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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

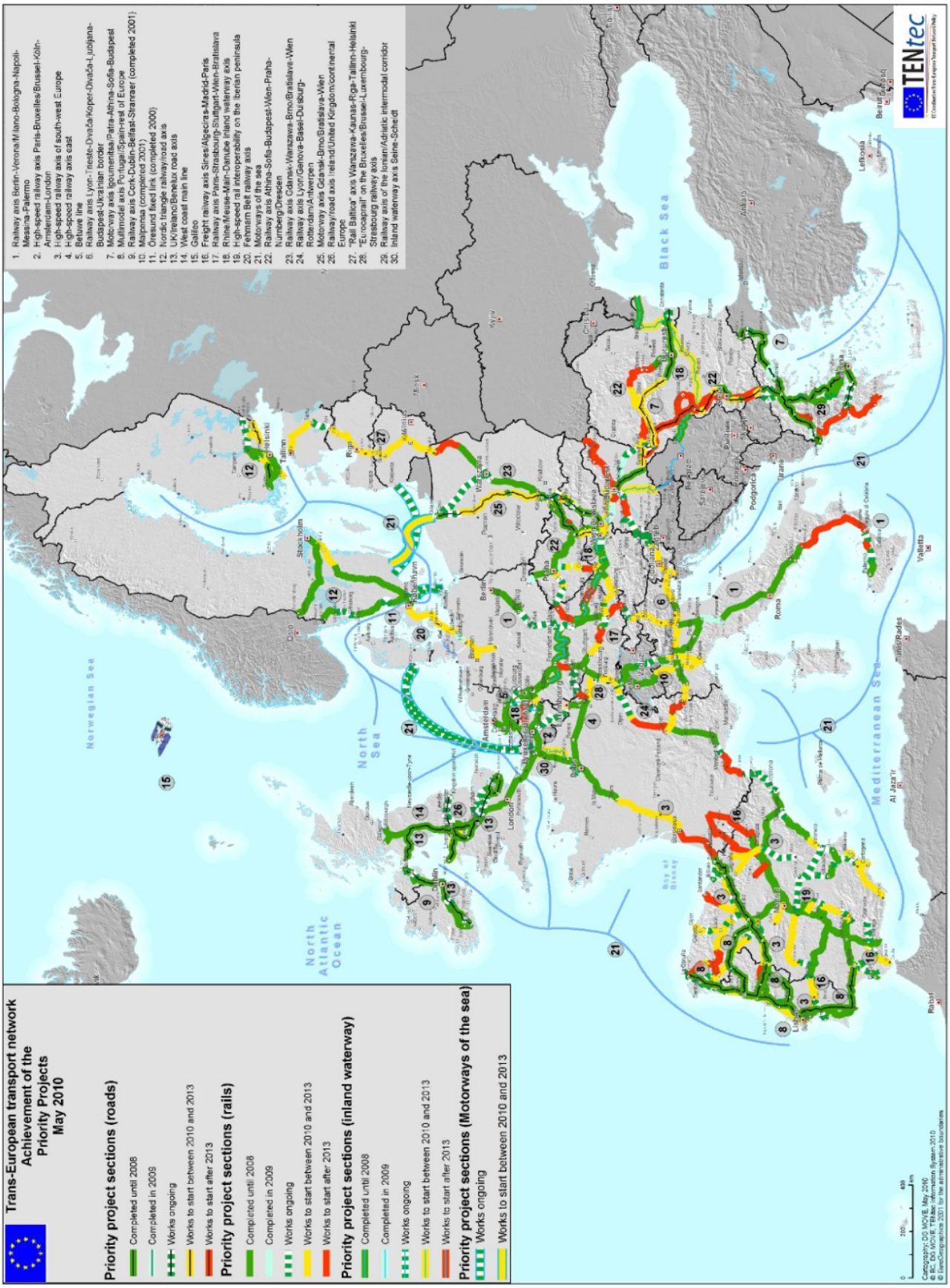

Figure 1: Achievements of the Priority Projects – May 2010

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.

