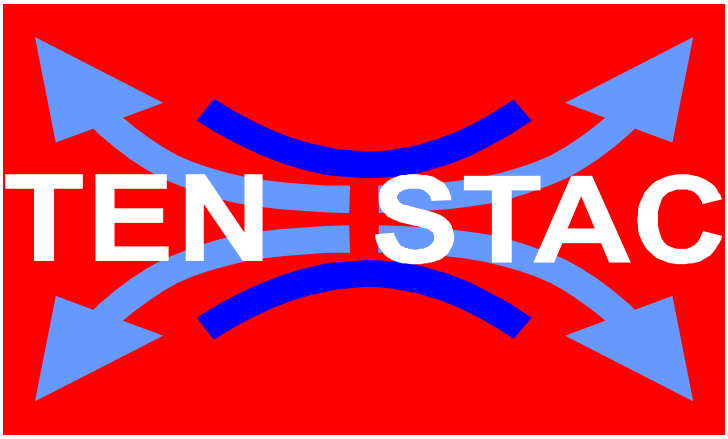
TEN-STAC:
SCENARIOS, TRAFFIC FORECASTS AND ANALYSIS OF CORRIDORS ON THE TRANS-EUROPEAN NETWORK

D6 Deliverable Part II

TRAFFIC, BOTTLENECKS AND ENVIRONMENTAL ANALYSIS ON 25 CORRIDORS



CONTRACT N° : ETU/B5-7000A-SI2.346797

PROJECT N° : 14159000/R20040194

ACRONYM : TEN-STAC

TITLE : Scenarios, Traffic Forecasts and Analysis of Corridors on the Trans-European network

PROJECT CO-ORDINATOR : NEA Transport research and training BV

PARTNERS :

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- IWW
- NESTEAR
- PWC
- TINA
- IVT
- HERRY
- MKmetric

PROJECT START DATE : 01-01-2003
DURATION : 15 Months
Date of issue of this report : September-2004

Project funded by the European Community

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5 GLOBAL ASSESSMENT ALL PROJECTS SCENARIO

5.1 Traffic flows of all projects scenario

In this section, the aggregated results of implementation of all the priority projects are assessed. Changes in traffic flows are calculated by comparing the all projects scenario to the reference 2 scenario. The all projects scenario traffic flows for road and rail, passenger and freight, are illustrated in Figure 5.1 to Figure 5.4, and the related changes of traffic flows in Figure 5.5 to Figure 5.8.

All indicators on freight flows are related to interregional transport, so local intraregional transport is excluded. With regard to passenger transport the zoning system is more detailed, so local flows are partially included here.

In general, the rail passenger traffic flows on the European high speed network are clearly increasing as a result of implementation of the priority projects. Rail links in the secondary network lose some traffic due to the concentration of flows on the main axes. In Central and Eastern Europe this decline is enforced by the shift from rail to road as a result of implementation of the road priority projects.

In rail traffic the effects are stronger; the largest effects are observed on the routes to the North Sea harbours, on the Alpine crossings and on the North-South routes in Central Europe. For rail freight the concentration on the main lines also takes place. Road freight loses on the main axes, with the exception of those sections where road priority projects take place, mainly in UK, Sweden, Central Europe, Spain and Portugal.

In chapter 6, the results per priority project are presented.

