYSIS OF TENCONNECT II RESULTS

2.1. Relevance of the TENconnect II results to the Impact Assessment Report evaluation of options

It needs to be made clear that **the results of the TENconnect II study cannot be directly compared with the analysis of impacts contained in the TEN-T Impact Assessment** for a number of reasons. In a first place, the work on TENconnect II started before the work of drafting the final version of the TEN-T Guidelines and the related Impact Assessment Report: Secondly, the primary objective of the TENconnect II study was to serve as a tool to help defining the planning methodology as requested by the Expert Group 1.

TENconnect II study has therefore focused mainly on calibrating traffic flows for the base year traffic analysis and on calculating traffic forecasts, to identify methodically the Core Network shape and an idealised Comprehensive Network with the highest available standards that copes best with these traffic flows.

Economic, environmental and social impacts of the three scenarios were calculated. In this respect, TENconnect II **only simulates the impacts of planning scenarios** which correspond to the Impact Assessment planning scenario A1 (BAU), A4 (Core Network) and A5 (Dense/Comprehensive Network) respectively, **in the absence of an implementation dimension**. The impacts of the planning scenario A3 (Essen II) was not taken into account since it could not integrate into the model's parameters the unsure dimension of the selection of Priority Projects by the Member States in a continuing bottom-up approach to planning of the TEN-T.

Finally, it should be noted that the TENconnect simulation was not intended to take into account the implementation dimension of the proposed TEN-T Guideline policy, not least due to the fact that mathematic models cannot readily translate in figures for instance the role of a European Coordinator, the level of Member States coordination or a Corridor agreement on train drivers licensing or signalling systems on the successful implementation of ITS on the TEN-T.

As a consequence, the results of the TENconnect II simulation of the impacts of the TEN-T (planning) scenarios cannot be directly compared with the policy Options 0, 1 and 2 studied in the Impact Assessment. With this caveat in mind, the data generated by TENconnect could however be used to analyse the merits of a coordinated European approach to planning the network, as retained in policy Option 2 in the Impact Assessment, as opposed to the current, primarily bottom-up approach, that characterises both Option 0 (BAU) and Option 1. To this end and taking into account the limits of the model calculations in terms of absolute values, the results of the TENconnect II simulation of the various economic, social and environmental impacts of the CORE versus the BAU planning scenarios have been submitted to a "reality check"/ sensitivity analysis of the underlying assumptions of the model and, where available, the results of other relevant studies have been used to support this analysis.

2.2. Preliminary analysis

A high degree of uncertainty is surrounding projections over such a long time horizon, especially for such a complex concept as the EU's transport system. It is due to the high numbers of factors involved in the calculation; the error margins related to the assumptions behind each of the factors (oil price, expected growth…); the great difficulty, if not the impossibility to integrate some factors in the models (such as congestion around urban areas); the magnitude of factors exerting a decisive influence on the modelling results (eg number of lanes, operational rules, interoperability systems, borders and customs controls, technological progress…) ; or the black swans (major disruptive events impossible to predict, for instance such as the eruption of the Icelandic Volcano or the impact of the Japanese Earthquake on the European economy). Therefore, policy choices regarding transport infrastructure cannot rely solely on modelling results.

As an example, TENconnect II is unable to adequately integrate congestion in the input of the modelling. To be able to properly model congestion, for which most parts take place in and around urban areas, more disaggregated models would be needed. One of the purposes of the TEN-T guidelines is to solve fragmentation by providing a network that completes the missing-links. Therefore, the Core Network as integrated as an input in the modelling completes the road and the rail network in the Union according to the given methodology. As a consequence of the inability to integrate congestion, the models assume that motorways allow a constant speed of 120 km/h all over Europe (for passenger cars), making it by far the most efficient mode and therefore attracting new traffic and fostering a modal shift from rail to road.

This is of course contradicting reality: motorways around major economic centres of Europe are already congested, with low average speed and new motorways will not be built in those areas. Logistics operators are looking for available capacities in other modes to solve this problem. In order to take congestion into account, the only possibility was to reduce the average speed in major economic region to 100 km/h, which brought better results but did not represent much reality.

For the purpose of the study, the option with the idealised comprehensive network a speed of 120 kph is used on all improved non-urban roads. Also no capacity restraints are used. This obviously provides a highly efficient road network and this option also gives the highest road share of all. The more balanced core network development and has a speed of 100kph and hence provides a lesser road share than the idealised comprehensive option, but a higher share than the priority projects concluded.

It has to be borne in mind that infrastructure development is a limited factor when calculating transport impacts. Infrastructure has a clear impact on territorial cohesion and the economy (see below) but a much more limited impact on environmental aspects. As demonstrated by the configuration of the proposed policy options of the Impact Assessment to the Transport White Paper, behavioural changes (pricing), vehicle technologies and standards (for emissions and safety) need to be combined with infrastructure planning policy in order to maximise the environmental impact of transport policy.

The sections below analyse the data received from the TENconnect II study, by explaining them and undertaking a sensitivity analysis.

The data is given for three planning scenarios, as described in the following table.

Scenario	Year	Description
PP (BAU)	2030	Priority Project scenario, includes already decided projects and is essentially the Business As Usual.
CORE	2030	Core network scenario, includes a mixture between COMP and PP but with reduced speed on the core network to represent congestion effects.
COMP	2030	Idealised Comprehensive scenario, includes development of the whole TEN-T.

Table 1: Description of scenarios.

2.3. Analysis of economic impacts

2.3.1. General Economic impacts

Economic growth & Consumer surplus

Economic Growth and consumer surplus are closely related in the TENconnect II results. The TENconnect results give the following outcome regarding consumer surplus:

		Scenario	
Impact type (billion euros)	**Type**	CORE30 vs BAU30	COMP30 vs BAU30
Consumer surplus - passenger	Zone internal	44.8	130.7
Consumer surplus – freight	Zone internal	0.3	0.9
Consumer surplus - passenger	Zone external	25.5	94.1
Consumer surplus – freight	Zone external	7.1	18.4
Subtotal – direct benefits		**77.7**	**243.8**
Subtotal – 2.order GDP effects		**30.7**	**75.6**
Total		**108.4**	**319.4**

Table 2: Consumer surplus impact in billion Euro

Compared to the BAU, the Core Network brings by 2030 € 77,7 Bln of direct benefits to the European Consumer. The Comprehensive Network option triples this amount (including second order GDP effects adds some 40% benefit to the core and 31% benefit to the Comprehensive networks).

However, these results need to be qualified on several grounds. First of all, the same calculations applied to a Core Network for which the speed was not reduced around major economic centres (in order to take into account congestion, see above) gives a direct surplus of € 114,5 Bln. It shows that Consumer surplus in this model is highly dependent on speed traffic on the road.

Consumer surplus is calculated from the saving in time/increased road traffic caused by the network. It is therefore related to the numbers of billions of passenger car/Kms calculated by the model. This means in the end that each car/Km generated by the network gives a benefit to the European economy. The benefits are calculated by distinguishing between business travel and various categories of leisure travel activities, hence acknowledge the difference in added value to the society. The Economic growth (measured in induced GDP Growth) is also related to traffic growth.

The map below shows the growth induced by the Core Network in 2030 compared to the growth of the Business-as-usual scenario (with the completion of the current Priority Projects) at the level of regions. It therefore gives an idea of the impact on territorial cohesion.