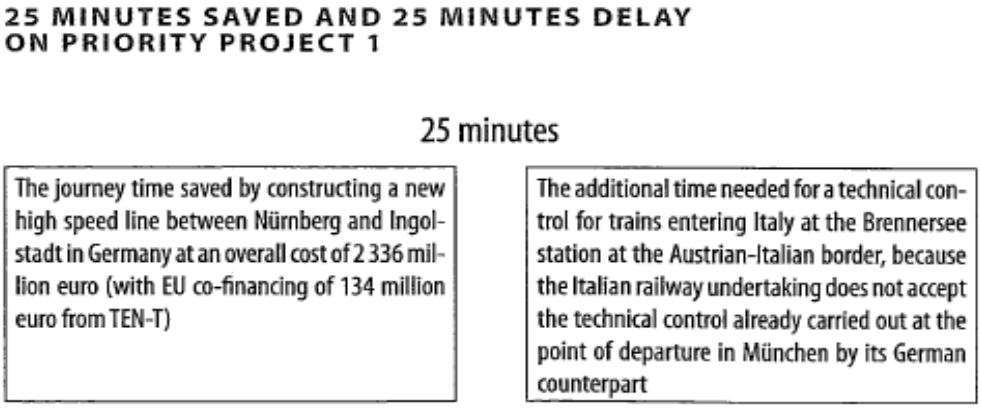

Figure 2: Example from the Special Report from the European Court of Auditors

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].