Figure 5.1 *Rail passenger flows all projects scenario, total interregional*

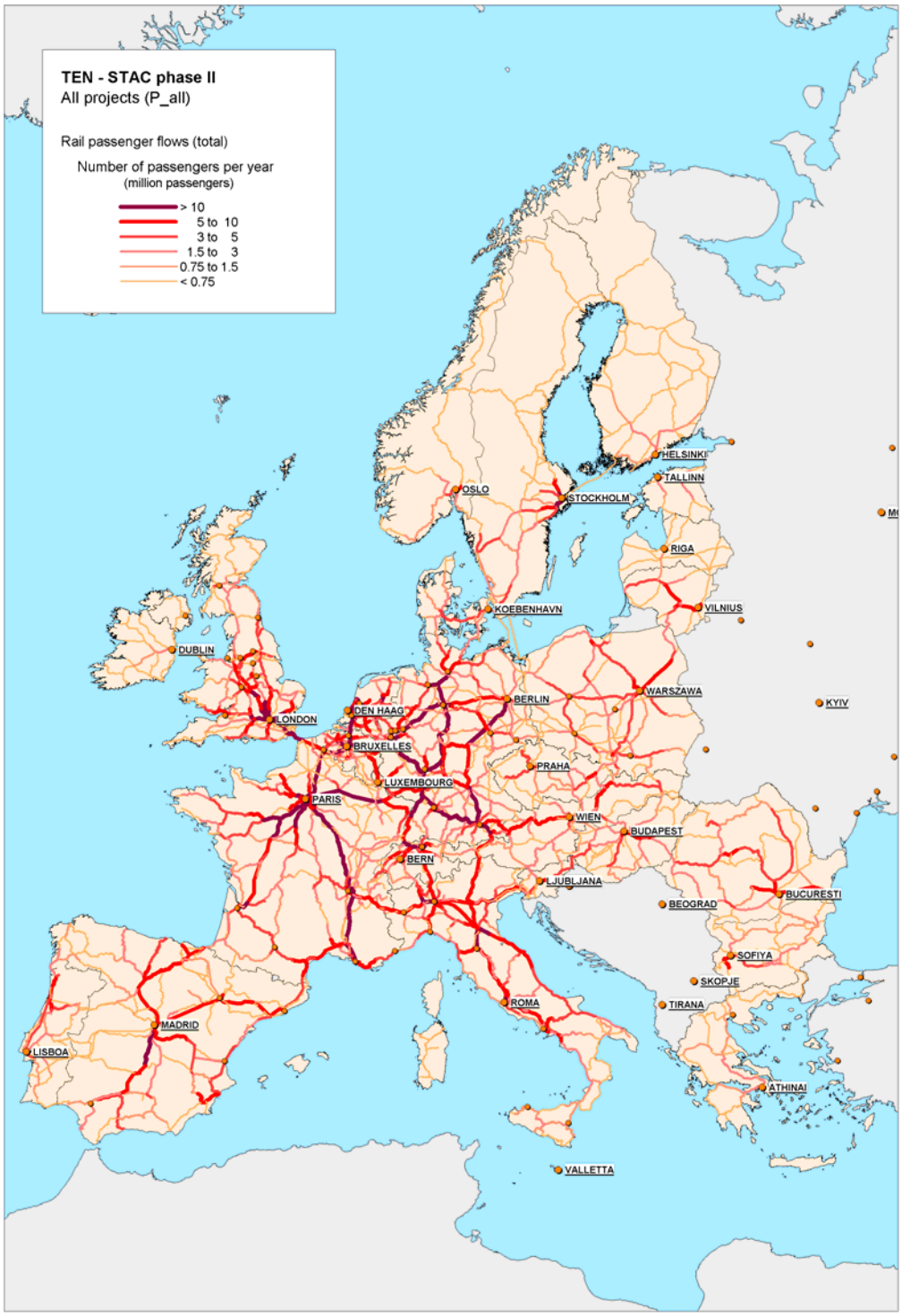


Figure 5.2 *Rail freight flows all projects scenario, total interregional*