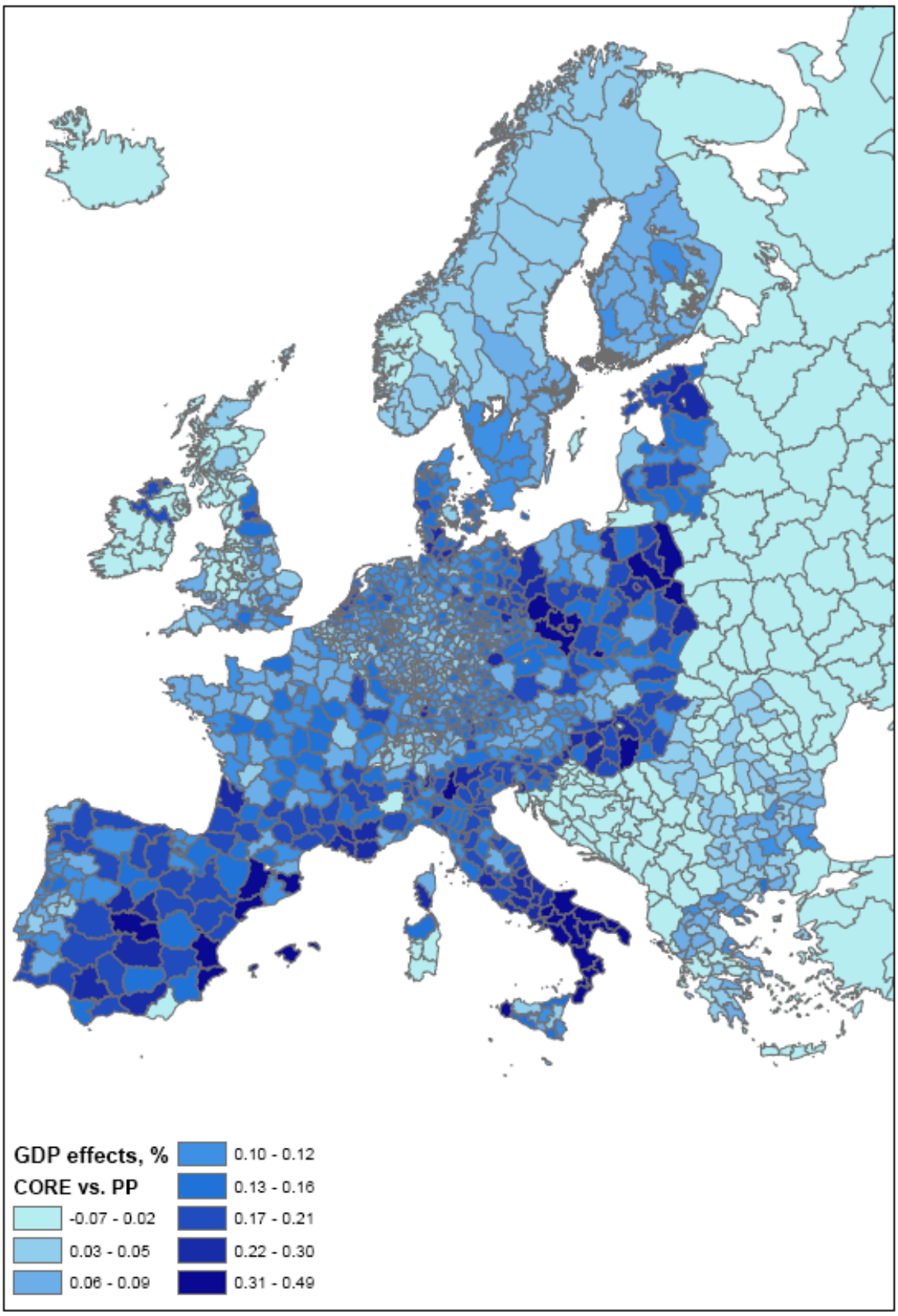


Figure 1: GDP effects

This map shows the positive benefits of the Core Network for regions situated along the eastern and southern shores of the EU. Regions that are already well connected (or that should be thanks to the completion of the current Priority Projects) do not gain much from the Core

Network, unlike regions that were not connected because of the political choices made when selecting the Priority Projects; this seems logical. However, while the general results seem coherent, results are sometimes incoherent for a limited number of regions. The same reasoning applies to the accessibility map below:

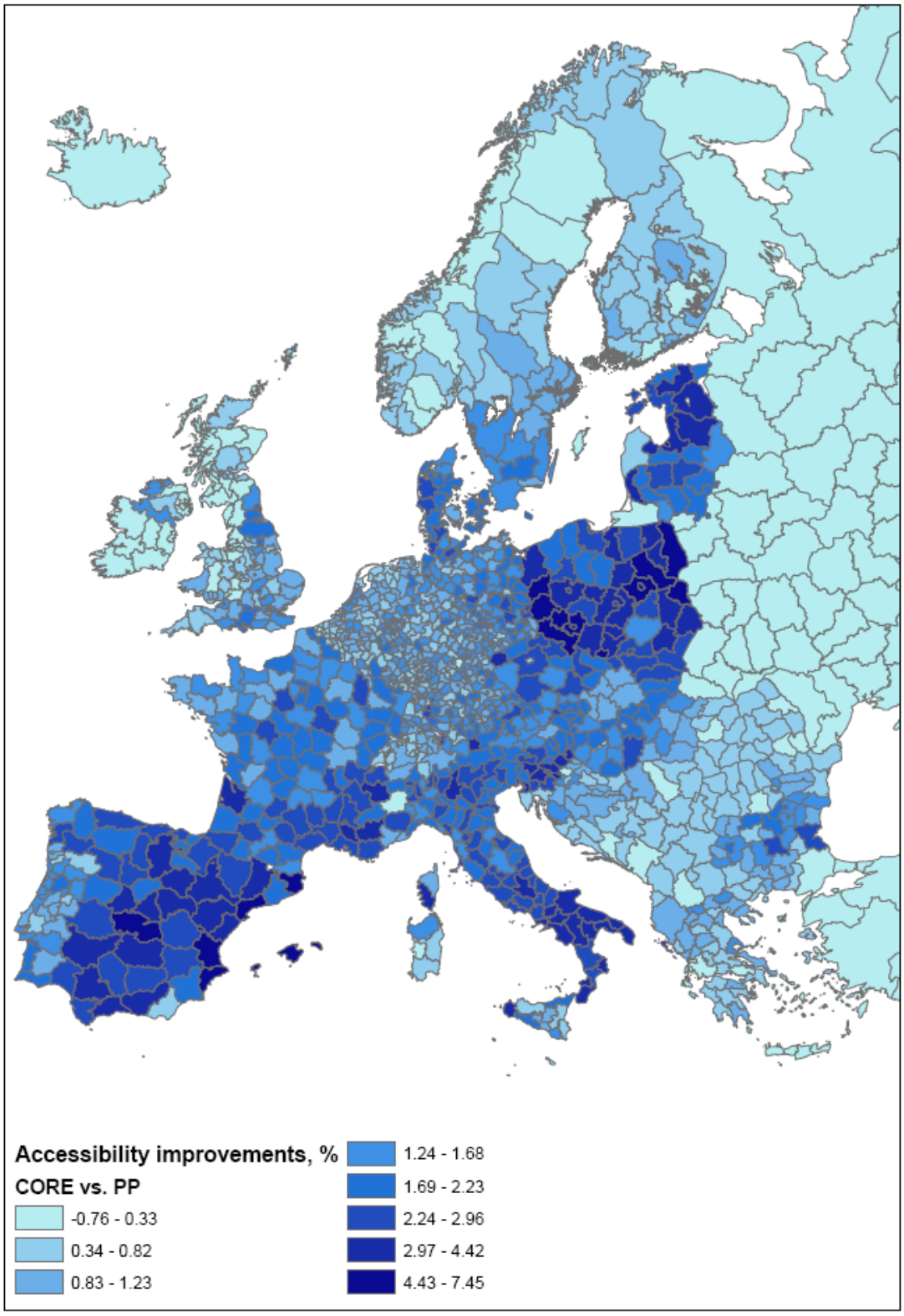


Figure 2: Comparison of BAU with the proposed CORE network for Accessibility

- **TENconnect II results**.

Impact type	Type	BAU30	CORE30	COMP30
Travel time car driver (billion hours)	Zone external	30.3	29.9	28.6
	Zone internal	39.0	37.6	34.5
Travel time car passenger (billion hours)	Zone external	18.1	17.8	17.4
	Zone internal	23.8	23.0	21.3
Travel time rail pass (billion hours)	Zone external	4.8	4.7	4.4
	Zone internal	2.2	2.2	2.0

Table 3: Travel time impacts (Figures are an estimate for the whole traffic in Europe, not only for the vehicles running on the TEN-T network defined, at a 2030 horizon.)

It is important to be aware that the passenger kilometres represented in Table 2 represent an estimate of total road traffic carried out by private cars. This include in addition to the assigned traffic also traffic on smaller roads (that is not part of the network), pre-loaded traffic, and connector traffic. Although these kilometres are not part of the CORE network in any sense they should be included when measuring total impacts

TENconnect II simulation shows that, in a Core Network scenario, European car drivers would save 0.4 billion hours when driving outside their region (30.3 – 29.9). In the same scenario, rail passengers would save 0.1 billion hours. In relative terms, the results indicate a 1.32% increase in time saving for car drivers and 2.08% time saving for rail passengers as opposed to a BAU scenario.