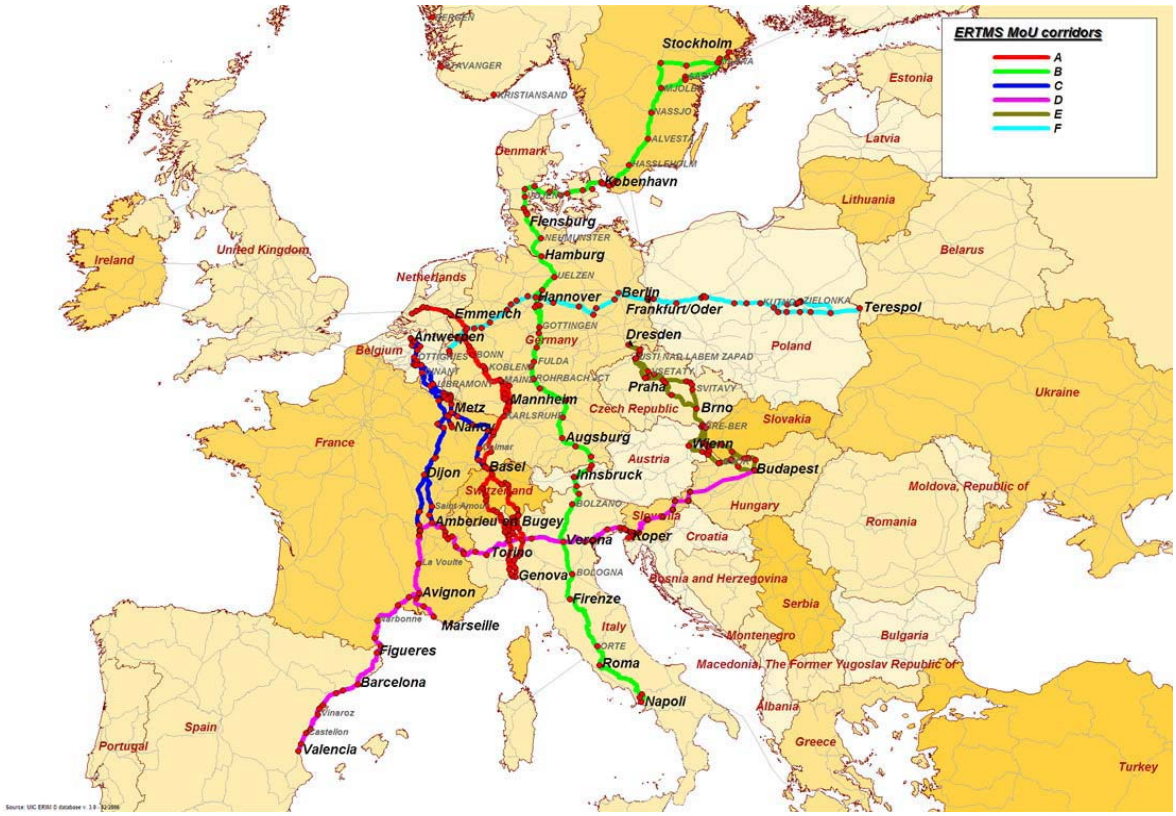

Figure 3: ERTMS Corridors

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.

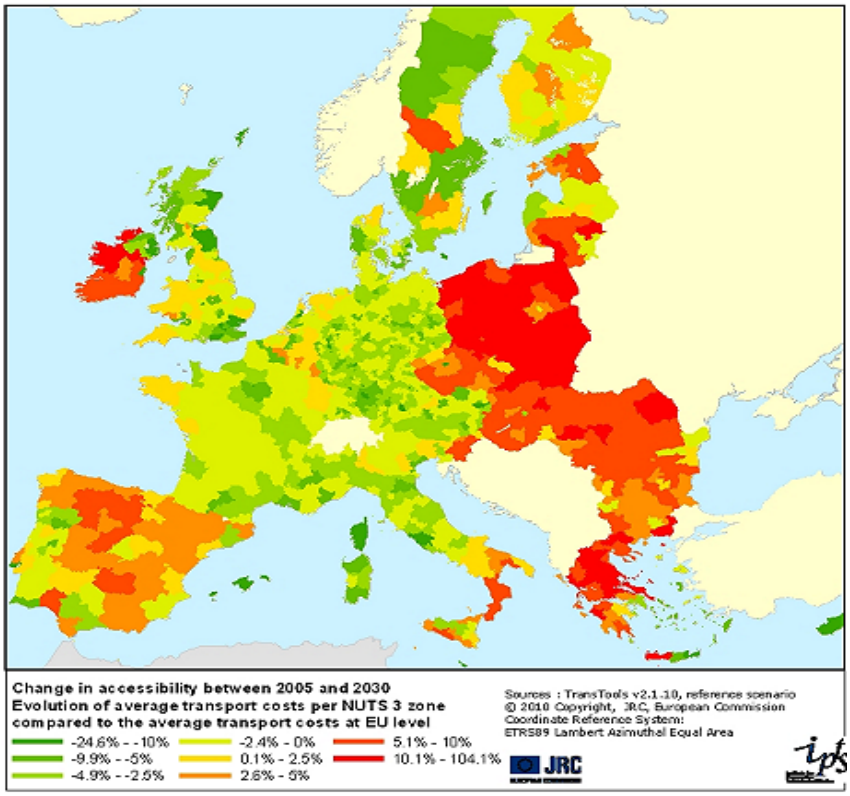

Figure 4: Change in accessibility between 2005 and 2030[73]

[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.