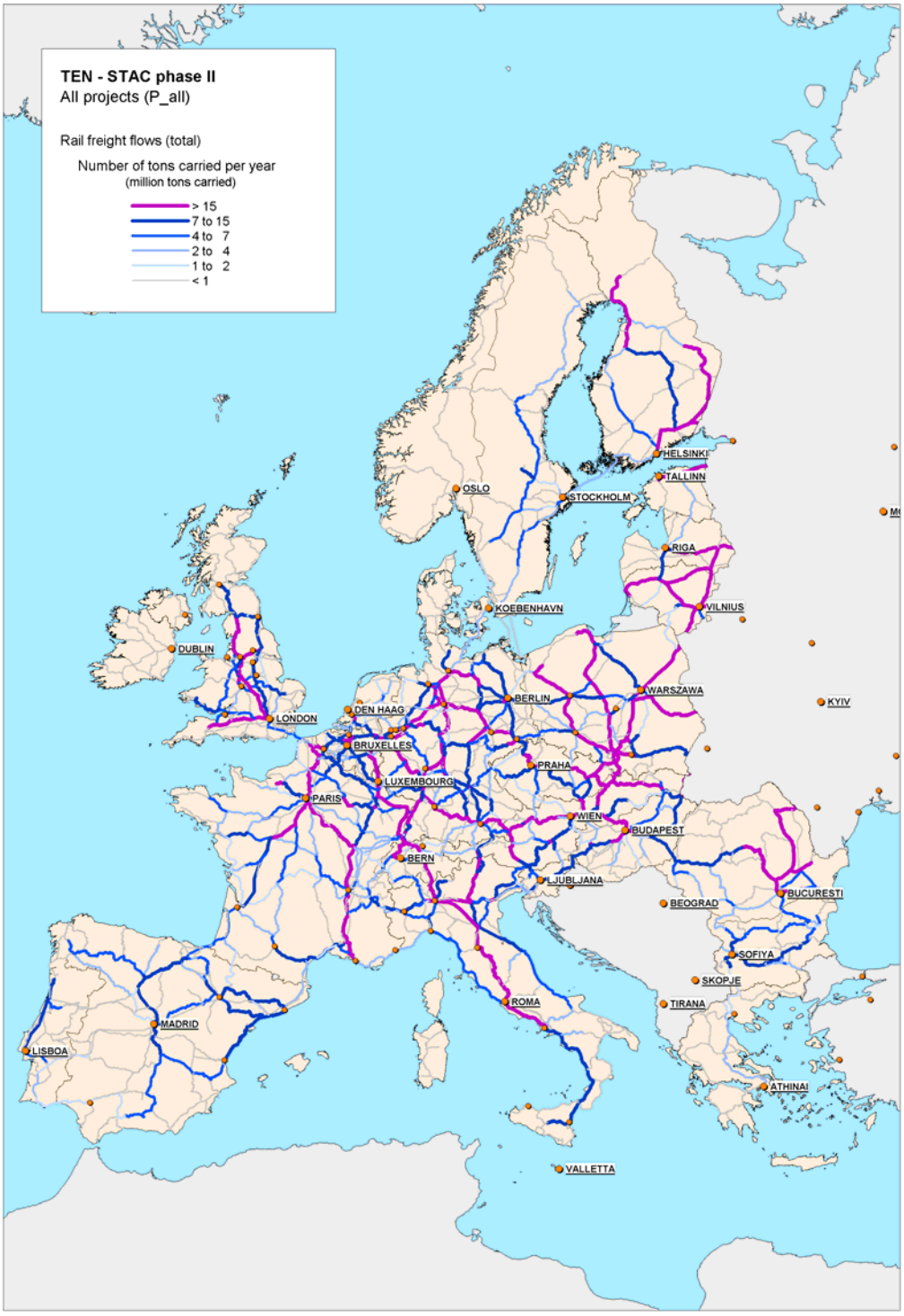


Figure 5.3 *Road passenger flows all projects scenario, total interregional*

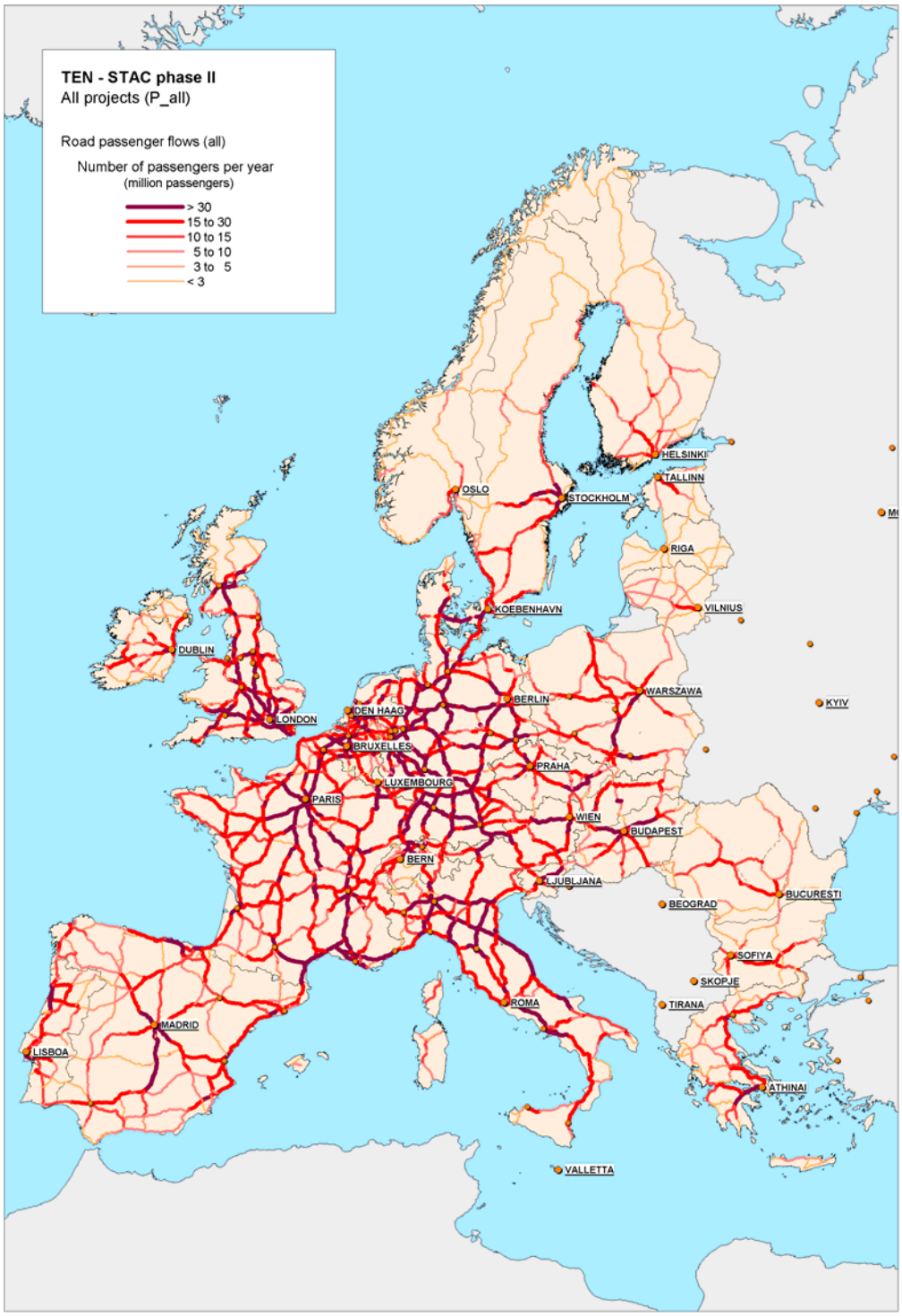