- **Interpretation/Qualifications**

Although these figures show the efficiency of the Core Network reflected in a reduced time spent in vehicles, the results are disputable (see preliminary analysis). In fact, the model does not calculate congestion (time lost in traffic jams) since the parameters are based on free traffic flows in the absence of capacity constraints (no information of the number of lanes for instance). It calculates the time saved in each mode by going from a point A to a point B if a new infrastructure is built, showing the increase potential efficiency of the network for transport operators, but without taking into account congestion parameters. Nor does it take into account possible co-modal travel options.

As a general comment, the TENconnect study shows the positive economic impact of the Core Network planning scenario compared to the Business-as-Usual. However, these results are based on a limited number of parameters (saving in time/increased road traffic) and do not take into account other parameters such as road congestion.

2.3.2. Transport as a business

Volumes & Modal split

- **TENconnect II results**:

		BAU30	**CORE30**	COMP30
Passenger car vehicle KM (billion PKM)	Zone external	2,779	**2,814**	2,892
	Zone internal	3,034	**3,060**	3,086
Total passenger car PKM		5,813	5,874	5,978
Passenger rail KM (billion PKM)	Zone external	404	**398**	394
	Zone internal	119	**117**	115
Air PKM (billion PKM)	All	1,158	**1,137**	1,118
Freight truck VKM (billion HGV VKM)	All	266	**272**	277
Freight rail TONKM (billion TONKM)	All	690	**649**	638

Table 4: Traffic flows impacts

Those figures show a slight increase of road traffic and a limited decrease of rail and air traffic.

- **Interpretation/Qualifications**

The results do not seem logical, since most of the road network already exists while a large share of the European rail network remains to be built.

After discussion with the modelling team, it was made clear that these results are once more related to the absence of congestion on the road network. Another issue that drives the passenger car demand includes increased income growth, which will increase the car ownership propensity and thereby car driving (especially outside the core where the saturation level is currently lower).

Much has been written on the economic relevance of the value of time. Whereas, it is generally accepted that time saved for a truck driver or a travelling salesman, could well translate into money saved, there is a question mark over how relevant time saving is for the travelling public. The OECD report makes the following point.

"The principle underlying the assessment of benefits associated with travel time is that transport system users' economic decisions regarding the location of their homes, businesses, mode choice or route followed to get to a specific destination and behaviour in traffic, reflect their valuation of travel time. In other words, users' willingness to pay in order to save time or the amount they would accept in compensation for losing time could be inferred from their behaviour.

Time savings are benefits resulting from an improvement in the efficiency of the transport system (shortened routes, increased traffic fluidity, better access to connection services, etc.). For freight carriers, time savings will take the form of money savings given that reductions in travel time reduce hourly costs of transport services (*e.g.* drivers' wages, insurance, etc.) for shippers. For consignees, travel time savings may be converted into reduced inventory costs. Some analysts argue that the common practice in CBA of valuing commercial vehicle time savings on the basis on drivers' wage produces estimates for value of travel time that are too low, thus capturing only part of the true potential cost savings of freight carriers. The concern is that costs of capital equipment, benefits from accrued reliability and reduced delivery time of shipments are not explicitly accounted for. On the other hand, for passenger transportation, travel time savings normally bring no direct monetary reward."

All IAs now include the HEATCO[202] values of time and for this IA, some 70 billion out of 77 billion Euro economic gain for the core network is down to passenger travel time savings.

2.4. Analysis of social impacts

2.4.1. Employment and Jobs

Within the TENconnect methodology, employment and jobs effects are integrated in the economic/GDP growth calculations.

The OECD report assessed the cost to employment ratio for various high value projects and gave the following indicators. The report was written in 2002 and therefore the values should be seen as giving a general correlation and not an accurate representation of employment levels over the period to 2030.

- **USA example**

Federal-aid construction expenditures are USD 1 billion. With state and local matching funds set at 20%, combined programme expenditures total USD 1.25 billion. Programme composition by improvement type as a percentage of total cost is:

 New route construction: 9.34%
 Relocation: 2.03%
 Major widening: 6.05%
 Minor widening: 2.20%
 Restoration and rehabilitation: 11.44%
 Resurfacing: 12.51%
 New bridge construction: 7.34%
 Bridge replacement: 9.80%
 Bridge rehabilitation: 3.36%
 Minor bridge rehabilitation: 2.00%
 Safety/Traffic/TSM: 9.57%
 Environment related: 4.32%
 Reconstruction (with added capacity): 13.04%
 Reconstruction (with no added capacity): 7.00%

Given these assumptions about the level and composition of programme spending, first-round direct employment income is estimated at USD 572.7 million. First-round direct employment in construction and materials supplying industries is 19 672.8 person-years. Of this total, 12 453.5 person-years occur

[202] Developing Harmonised European Approaches for Transport Costing and Project Assessment—Sixth Framework project- http://heatco.ier.uni-stuttgart.de/

in the construction sector and 7 219.3 person-years occur in materials supplying industries. In addition to substantial numbers of jobs in the construction sector, first-round employment effects are particularly large in Transportation and warehousing, Business and professional services, Stone and clay products, Petroleum refining, Wholesale trade, Fabricated structural metal products, and Non-metallic minerals mining.

A second round of employment and income effects occurs in the production sector in response to the demand for additional inputs required by construction materials supplying industries. An additional 6 851.2 person-years of indirect employment benefits in the production sector are generated, yielding employment incomes totalling USD 212.9 million. These indirect employment effects are distributed across a much wider array of industry sectors than the direct effects. In addition to employment gains in Business services, Transportation and warehousing, and Wholesale trade, relatively large numbers of jobs are also observed in Restaurants and amusements, Primary iron and steel manufacturing, Finance, insurance and real estate, Automotive repair services, Machinery and equipment, Crude petroleum and natural Gas, Chemicals, and Rubber products. Overall, the dollar value of first- and second-round goods and services produced due to highway construction expenditures is USD 2.93 billion. This implies a direct and indirect spending multiplier of 2.34. When direct and indirect employment incomes are spent, a third round of employment and income benefits occurs. This is termed "induced" employment and reflects producers' response to an increase in the demand for all goods and services. The total number of person-years of employment generated by this additional spending is 21 052.38. Third-round employment income generated is estimated at USD 527.5 million.

The largest employment gains occur in the service sector, including Wholesale and retail trade, Business services, Health services, Restaurants and amusements, Educational and social services, Finance, insurance and real estate, and Communications. However, large induced employment effects are also observed in Textiles and apparel, Construction, Agriculture, forestry and fisheries, Food and kindred products, Printing and publishing, Electric equipment and electronic components, Motor vehicles and parts, Paper and allied products, and Rubber products.

Total employment income due to first-, second- and third-round (*a.k.a.* direct, indirect and induced) effects of highway construction spending is USD 1.313 billion. The total number of person-years of employment supported by Federal-aid Highway programme expenditures of USD 1 billion and total highway project expenditures of USD 1.25 billion, is 47 576.4. The dollar value of goods and services generated across all sectors of the economy is USD 6.097 billion, implying a spending multiplier associated with highway capital investment of about 4.77.

Of course, the magnitude and incidence of income and employment estimates will vary with the level of programme spending, the amount of state and local matching funds, and programme composition, since different types of capital improvements have different labour and materials intensities. These estimates are provided to illustrate the order of magnitude of employment impacts due to highway capital improvement expenditures.

- In comparison to the US studies, a similar exercise in France gave the following:

Direct and indirect employment effects created by spending of FRF 1 000 million excluding tax (at 1995 prices) on major infrastructural works (motorways):

Direct jobs:	
-jobs on site and at head office	1210 job years
Indirect jobs:	
-jobs linked to manufacture of supplies	660 job years
-jobs upstream of the site	570 job years
Revenue effect	800 job years

Total 3240 job years

Comparing the results of the two approaches.

For EUR 1 billion (FRF 6.56 billion or USD 1.11 billiob-at 2002 prices), the number of jobs affected gives:

	United States	France
Direct jobs	11 059	7 940
Indirect jobs	12 493	8 070
Induced jobs	18 694	5 250
Total	42 246	21 260

So, the ratio of direct and indirect employment compared to cost is 42246/billion Euro in the USA and 21260/billion in France.