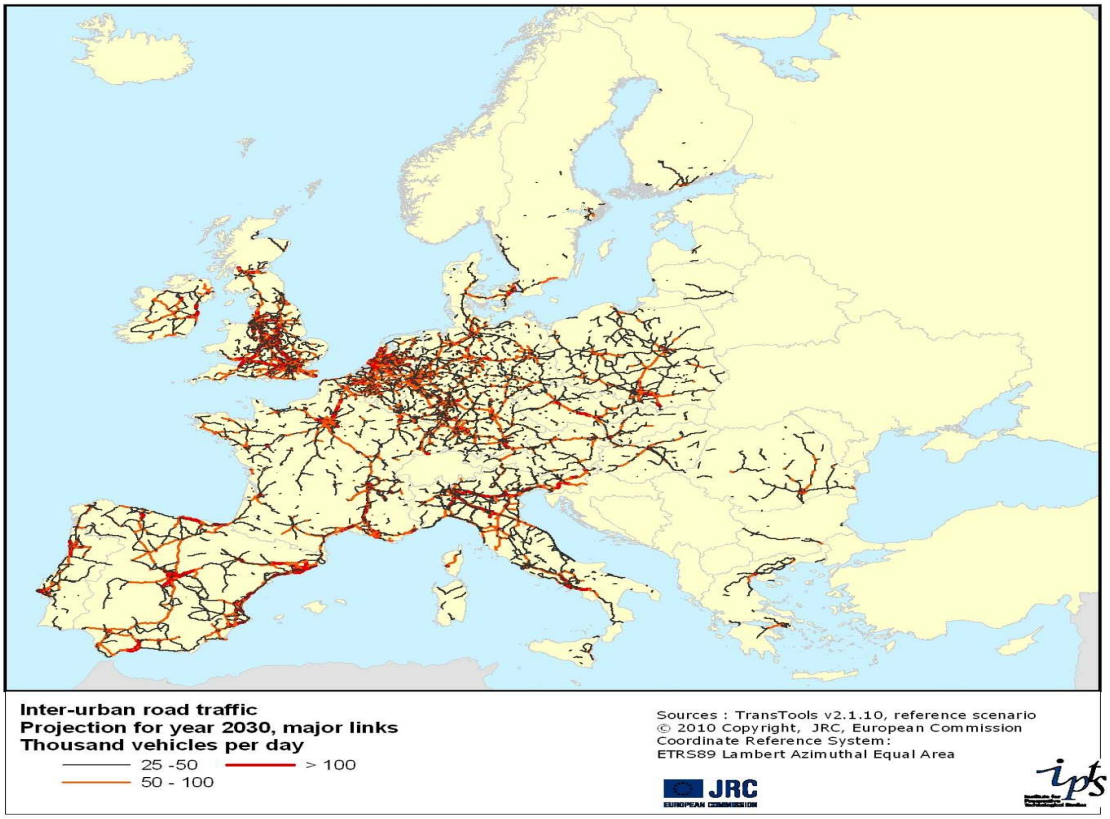

Figure 5: Congestion by 2030 in reference scenario

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

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

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

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

[121] www.eFreightproject.eu

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

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.

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.

[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.

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)

[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

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]

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

[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

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]