Figure 5.4 *Road freight flows all projects scenario, total interregional*

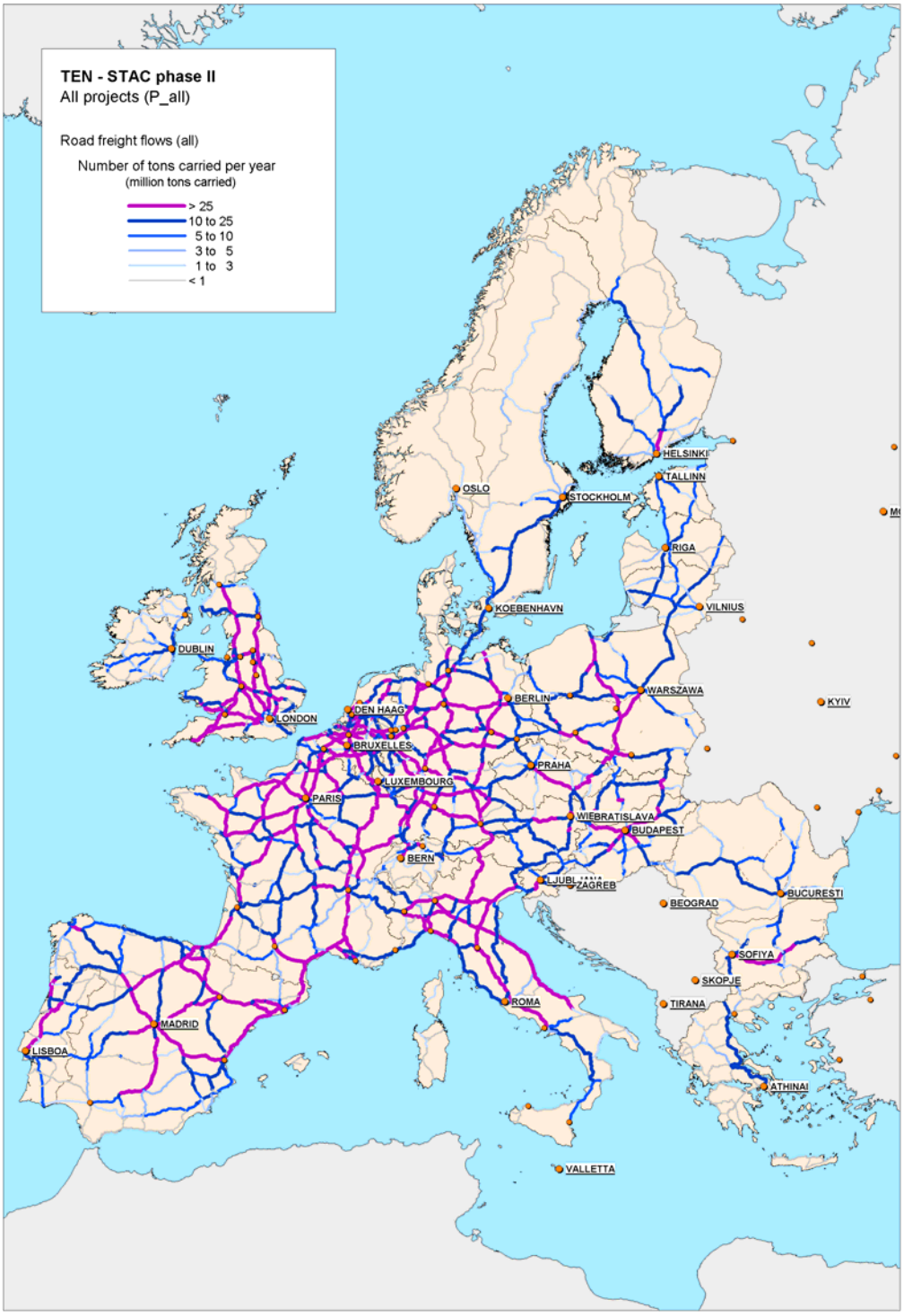


Figure 5.5 *Difference rail passenger flows all projects versus Reference 2, total interregional*