With the projections for the annual cost of the TEN-T given as ranging from € 21.4 billion for BAU/Option 0, through € 28.6 billion for the CORE and € 30.7 billion, based on the more conservative French data, the annual job creation would vary from 455000 for BAU, through 608000 for the CORE to 653000 for the COMP.

	Investments needs estimates by 2020[203]	Job creation in worker years estimates by 2020[204]
Option 0	€ 150 billions	3.2 million
Option 1	€ 200	4.3 million
Option 2	€ 215	4.6 million

Given that the build programme would last from 2013 until 2030, i.e. for a total period of 17 years, then the expected job creation could be as high as:

BAU=7.74 million worker years
CORE=10.3 million worker years
COMP=11.1 million worker years

[203] Estimates based on Member States Infrastructure Investment plans (2014 – 2020) established by DG MOVE in cooperation with Member states via TENtec database and bilateral meetings in April 201. These figures have also been used for the White Paper.

[204] Euro on 2011 basis, 18,000 total jobs for every $1 billion investment, average exchange rate euro – dollar of January 2009 (date of the above mentioned study)

2.4.2. Health/Safety

- **TENconnect results:**

Impact type (billion euro)	BAU	CORE	COMP	CORE vs BAU	COMP vs BAU
Road safety	136.0	137.1	138.9	**+1.1**	+2.9

Table 5: Road Safety impacts (External costs) (horizon 2030).

TENconnect simulation indicates a growth in total costs of accidents in the Core network planning scenario (Option 2) as opposed to the traffic forecast on the TEN-T in a continuing BAU scenario (Option 0).

- **Interpretation/Qualifications**:

The growth of accident related costs in a CORE network planning scenario is a consequence of improved efficiency of traffic (i.e. the rebound effect) as opposed to the BAU scenario. The data needs however to be read with the following two qualifications:

1) The relative overall increase (0.8%) that the TENconnect modelling shows in a CORE network planning scenario should be read as part of the overall costs vs benefits assessment.

2) As a consequence of its exclusively planning starting point, as highlighted earlier, the TENconnect model did not take into account a series of other implementation related factors that would contribute to mitigating the negative effects in two ways:

a) a likely increased modal shift in the actual Option 2 scenario, due to a series of non-infrastructural measures to be promoted in the context of the reinforced corridor coordination approach, that would lead to a shift away from road traffic, resulting in less traffic on road than estimated by the model and therefore less accidents;

b) a series of other measures that would contribute to increased safety on road, reducing thus the ratio of accidents/gravity of per unit of traffic volume (as opposed to the ratio used in the model), such as the use of intelligent traffic management systems and services and higher standards with regard to the construction of roads. (Notably, for example, the experience and results of Commission's Action Plan for road safety have not been taken into account in the TENconnect simulation.)

Yet, as demonstrated by the evaluation of the EasyWay project[205], the coordinated deployment of ITS services on the trans-European road network) can have significant positive impacts. Thus, within the frame of EasyWay I, this has lead to injury accident savings of between 10% and 20%, depending on the particular application, rising to approximately 60% on some safety critical roads sections.

The results of the deployment of dynamic traffic and network management services in particular, successfully deployed by European road operators to tackle disrupted traffic flows on strategic and critical sections of the TEN-T, have proved significant on those parts of the network that suffer greater congestion and accident rates. Positive impacts include increased capacity rates of up to 9% and a reduction in accidents of typically between 20% and 30%, but as high as 63% on particular safety critical sections of the TEN-T.

[205] EasyWay – Synthesis of Project Evaluation Results 2007-2009, 15 February 2011.

Implementation of both ITS and state of the art technological standards on the physical infrastructure is envisaged in all three retained TEN-T policy options but, as argued in the IA Report, these are likely to be most effectively and widely deployed in Option 2 as opposed to BAU/Option 0 as well as Option 1, due to better and coordinated implementation and wider traffic volumes affected.

2.5. Environmental impacts: Climate effects, Air pollution, Noise

- **TENconnect results**

	Scenario				
Impact type (€ billion)	**BAU**	**CORE**	**COMP**	**CORE vs BAU**	**COMP vs BAU**
Traffic noise	15.2	15.3	**15.4**	**+0.1**	+0.2
Air pollution *(NOx, PM, SOX, HCs)*	60.5	55.0	**55.0**	**-5.5**	-5.5
Climate effects *(CO2)*	94.4	95.5	**96.0**	**+1.1**	+1.6
Total environmental effects	170.1	165.8	**166.4**	**-4.3**	-3.7

Table 6: Environmental impacts (External costs)

This table shows the overall derived environmental impact, up-weighted to measure total road traffic (horizon 2030). The impacts on the CORE have also been scaled based on the "CO2 intensity" weighting factor derived from the White Paper envisaged measures.

The results of the TENconnect simulation show a relative increase in the estimated costs of noise and CO2 emissions, but a decrease in those related to air pollution, in a policy scenario where the TEN-T is the result of coordinated EU-level planning (core network) as opposed to continuing with the current 30 Priority Projects (the result of a bottom-up approach) in a BAU scenario. Again, the COMP network shows a similar picture albeit one that has increased CO2 due to the rebound effect of supposed traffic generation. Because of the improvement in air pollution, the overall effect of both the CORE and the COMP networks on external costs is positive.

- **Interpretation/Qualifications:**

As in the case of road safety data discussed earlier, the increase in the costs related to noise and CO2 emissions reflects the rebound effect of improved efficiency of traffic flows on a TEN-T with a core (or a COMP) network developed on the basis of a European methodology. Yet, just as in the case of the road safety data, the TENconnect simulation reflects:

1) the impacts of a CORE network where effects of multimodality (an in-built dimension of CORE network planning and implementation in Option 2) have not been taken into account - i.e. a shift away from road to rail and air for passenger traffic, and to rail and inner waterways for freight, and

2) the impact of infrastructural development taken in isolation, and not as part of

a) a policy approach with a reinforced EU coordination dimension in implementation, that envisages the use of highest technological standards with regard to, for example, the motorisation of road vehicles, or the sources of electricity used in the power grids of rail on the CORE network;

b) the overall measures as envisaged in the White Paper and meant to reduce transport emissions as a whole.

The decrease in emissions of air polluting particles, on the other hand, reflects a higher accuracy of the TENconnect simulation, as the positive results of measures taken so far at EU level and aimed at reducing these kinds of emissions, have been taken into account (for instance the implementation of the EURO norms for vehicles).

A number of studies have however shown that the negative impacts of the rebound effect of improved efficiency of traffic can be mitigated when measures to improve efficiency are taken in conjunction with a series of other measures meant to reduce the environmental impact of the transport sector.

Thus, the European Environmental Agency report on 2009[206] for example starts from the premise that more efficient vehicles using less fuel may in the long run be cheaper to operate, lowering the general transport costs and leading, in turn, to more transport, as tasks that were earlier too costly to undertake could then be done at a reasonable price. While this entails added choice for consumers and thus added welfare, it also means that significant parts of the environmental benefits disappear in growing transport volumes. Nevertheless, the report shows a set of measures including adoption of technological improvements (improved engine and vehicle design, use of electric cars, low carbon fuels, technologies encouraging behavioural change) and demand control could combine to support the achievement of a 60% reduction in CO2 emissions from transport by 2050.

The evaluation of the EasyWay I impacts provides another, though more limited in scope, example in this sense. Results have thus shown that the coordinated deployment of ITS on the TEN-T only has led to CO_2 savings of up to 4% (between 2007 and 2009), as a consequence of reduced congestion (due to increased capacity throughputs by up to 20% where lanes are managed dynamically) and reduced accidents. [207]

Last, but not least, the Transport White Paper IA Report shows that measures to modernise and increase the efficiency of transport infrastructures are essential for any efforts to achieve the 60% CO2 reduction target, but that a comprehensive and combined set of measures is needed to insure the sustainability of the transport system.