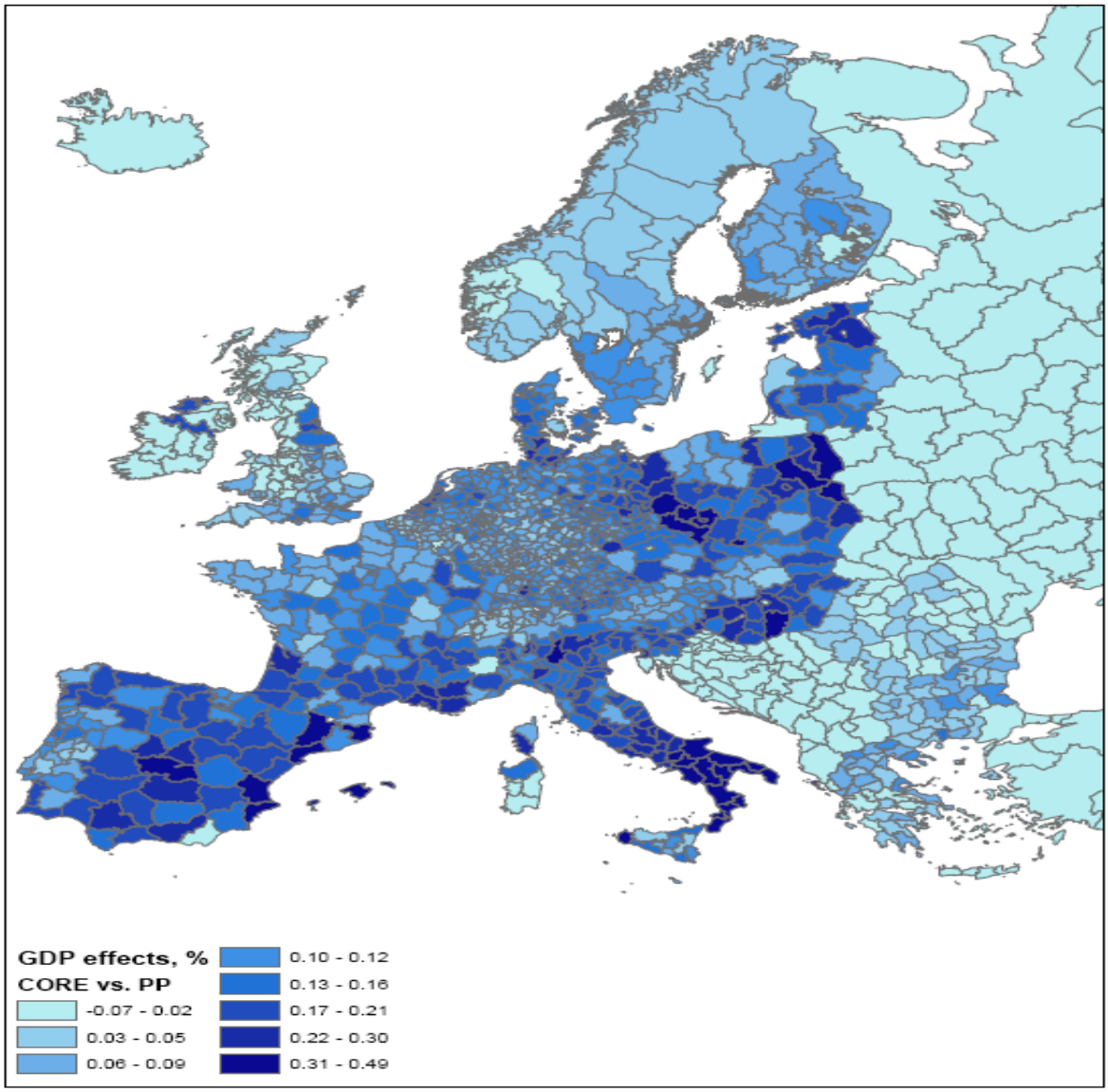

Figure 6: TENConnect II GDP effects (horizon 2030)

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 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

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

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 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

[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

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 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

[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

[140] How Infrastructure Investments Support the U.S. Economy: Employment, Productivity and Growth, Political Economy Research Institute, January 2009.

[141] Ibid.

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 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

[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

[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.

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

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

[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

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 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

[153] Annex 3

[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).

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 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

[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.

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 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.

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[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)

[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.

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.