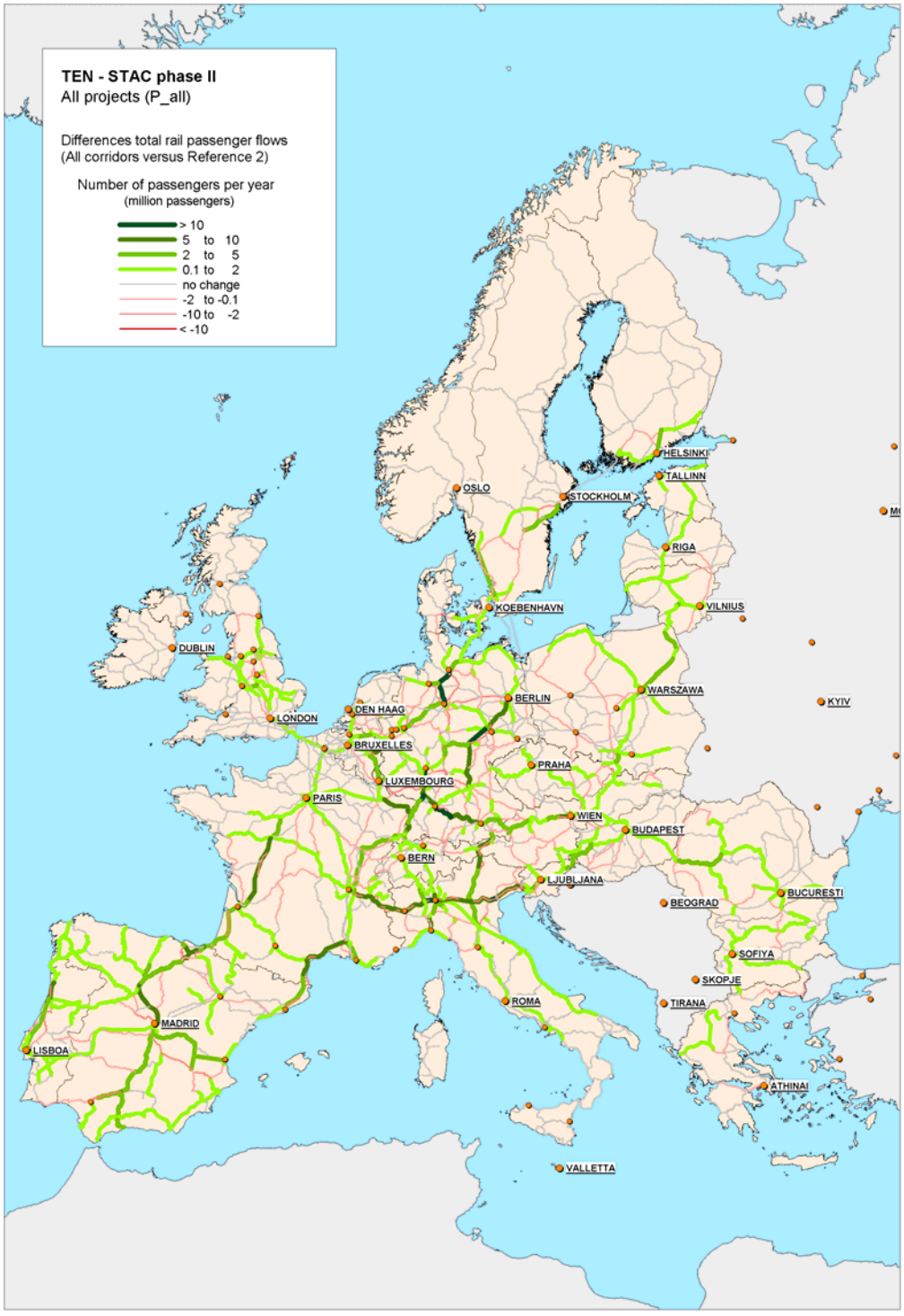


Figure 5.6 *Difference rail freight flows all projects scenario versus Reference 2, total interregional*

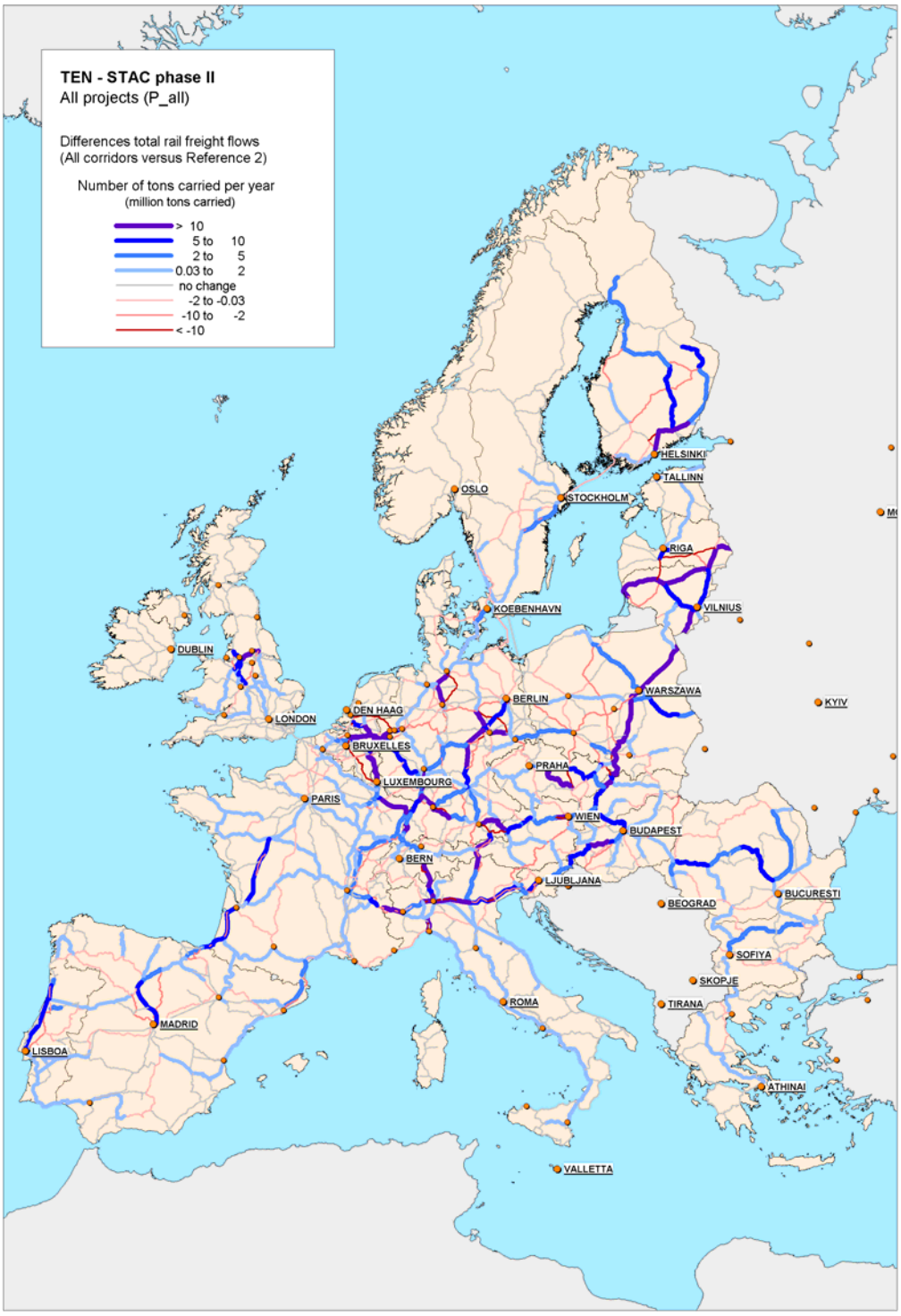


Figure 5.7 *Difference road passenger flows all projects scenario versus Reference 2, total interregional*