3. CONCLUSIONS

- The results of this 3-year long modelling exercise show the economic and cohesive benefits of a coherent infrastructure development, planned at the European level.
- However, many uncertainties are inherent to such a modelling exercise over a long time period with a large number of parameters that are difficult, if not impossible to integrate in the model. It has led to qualify the results and to use them only as supportive elements to a qualitative assessment and logical reasoning on the Options of the IA Report. Moreover,

[206] EEA Report No 2/2010: Towards a resource-efficient transport system - TERM 2009: indicators tracking transport and environment in the European Union, April 2010.

[207] Measures facilitated through a high ITS content that might be considered as ready for widespread deployment, include: cross border traffic management; dynamic lane management; variable speed limits / speed limit enforcement; co-ordinated data exchange / real time traffic information provision. A number of other measures show potential and after further evaluation by the EasyWay II programme should be reviewed and considered for mainstreaming. These include: co-modal information / journey planning; freight specific information / parking guidance.

the scenarios of the modelling exercise only correspond to the planning aspect of the Policy Options of the IA Report, not including the effects of the implementation aspects.

- The results confirm the positive impact of the Core Network planning in terms of growth, accessibility and pollutants emissions and prove direct economic benefits (€ 77.7 Bln) that are much higher than the potential negative externalities related to the rebound effect (€ 1.1 Bln for road safety, €0.1 Bln for noise, €1.1 Bln for climate effects).
- The results also show that infrastructure planning cannot solve alone transport negative externalities due to the rebound effect. As explained in the IA Report, infrastructure planning has to be combined with a strong implementation approach to be able to apply other measures (pricing, new technologies, interoperability standards…). In this way, transport infrastructure planning and corridor implementation can serve transport policy by being a main implementation tool of multiple initiatives.

ANNEX VII

Case Studies

The following table supports the TEN-T Impact assessment by describing the results of various projects and programmes that, in the main, focus on the application of governance, cooperation, standardisation and the application of best practice in implementing transport, mainly rail, networks. Also assessed are the likely effects of the application of 'best practice' in road transport ITS, especially effective at 'traffic calming' and hence congestion and accident reduction but also in reducing air pollution and CO2 emissions, in spite of any 'rebound effect' on traffic volumes.

The study from the European Environmental Agency, the FREIGHTVISION study and the work that underpinned the Impact Assessment to the Climate Change roadmap, all emphasise the key role that technological innovation will play in implementing a more efficient and sustainable European transport system by acting on 3 main factors: vehicle efficiency through new engines, materials and design; cleaner energy use through new fuels and propulsion systems; better use of networks and safer and more secure operation through information and communication systems.

The European Environment Agency's 2009 (TERM) report[208], observes that more efficient vehicles using less fuel may in the long run be cheaper to operate and thus lower the general transport costs. This in turn leads to more transport (the rebound effect) because tasks that were earlier too costly to undertake can now be done at a reasonable price. While this entails added choice for consumers and thus added welfare, it also means that significant parts of the environmental benefits disappear in growing transport volumes. The report shows the combination of measures that are necessary to achieve the transport target of a 60% reduction in CO2 emissions by 2050. The potential impact of technology measures can reduce by half the GHG emissions compared to the base year 2008, but only achieve about a 20% reduction based on 1990. When the potential for demand control measures are included (through pricing etc facilitated by the application of ITS) then a 60% reduction in the cumulative affect of C02 measures is achievable. And it is this level of reduction that was designated in the Transport White Paper[209].

The proposed CORE network with its optimal implementation strategy both for its construction and its operation will facilitate the provision of these mechanisms that will maximise the efficiency of the network as a whole and together, enable future demand to be met in a sustainable way and hence achieve the White Paper's target for a 60% cut in CO2 emissions by 2050 (on 1990 levels).

The projects and Programmes presented below are a selection of the list given in annex 1 to this IA. They are not presented in full detail but only with the aim of highlighting certain impacts.

[208] EEA Report No 2/2010: Towards a resource-efficient transport system - TERM 2009: indicators tracking transport and environment in the European Union, April 2010
http://www.eea.europa.eu/publications/towards-a-resource-efficient-transport-system
[209] EU Transport GHG Routes to 2050--www.eutransportghg2050.eu

Study	Principle Benefits / Implementation Measures	Conclusion
DIOMIS study[210]	"Developing Infrastructure and Operating Models for Intermodal Shift (DIOMIS)" concerns the development of combined transports (road/rail) in Europe, where a total growth of volume from 125.3 million gross tonnes in 2005 to 268 million gross tonnes in 2015 was expected, an increase of 57% (pre recession estimates) and had the following objectives: - to provide a survey of best practices for Combined Transport (CT) terminal management in selected European countries; - to set up recommendations on how "soft" management measures can contribute to using existing terminal infrastructure in an optimum way or increasing the transhipment capacity without major investments; - to foster the exchange of capacity management knowledge between European intermodal terminal operators. Shifting road transports to CT is calculated to give a 60% reduction of CO2 emissions per km (incl. the local road transport at each end) and a 29% reduction of overall fuel consumption per km for unaccompanied CT, compared to road transport only (based on the industry's "CO2 Reduction through Combined Transport" Report).	The DIOMIS Agenda 2015 addresses a large number of infrastructure-related issues where investments in infrastructure on different levels will lead to the expected growth of unaccompanied combined transports. The measures include: - More efficient employment of network and terminal infrastructure. - Realisation of envisaged infrastructure enlargement investments and fast implementation of further actions to eliminate bottlenecks. - Improvement of cooperation and international coordination amongst intermodal stakeholders. The study pinpointed combined transport growth potential by 2015 and beyond, thus providing a frame of reference for: - the intermodal industry: customers, shippers, forwarders and shipping lines - Investors: loading units, wagons, terminals, locomotives - Improved co-operation and international co-ordination The extra utilisation and efficiency would be gained through: - More efficient use of rail infrastructure - Capacity impact of adopting best-practice utilisation of existing infrastructure - More infrastructure investments and international co-ordination.

[210] Diomis study- http://www.uic.org/diomis/spip.php?article11

Freight oriented rail network:	Regulation 913/2010 of 22 Sept 2010 concerning a European rail network for competitive freight requires Member States to set-up rail freight corridors, based on "business cases" to meet three challenges concerning: - the European integration of rail infrastructures by strengthening coordination between infrastructure managers on investment and operational matters; - the balance between passenger and freight traffic on major international axes by giving adequate capacity and priority to freight trains and making capacity allocation and traffic management more and more driven by socio-economic considerations as opposed to mere political reasoning; - the intermodality between rail and other transport modes by developing and making access to and use of freight terminals more efficient. Greater coordination and a common desire to give adequate priority to freight on these routes should make it possible to improve the performance of the services and improve the position of rail freight transport.	The objectives differ depending on the corridor. - Along the Rotterdam-Genoa[211] corridor the objective is to double the volume transported by 2020, by increasing punctuality by 26% and reducing travel time by 20%. - Along the Antwerp-Lyon/Basle corridor, the measures will allow about 7 billion tonne-km of freight to be transported by rail instead of by road. The benefits for society in terms of pollution, congestion and safety have been estimated at over 140 million euros per year. - Along the Antwerp-Lyon/Basle corridor, the objective is to increase the volume transported by 55% by 2020. This will be achieved by reducing travel time by 15%, by reducing the number of late trains on the Antwerp-Lyon branch by a factor of more than four, and by halving those on the Antwerp-Basle branch. The cost of developing an entire network with a total length of about 25 000 km amounts to about €170 billion.
BRAVO[212]	BRAVO's main objective was to develop a coherent corridor management scheme including the: - improvement and intensification of cooperation between the railway undertakings and infrastructure managers - improvement of communication and data exchange to optimize the interfaces between parties involved	The implemented measures of the project exhibit very positive results: - an increase in traffic volumes of about 57 percent (16% per year) in unaccompanied combined transport (CT) on the Brenner axis has been reported by the operators and railways, which have been participating in the BRAVO project

[211] Rotterdam – Genoa Corridor, IQ-C Action plan 2006-2010, June 2008
[212] www.bravo-project.com