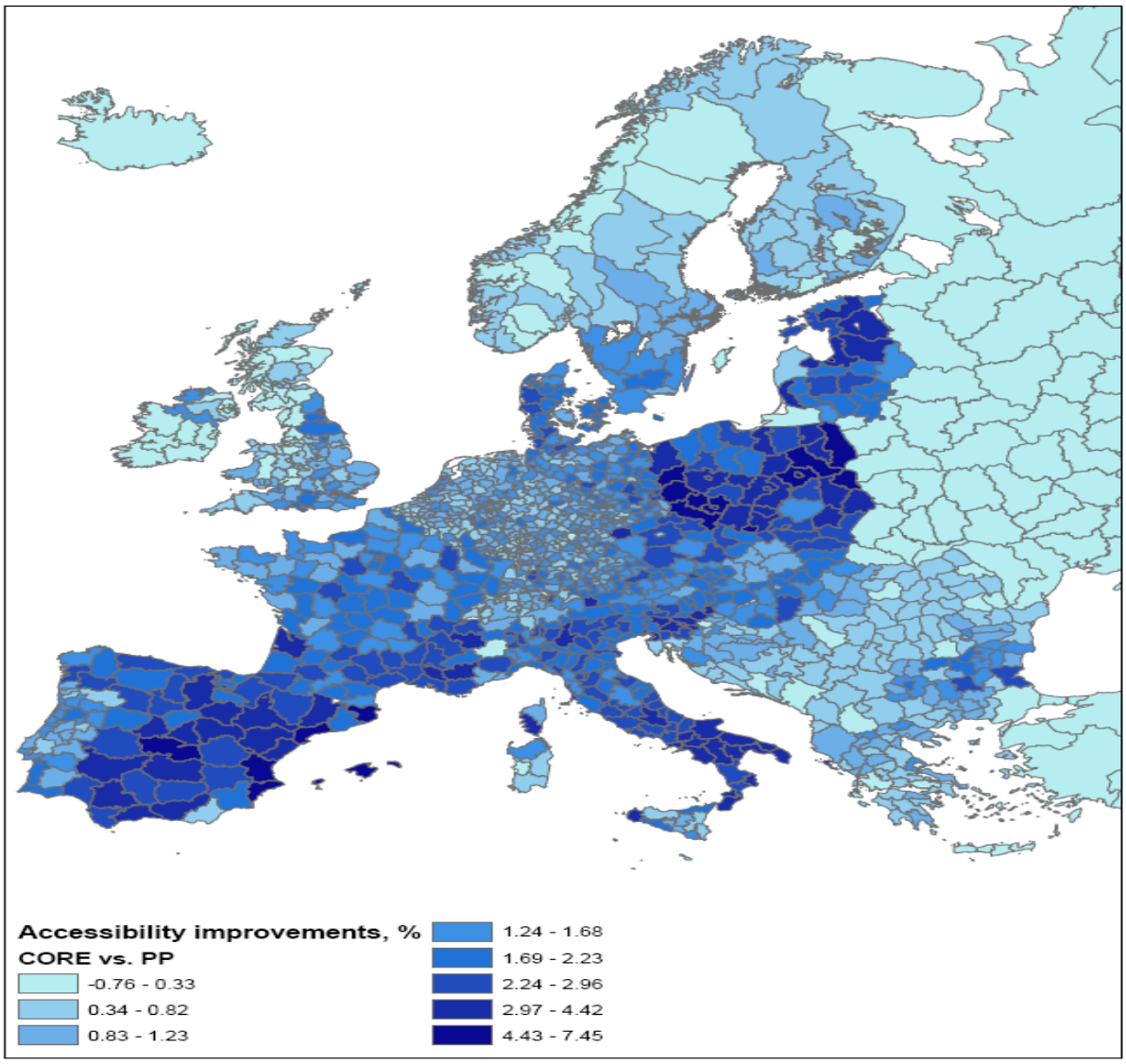

Figure 7: Comparison of BAU with the proposed CORE network for accessibility (horizon 2030)

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%.

[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]

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

[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.

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).

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

[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.

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.

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%.

[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

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 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]

[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.

[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

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, 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

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.)

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.

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.

[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 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*			
-yearly Investments estimates	€ 21.4 billion	€ 28.6 billion	€ 30.7 billion
- for 2014 – 2020[176]	*€ 150 billion*	*€ 200 billion*	*€ 215 billion*
Administrative costs			
- TEN-T EA	€ 10 million	€ 10 million	€ 10 million
- Corridor Approach administration (for 10 Corridors)		€ 20 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			- € 1.1 bln
*noise			- €0.1 bln
*climate effects			- €1.1 bln

Table15: Efficiency of envisaged policy options

[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.

[176] See footnote 84

* 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 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 other modes, especially (High-Speed) railways and inland waterway systems by 2050	Share of Major European airports and seaports connected with other modes	• TENtec
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	Number of memorandum of	• Coordinators' report on the

[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

Member States for the implementation of essential cross-border projects with a binding timetable.	understanding, treaties and binding decisions adopted	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