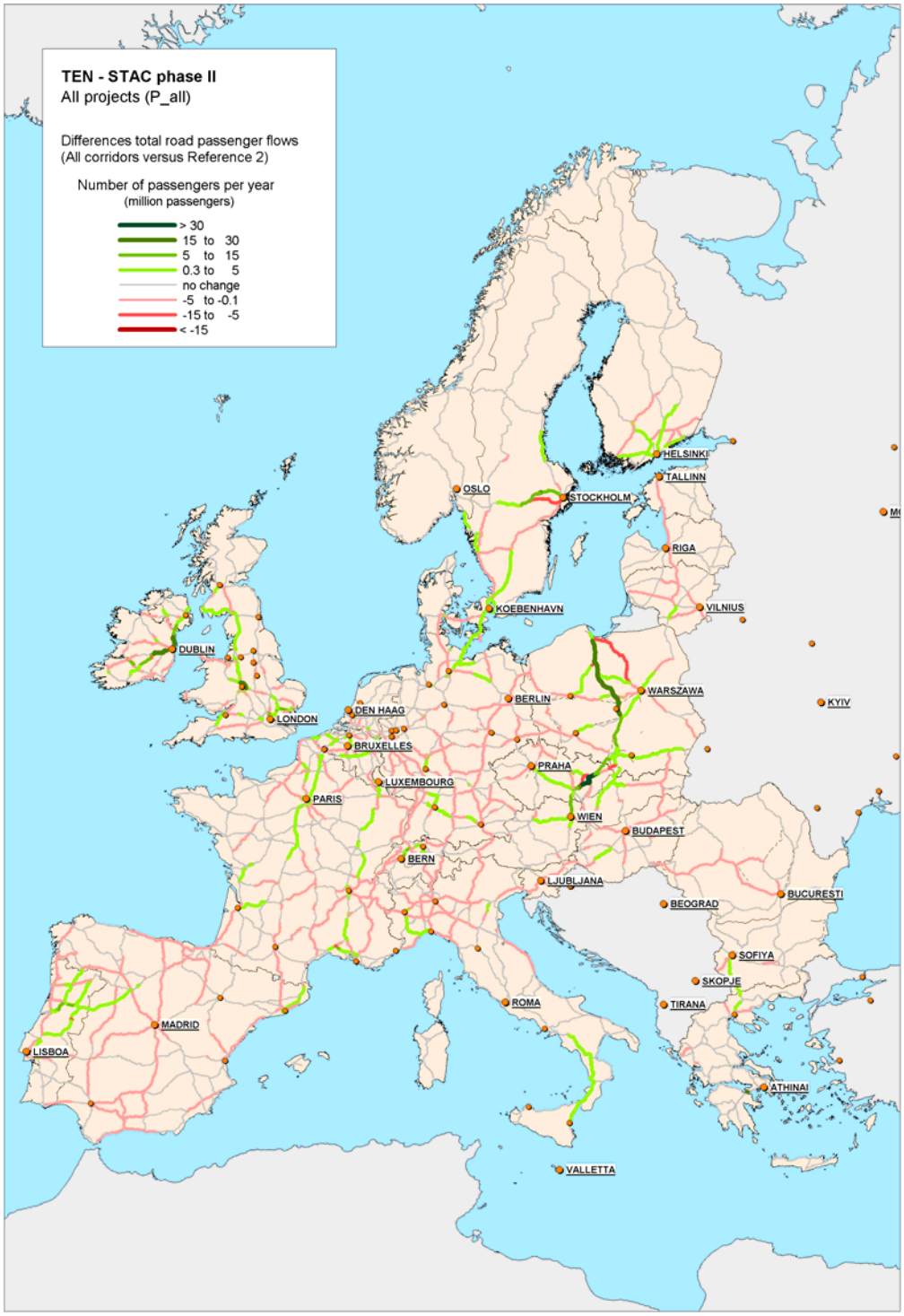
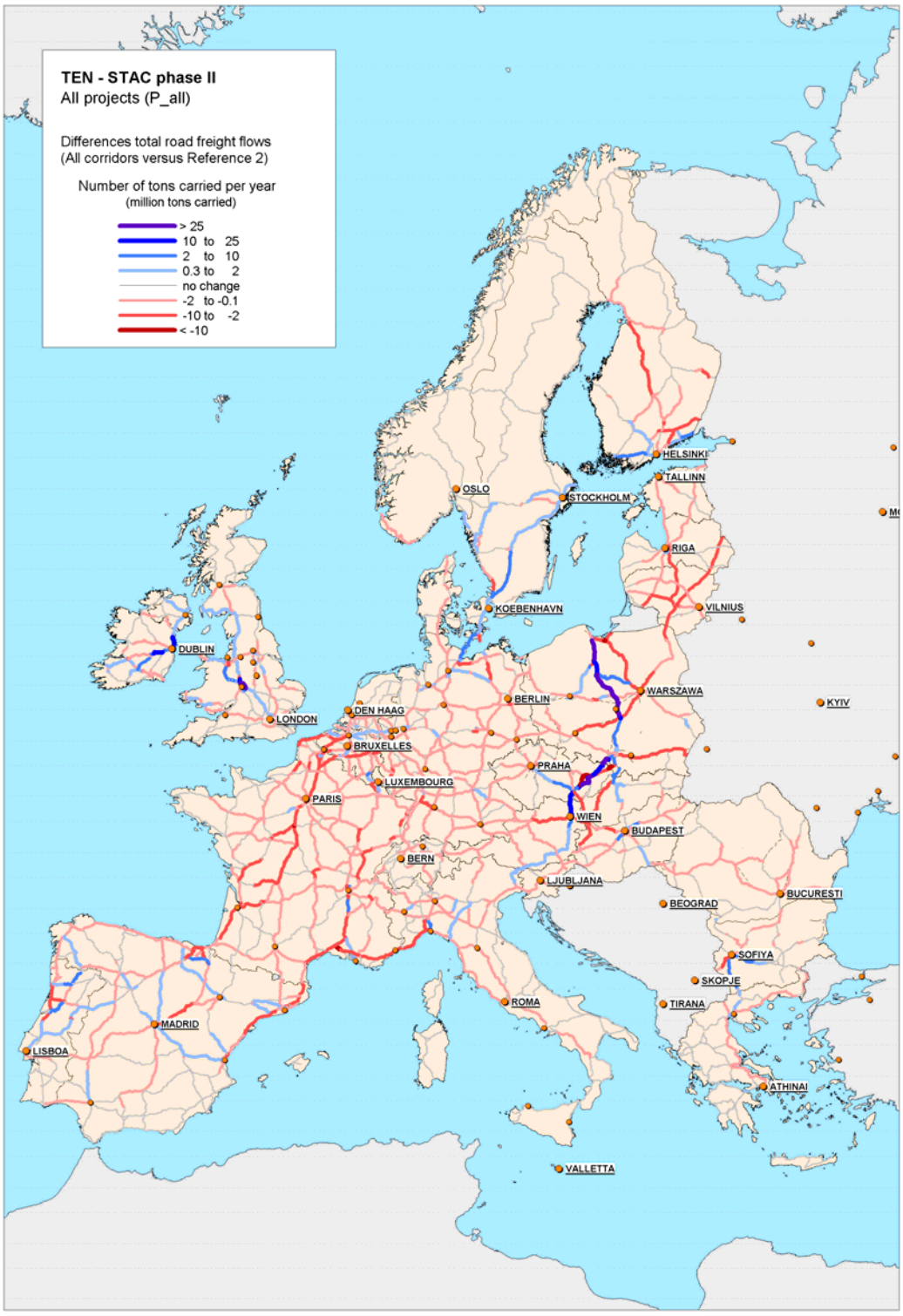