	- introduction of an overall quality system and the removal of operational bottlenecks - application of interoperable rail traction involving multi-current locomotives and including train path rescheduling - simplification and harmonization of locomotive approval procedures (certification). The project results offer many transferability opportunities, as the project was designed to function as a blueprint applicable for other European corridors.	over these three years - modal shift: 5.92 to 6.86 million gross tonnes from 2005 to 2006 - quality improvements in terms of reliability, flexibility, enhanced customer satisfaction and accuracy of transport documents. The expectation is to: - double the volume transported by 2020 by increasing punctuality by 26% and reducing travel time by 20% - 28 billion tonne-km of freight to be transported by rail instead of by road on an annual basis. This represents, at each point of this 1300 km long corridor, 1 lorry loaded with 26 tons of freight every 37 seconds, 24 hours per day, every day of the year.
New Opera[213]	NEWOPERA stands for New European Wish: Operating Project for a European Rail Network and studied the necessary step changes for achieving a long-term scenario (identified as 2020) of a core rail network predominantly dedicated to freight. The regional impact of this project on road traffic is mainly concentrated in Germany, Italy and central Europe and is the most trafficked region of the EU. Tributaries run to the East and peripheral MSs (but are not part of the New Opera network). As with the above, the total infrastructure investment is limited with the emphasis on maximising the efficiency of the existing infrastructure. The New Opera network utilisation represents 59% of the total rail traffic and 66% for transport distances above 800Kms.	The conclusion of the project was that **q**uadrupling of the rail freight trains on the New Opera corridor would expand rail freight's market share from 6% (2006) to 16%. This represents a shift from road to rail/intermodal traffic - 144 billion tonne.kms on the overall rail of which 131 billion tonne.kms would be on the New Opera Network. Other recommendations include: - rolling stock upgrades, - electric locomotives - upgraded sidings and equipment for longer trains - Institutional cooperation

- [213] www.newopera.org

REORIENT[214]	The REORIENT's study, commissioned by DG TREN was to assess the progress in implementation of the new rail legislation, and the impacts that the legislation had on the market behaviour of the European rail freight industry. Both the incumbent railway operators and the promising new rail start-ups were in the REORIENT analytical focus. The study assessed each MSs performance against four main critera and found the following: ***1. Independence:*** *the requirement that the country's Infrastructure Manager be completely independent of all of the country's railway undertakings.* Norway and Finland had the highest score, and Greece had the lowest. There were also severe shortcomings in Austria, while Sweden, the Czech Republic, Slovakia, and Romania had only limited shortcomings. ***2. Access:*** *the requirement that there should be non-discriminatory access for all freight railway undertakings to the Trans European Rail Freight Network.* No countries had full open access. Each country had some conditions that were unfavourable for new entrants. The best performing countries were Norway, Poland, and the Czech Republic. Greece currently provides no access for new entrants. Some severe limitations also exist in Finland and Hungary, although for different reasons. ***3. Support:*** *Willingness of the National Rail Regulator to Implement Administrative Changes.* It shows that there is strong support in the Nordic countries and in Hungary for implementing the necessary administrative changes, while there is some degree of opposition in Bulgaria, Romania, and	The main barriers to meeting the requirements relate to: - Inadequate mandates and lack of willingness of national regulators to implement and enforce administrative changes. - Inadequate organizational structures, skills and knowledge of rail institutions (railway undertakings, infrastructure managers, and regulators) to handle changes in task execution. - Lack of potential and willingness of rail undertakings and Infrastructure Managers to adjust to changed market structures. If only the requirements related to the transport network are taken into account, financial barriers are dominant. The main financial barriers are the potential of both the railway sector and the national government to accommodate required investments and the willingness of the railway sector to invest in technological improvements and new business concepts. Other barriers for improving the transport network are inadequate organizational structures, skills and knowledge of rail institutions, and technical barriers. Information is not widely available and varies considerably by country. Infrastructure quality is uneven, especially in new Member States, resulting in slower speeds. Analysis of higher speed scenarios suggest greater potential market share for rail.

[214] www.reorient.no

	Greece. ***4. Capability:*** *Government Potential to Support Investments.* It shows that there are significant financial barriers to achieving the goals of interoperable international rail freight transport in Romania, Bulgaria, and Greece. No such barriers exist in the Nordic countries or Austria. The opening up to a market economy for new MSs could mean that the voting public and politicians are anxious to adopt West-European solutions, abandoning rail and instead adopting long haulage freight solutions. Such worries are not unfounded given evident from the Polish government's transport planning document that shows that between 2007 and 2013, Poland will receive about 19 billion € from Union funds for ”Improvement of Infrastructure and Natural Environment”. 11 billion € will be channelled to building new highways, whereas 4.8 billion € – less than half – will go to railways. However, rail freight is less in conflict with Natura2000 areas. REORIENT results show that rail solutions along a North-South Corridor are considerably less in conflict with EC special protected areas than long haulage truck transport. This is due to the extensive rail network that is already in place and that is underutilised. That rail overall is the more environmentally friendly solution is well known and the study shows that with respect to potential conflict areas, rail is in a much better position than road along the business corridor from North to South.	Intermodal transport is still hampered by terminal processing times due to technological limitations. On Management Practices, while nominally open, current slot allocation processes reflect biases that hamper the ability of new entrants to provide new intermodal rail-based freight services. Existing processes are partly inefficient and not freight-friendly. And politically, rail freight does not receive sufficiently high visibility on the national or European agendas. Overall, improvements are left primarily to administrative processes that move slowly and are largely dominated by national rail undertakings. Financial barriers are a major factor hindering the rapid adaptation of new Trans-European rail freight solutions. They are substantial and cannot be handled by the rail freight and logistic industry alone. Support for rail among the voting public and local politicians is thus critical for securing national and regional corridor development.
RODER and AlpFRail[215]	This is a successful supply chain logistics case exhibiting the synergies between two separate developments, presented as distinct good/best practice examples in PROMIT[216]. It	Improvements in rail operations along the Tauern axis are the objective of the AlpFRail (Alpine Freight Railway) project, aiming at a consequent

[215] http://www.lkzprien.de/en
[216] 6FP project on Best Practice in Intermodal Transport-www.promit-project.net

	concerns freight traffic between Turkey and Western Europe. The existing land-based road routes were already unattractive in respect to distance, time, transport costs and environmental impact, especially due to the poor prevailing road conditions and the long time required for clearing the numerous border crossings. The internal conflicts in former Yugoslavia further worsened the situation. In 2001, the RODER company was founded to develop the combined transport services between Turkey and Europe through short sea shipping. The immediate targets were: - avoidance of traffic pressures on main transport routes, - reduction of operational costs, - limiting capital investment on trucks, and - reduction of emissions and noise. The intermodal transport chain is organized as follows: • Road transport: Cargo is picked up from various inland locations in Turkey and transported to a RoRo terminal (Pendik, Ambarli or Çeşme). • Short sea shipping (unaccompanied transport): Following customs clearance, the complete units (tractor and semi-trailer coupled) or the uncoupled semi-trailers (tractors are left behind at the terminal) are boarded on RoRo vessels and trans-shipped to Trieste. Sailing time takes approximately 60 hours. The truck drivers fly from Istanbul to Ljubljana and reach Trieste by bus. • Rolling motorway (accompanied transport): Following unloading and customs clearance at Trieste, a significant share of the trucks are loaded on trains serving the Tauern axis	displacement of freight flows to rail in the Alpine region. By means of technical and organizational improvements on this axis, additional capacities for up to 18 trains per day can be generated. The preliminary results of the AlpFRail project are positive. Within one year, 10 additional trains per day are provided on the Tauern axis, replacing 45,000 truck trips per year. The scheme has the following advantages: - Lower operating costs for the transport operator due to shorter transit time (less than 12 hours as opposed to 14-16 hours of the present solution). As the rail leg is carried out without drivers, about 1 day lower personnel and equipment operation costs can be realized per trip. - No waiting time for trucks in the terminal for loading and unloading from the train. - The possibility to cross the Alps also on weekends and bank holidays. - No resting time for the drivers. - The customs clearance takes place in the destination (instead of the sea port) leading to additional time savings. The Trailer-Train initiative aims to extend the intermodal unaccompanied transport chain of RoRo services from Turkey to Trieste to the Bavaria region by train. The extensive market analysis performed covers both craneable and non-craneable trailers (presently 60% of unaccompanied trailers coming to Trieste are craneable). The port of Trieste provides

	(Trieste-Villach-Salzburg). The journey to Salzburg takes 9 hours. There are 3 departures daily on each direction and the trains can carry 20 transport units. The truck drivers use special sleeping cars of the train. • Road transport: The trucks disembark at the Salzburg rail terminal and continue their journey to their final destination by road.	several alternatives for the trans-shipment of trailers. Overall 5 existing or future possibilities were analysed, involving trans-shipment by crane, by using the Modalohr system, and by using RoLa tractors. The rolling motorway approach is easily transferable to other European corridors.
MONITRAF[217]	MONITRAF provides a platform for the alpine transit regions. Freight traffic and its impacts are a major challenge for the Alpine countries and require an international approach in order to prevent distributional impacts between the different countries. Because the transit regions are especially affected, the regions Tyrol, South Tyrol, Central Switzerland, Ticino, Piemonte, Rhône-Alpes and Valle d'Aosta have started the project MONITRAF aimed at the development of a common and sustainable strategy for transalpine freight traffic. MONITRAF ran from 2005 until 2008 and defined major indicators to describe the traffic development and its impacts and collected traffic, environmental and socio-economic data to obtain a comparable picture of the situation in the Alpine countries, something that had not be achieved until then.	The modelling of future emission scenarios indicate the impacts of future traffic development, the role of technological development and positive effects of new measures. As a first step, a business-as-usual scenario (BAU) has been developed on the basis of the situation in 2005. This BAU is built on existing forecasts for freight traffic (e.g. Federal Council of Switzerland 2007, study for the base tunnel Lyon-Torino (LTF – Etude de trafic Fret – Résultats Phase 1 - Septembre 2006). By the year 2025 an increase of traffic by 47% is assumed for the Fréjus, 62% for the Mt. Blanc, 17% for the Gotthard and 74% for the Brenner.
FERRMED Global Study[218]	The FERRMED Association is supported by the EC and several European national and regional Governments with a view to contributing to improve EU railway freight transportation system. It was undertaken by a consortium of European consulting companies over a period of more than 2 years. Today FERRMED is supported by 143 members,	The study concluded that upgrading the FERRMED Great Axis Rail Network, implementing the FERRMED Standards and eliminating the institutional, legislative, infrastructural and technical bottlenecks should increase the transport share of railways to 17% of all inland freight and 24% (more

[217] http://www.monitraf.org/44.html
[218] FERRMED, October 2009:
http://www.vialibre-ffe.com/PDF/FERRMED_GLOBAL_STUDY_BOOK.pdf2

	including key business institutions and private companies from all over Europe and North Africa. The FERRMED Great Axis Network is the focus of the FERRMED standards. This Network interconnects the most important maritime and fluvial ports, the most important economic regions and the main East-West axes of the European Union, spanning over more than 3,500 kilometres from Stockholm and Helsinki to Algeciras and Genoa, crossing 13 countries (Belgium, Denmark, Finland, France, Germany, Italy, Luxembourg, Netherlands, Spain, Sweden, United Kingdom, Norway and Switzerland), encompassing Northern and Baltic Sea basins with Western Mediterranean coasts. The FERRMED Great Axis would have direct influence over an area that concentrates 54% of the EU population and 66% of its GDP. In addition, it would link the EU to Russia, through the connections with the Western end of the Trans-Siberian Railway in St. Petersburg and Finland, and with the North of Africa. In its present condition, this Network transports an estimated 266 billion of tons km per year. The Study identifies the infrastructure, technical, institutional, legislative and regulatory actions required, and the financial alternatives initially available, to upgrade the FERRMED Great Axis Rail Freight Network into a harmonized, interoperable, profitable, competitive, efficient, safe and sustainable rail freight network, which would be consistent with EU transportation interoperability policies, legislation and regulations. The resulting increase in the total amount in goods transported would be to 524 billion of tons km per year by 2025.	than 500 km) - 28% (more than 1,000km) of all long distance transport by 2025, reversing the trend of road transport share growth and capturing a broad range of socio-economic and environmental benefits for Europe. Three investment scenarios were developed: - EUR 130 billion in investments until 2025 should generate EUR 150 billion in savings in vehicle operational costs (VOC), EUR 41 billion in savings in travel and transport time and EUR 12 billion in savings in accident and environmental benefits from 2016 to 2045. The Economic Internal Rate of Return (EIRR) under the MFS, based on socio-economic and environmental costs and benefits, is estimated at 4.97%, in line with profitability benchmarks for these types of projects in Western Europe (3 to 5%). - EUR 177 billion in investments until 2025 should generate EUR 194 billion in savings in VOC, EUR 284 billion in savings in travel and transport time and EUR 15 billion in savings in accidents and pollutant emissions from 2016 to 2045. The EIRR under the MFS, based on socio-economic and environmental costs and benefits, is 11.09%. With additional public policy support, the FERRMED Network could reach 30% to 35% of inland long distance freight rail transport market in later years. - EUR 210 billion in investments until 2025 would

		give an expected EIRR of 8.85%.
ITS and the EasyWay programme[219]	Within the frame of the first EasyWay Programme, the coordinated deployment of Intelligent Transport Systems (ITS) on the TEN-T road network took as its overall objective to: - Reduce accidents by 4-6%; - Reduce congestion by 3-6%; - Reduce CO_2 emissions by 1-3% between 2007 and 2009 Measures facilitated through a high ITS content that might be considered as ready for widespread deployment, include: - Cross Border Traffic Management - Dynamic Lane Management - Variable Speed Limits / Speed Limit Enforcement - Co-ordinated Data Exchange / Real Time Traffic Information Provision A number of other measures show potential and after further evaluation by the EasyWay II programme should be reviewed and considered for mainstreaming. These include: - Co-Modal Information / Journey Planning - Freight Specific Information / Parking Guidance The most important measure for the TEN-T is: Europe-Wide Traffic Management Services (TMS) - Dynamic Traffic and Network Management Services that have been successfully deployed by European road operators to tackle disrupted traffic flow on strategic and critical sections of the TEN-T. Dynamic Traffic Management Services deployment mainly consists of: - hard shoulder running	Overall, the evaluation showed that where services have been deployed, the benefits delivered are in line with the objectives set by the project. There have been positive impacts on: - Safety – with injury accident savings of between 10% and 20%, depending on the particular application, rising to approximately 60% on some safety critical roads sections - Congestion – with capacity throughputs increased by up to 20% where lanes are managed dynamically - The environment – where reduced congestion, along with reduced accidents, have resulted in CO_2 savings of up to 4%. The deployment of TMS have provided significant results on those parts of the network that suffer greater congestion and accident rates. Positive impacts include increased capacity rates of up to 9% and a reduction in accidents of typically between 20% and 30%, but as high as 63% on particular safety critical sections of the trans-European road network. Other key measures: - A good quality on-board weather information and warning service has been estimated to reduce the risk of injury accidents in adverse conditions by 11%[220] and fatalities about twice as much (i.e. around 20%). As circa 15% of fatalities in the EU occur in adverse conditions, this translates into a

[219] www.easyway-its.eu
[220] Safety potential of road transport information services, Elina Aittoniemi, Technical Research Centre of Finland, 2007

	- dynamic lane management - ramp metering (controlling the amount of traffic on the motorway)	fatality reduction of circa 3% over the whole year. - The deployment of Speed Control on Critical Road Segments of the TEN-T Road Network including variable speed limits and speed enforcement, has shown impacts of a 15% to 54% reduction in accidents (more typically accidents are reduced by between 20% and 30%) and up to 20% in the improvement of traffic flow.
FREIGHTVISION[221]:	FREIGHTVISION project assessed what needs to happen to long distance freight transport in order that it becomes 'sustainable' by 2050, and used an 80% cut in CO2 emissions (based on 1990 levels) as one of its goals. To do this it developed a holistic approach by integrating all aspects of the problem (infrastructure, vehicles, fuels, interoperability etc.) and all types of criteria in the solution (research, technologies, policies and pricing). Of the 36 measures discussed, the following relate directly to the TEN-T IA—the other measures have a secondary effect and together should achieve freight transport's sustainability goals: - Investment in road infrastructure - Investment in rail infrastructure - Investment in IWT infrastructure - Investment in maritime port infrastructure - Intermodal Transport FREIGHTVISION's results show that to achieve 'sustainability' in long distance freight transport, then a combination of measures need to be taken, the most important of which is seamless transport flows (especially so as to	- **Investment in road infrastructure** The TEN road network is essential for the overall freight flows in Europe. Investments in the TEN-T should focus on removal of bottlenecks, linking networks of all modes of transport and better utilization of the existing network by using ITS. At the same time it is necessary to have a holistic approach to the transport system as a whole. Introduction of Green Corridors is an opportunity for combining measures and a holistic approach. There is also a need to include the connections to the non-EU countries. - **Investment in rail infrastructure** Providing rail corridors that are mainly or completely dedicated to freight can enable rail to become more competitive against other freight modes (especially road transport) and provide a higher quality service while minimising conflicts with passenger rail transport. This would address the current barrier to modal shift to rail posed by railway infrastructure capacity constraints. - **Investment in IWT infrastructure** Capacity of the IWT network is hampered by