Figure 5.8 *Difference road freight flows all projects scenario versus Reference 2, total interregional*



5.2 Interpretation of the results of the all projects scenario

The performance results per sub-sections have to be interpreted carefully, first of all due to the fact that the results were generated by a standardised modelling approach at European level: the approach implies certain restraints with regard to level of detail considered for evaluations, or with regard to taking specific circumstances at local level into account. Furthermore, it has to be emphasised that the priority projects and sub-sections evaluated within TEN-STAC are heterogeneous, e.g. in terms of:

- modes concerned (rail, road, rail and road, inland waterways, short sea shipping, air),
- type of infrastructure measures (upgrade, new infrastructure)
- dedication of infrastructure measures for certain transport purposes (sub-sections exclusively for passenger transport, sub-sections dedicated to high-speed passenger rail transport, sub-sections exclusively for freight transport, sub-sections for passenger and freight),
- length of infrastructure concerned by measures[1]
- spatial circumstances of investments (infrastructure measures in the geographical centre of Europe versus investments in the periphery),
- geographical and topological circumstances of investments, including for instance bridges over straits and (base) tunnels through mountains.

The huge diversity in characteristics of the sub-sections under evaluation has to be considered carefully when interpreting the sub-section-specific performance values. Furthermore, since for many performance indicators the values represent the difference with regard to the reference case (Reference 2 scenario), the situation of transport infrastructure in the Reference 2 scenario has to be considered thoroughly.

A few priority projects and sub-sections feature overlapping links, i.e. links, which belong to two different priority projects and sub-sections. However, in order to avoid double counting and methodological difficulties due to the possibility of the same link being considered within the scope of two different sub-sections, for most of the overlapping links a clear allocation has been made.

[1] For instance, the length of specific infrastructure measures on sub-sections varies between 10 km (P01.3, rail/road bridge over the Strait of Messina) and 747 km (P06.3, railway line Venezia – Ljubljana – Budapest).