[221] Freightvision - 7FP project on long distance freight transport futures (policy, demand and technology scenarios), December 2010: http://www.freightvision.eu

	encourage rail modal shift) and road vehicle technology, including ITS as a facilitative mechanism for introducing pricing.	bottlenecks. Lack of sufficient investments have led to a reduction of preventive maintenance, unexpected draught restrictions, temporary closure of locks, etc. This results in unreliable services, reduced safety and higher costs. - **Investment in maritime port infrastructure** In 2018 maritime freight volumes are expected to have grown from 3.7 Bn tonnes (2006) to 5.3 Bn tonnes. In ten years time, EU ports and the shipping industry thus have to be able to handle, at least 1.5 billion tonnes more than today. Investments in port infrastructure are needed to improve efficiency and hinterland connections. - **Intermodal Transport (IMT)** A combination of different modes of transport comes more and more into focus due to a growing importance of environmental and financial aspects. But the feasibility of IMT depends on the transported products and their industry, as well as the different characteristics (speed, flexibility, reliability, network density etc.) of road, rail and inland waterway (IWW). Today, the largest problems of IMT are the slowness and reliability of rail and IWW, bottlenecks in terminal capacity, inefficiency of transhipment technology as well as information gaps concerning existing advantages and applications of IMT.

Conclusion

The case studies show how the application of today's 'best practice' will reduce transport externalities, to more than compensate for any increase in traffic volume resulting from the operation of an efficient CORE network (the rebound effect).

For instance, the BRAVO project along the Brenner Corridor saw an increase in traffic volumes of about 57 percent over its first three years of operation. The other studies focus on proposed networks, from the central network of NEWOPERA to the 'red banana' of FERRMED. NEWOPERA estimated that a quadrupling of the rail freight trains on the New Opera corridor would expand rail freight's market share from 6% (2006) to 16%. FERRMED gives estimates of 17% of all inland freight and 24% (more than 500 km) - 28% (more than 1,000km). But for these gains to be realised then all studies conclude for EU Railway Corridors Management. The benefits of the corridors are given in terms of modal shift (up to a doubling of 'long distance' freight transport volume by rail) and CO2 reduction and the costs are a similar order of magnitude to that estimated in the IA for the freight orientated rail network regulation.

The studies highlighted are giving factual support and data that underpin the Impact assessment and in particular the implementation scenario B4 in combination with the planning scenarios A3 and A4.

The EASYWAY study on the application of ITS best practice shows how the 'rebound effect' resulting from the operation of an efficient CORE network does not need to lead to higher external costs. Their work has shown road accident savings of between 10% and 20%, depending on the particular application, rising to approximately 60% on some safety critical roads sections. Congestion is improved with capacity throughputs increased by up to 20% where lanes are managed dynamically; and for the environment, reduced congestion, along with reduced accidents, have resulted in CO_2 savings of up to 4%.

Finally, FREIGHTVISION supports the notion of the Transport White Paper, that future sustainable mobility can only be achieved by the Cumulative effect of a combination of 'improve', 'avoid' and 'shift' measures. And this line is supported and quantified by the EEA TERN study and the IA for the Climate Change Roadmap.

All these studies prove that the combination of a planning dimension with an implementation dimension is able to improve the functioning of the transport market while tackling the environmental challenges, among which include the rebound effect. These case studies reveal that a Corridor approach promoting the best practices and technologies is paramount to an efficient and greener transport system at the level of the European Union.

ANNEX VIII

General Definition

1. **European added value** of projects means the value of spill-over effects to non-investing countries and regions. Cross-border projects typically have high spill-over effects, but lower direct economic effects compared to purely national projects and therefore, they are likely not implemented without EU support.

2. **NUTS region** means a region which meets the criteria of the relevant level defined in the Nomenclature of Territorial Units for Statistics.

3. **Third country** means any neighbouring country and all other countries with which the Union may cooperate to achieve the objectives pursued by this Regulation.

4. **Neighbouring country** means the countries belonging to the European Neighbourhood Policy, the Enlargement Policy, the European Economic Area and the European Free Trade Association.

Trans-European transport network configuration

5. **Projects of common interest** are projects that develop the TEN-T according to the maps annexed to the TEN-T Guidelines and fulfil the objectives set out in the Guidelines.

6. **Priority Projects** are Projects of common interest selected according to criteria set out in the Guidelines.

7. The **wider/comprehensive network** is made up of all existing and planned transport infrastructures of the transport-European transport network as outlined in the maps annexed to the Guidelines. This form the basis of the Priority Projets/Core Network identification.

8. The **Core Network** consists of those parts of the comprehensive network which are of the highest strategic importance for the achievement of the objectives for the development of the trans-European network.

Transport sector specific definitions

9. **Transport mode** means railway, inland waterways, road, maritime or air transport.

10. **Multimodal transport** means the carriage of freight and/or passengers using two or more modes of transport

11. **Co-modality** refers to a "use of different modes on their own and in combination" in the aim to obtain "an optimal and sustainable utilization of resources".- therefore, not only a multi-modal, but also a uni-modal transport can be co-modal.

12. **Upgrading of existing infrastructure** means modifying existing infrastructure to meet higher standards.

13. **Intelligent transport systems (ITS**) means systems which apply information, communication and positioning/localization technologies for the purpose of managing mobility and traffic on the trans-European transport network and provide value added services to citizens and operators for safety, security and environmental efficient use of the network. They are part of the transport infrastructure.

14. **Air traffic management system** means a system as identified in Regulation (EC) No. 552/2004 of the European Parliament and of the Council of 10 March 2004 on the interoperability of the European Air Traffic Management network (the interoperability Regulation)[222] and in the European Air Traffic Management (ATM) Master Plan as defined in Council Regulation (EC) No 219/2007 of 27 February 2007 on the establishment of a Joint Undertaking to develop the new generation European air traffic management system (SESAR)[223].

15. **Vessel Traffic Monitoring and Information Systems** (VTMIS) means systems deployed to monitor traffic, using information from AIS, Long Range Identification and Tracking, coastal radars and radio communications in line with Directive 2002/59/EC of the European Parliament and of the Council of 27 June 2002 establishing a Community vessel traffic monitoring and information system and repealing Council Directive 93/75/EEC[224].

16. **River Information Services (RIS)** means information and communication technologies on inland waterways as defined in Directive 2005/44/EC of the Parliament and the Council of 7 September 2005 on harmonised river information services (RIS) on inland waterways in the Community[225].

17. **e Maritime services** means services based on the use of advanced and interoperable information technologies in the maritime transport sector, aiming at facilitating the throughput of cargo on the sea and in the port area.

18. **European Rail Traffic Management System (ERTMS)** means the system as described in Commission Decision of 22 July 2009 amending Commission Decision 2006/679/EC concerning the technical specification for interoperability relating to the control-command and signalling subsystem of the trans-European conventional rail system[226].

19. **Freight terminal** means a structure equipped for the transhipment and temporary storage of freight in transport units.

20. **Logistic Platform** means an area directly linked to the transport infrastructure of the trans-European transport network which includes at least one freight terminal and enables the provision of logistics activities.

21. **Multimodal logistic platforms** are nodes where series of logistic activities take place, connected to different modes of transport, and open to commercial traffic. These infrastructures, that include at least one Terminal, are often linked to Sea / IWW ports. In order to make the most of scale economies on international routes, their nodal function

[222] OJ L 96, 31.3.2004, p. 26-42
[223] OJ L 64, 2.3.2007, p.1-11
[224] OJ L 208, 5.8.2002, p. 10–27
[225] OJ L 255, 30.9.2005, p. 152–159.
[226] OJ L 194, 25.7.2009, p. 60-74

does not only include transport-related activities but also national and international logistics and distribution.