Most of the overlapping sections can be found in Spain due to priority project P19, interoperability of the Spanish high-speed rail network. The allocation of links to sub-sections does not have an impact on the network models, but relates only to the generation of the performance data. Hence within the networks models the overlapping links are considered within all sub-sections, in which they appear. For the generation of performance data however, they are dealt with in the scope of only one sub-section. The allocation of the concerned links to sub-sections is documented in Table 5.1.

Table 5.1 *Allocation of overlapping links to sub-sections*

Project #	Project name	Proposed final agregated sections		Allocation of overlapping sections
P03	High-speed railway lines of south-west Europe	P03.1	Lisboa - Badajoz - Madrid	
		P03.5	Aveiro - Salamanca	
		P03.6	Lisboa - Porto	
		P03.2	Barcelona-Figueras-Perpignan-Montpellier-Nimes	
		P03.3	Madrid-Vitoria-Irun/Hendaye - Bordeaux	
		P03.4	Bordeaux-Tours	
P08	Multimodal link Portugal/Spain-rest of Europe	P08.1	Railway line Coruña-Lisboa-Sines	Sines - Ermidas considered within P16.2
		P08.2	Railway line Lisboa-Valladolid	Lisboa - Entroncamento - Pampilhosa - Porto considered within P08.1
		P08.3	Lisboa-Valladolid motorway	
		P08.4	New Lisboa airport	
P16	Freight railway line Sines-Madrid-Paris	P16.1	New high-capacity rail link across the Pyrenees	
		P16.2	Railway line Sines-Badajoz	
P17	Railway line (Paris-) Strasbourg-Stuttgart-Wien-Bratislava	P17.1	Baudrecourt-Strasbourg-Stuttgart with the Kehl bridge as cross-border section	
		P17.2	Stuttgart-Ulm	
		P17.3	München-Salzburg , cross-border section	
		P17.4	Salzburg-Wien	
		P17.5	Wien-Bratislava , cross-border section	
P19	High-speed rail interoperability on the Iberian peninsula	P19.1	Madrid-Andalucia	
		P19.2	North-East	Madrid - Valladolid - Irun considered within P03.3
		P19.3	Madrid-Levante and Mediterranean	
		P19.4	North/North-west corridor, except Vigo-Porto	New line Aveiro - Salamanca considered within P03.5
		P19.6	Vigo-Porto	Project considered within P08.1
		P19.5	Extremadura	New line Madrid - Badajoz - Lisboa considered within P03.1
P28	"Eurocaprail" on the Brussels-Luxembourg-Strasbourg railway line	P28.1	Brussels-Luxembourg-Strasbourg	Metz - Strasbourg considered within P17.1

The sub-sections P19.5 and P19.6 are completely dealt with in the framework of other sub-sections (P03.1 and P08.1).

Some of the sub-sections are multi-modal, like sub-sections on the Nordic Triangle (P12) and the bridges over the Strait of Messina (P01.3) or the Fehmarn Belt (P20.1). When interpreting the results, one has to be aware that the values refer to all modes concerned by the infrastructure measure. Therefore, especially the values referring to transport volumes on a sub-section tend to be higher for multi-modal sub-sections than for uni-modal ones.

The values for changes in (potential) passenger transport costs reflect two dimensions: the demand on the sub-sections and the dimension of the infrastructure project in terms of length of transport infrastructure subject to improvements and type of infrastructure measures (e.g. upgrade versus new construction).

The share of international volumes on a sub-section inform about the sub-section's relevance for international transport flows. For the interpretation of the performance values, the scope and the definition of the sub-sections have to be considered: A relatively short border-crossing sub-section is more likely to represent a high value than a large sub-section with a border-crossing link. A comparison of the share of international volumes of passenger transport with that of freight transport reveals, as expected, for most of the sub-sections higher shares for freight than for passenger and supports the supposition that freight transport has a larger international dimension than passenger transport. Some sub-sections with a low share of international traffic volumes, suggest the conclusion that their significance is mainly at national level.

When interpreting the performance values based on selected O/Ds, like indicators (4a)-(7), (24)-(26) and (28a)-(29), the methodology applied for the generation of the performance values has to be kept in mind: the calculation of the performance values for the indicators listed above starts with the identification of selected O/Ds on the sub-section in the loaded network for the all projects scenario. Then the selected sub-section-specific O/Ds are re-traced for the other modes for the all projects scenario and for all modes in the Reference 2 scenario. The differences in volumes and routings of the selected, sub-section-specific O/Ds are applied in order to generate performance data for the indicators above. This approach may result in unexpected outcomes in some cases, if the combination of large-scale infrastructure measures in the all projects scenario provokes changes in O/D flow patterns, which by the approach of re-tracing selected O/Ds may be allocated to sub-sections being not responsible for the changes.

5.3 Impact of implementation of the priority projects on the traffic flows in high sensitive areas: the Alps

The priority projects address the major bottlenecks of European infrastructure and their implementation. They are supporting the realisation of the objectives of the White Paper, by creating the "hardware" support of implementing policies to encourage the use of alternative transport modes for both passenger and freight.

In case of highly sensitive areas, such as the Alps, where there are limited possible routes for crossing the natural barriers, and the impact of traffic flows is more severe than elsewhere, TEN-STAC estimations are carefully assessed in order to offer a sensitive support of further use.

Impact on the Alpine crossings

The analysis consists of an overview of year 2002 traffic flows, as provided by ARE CH, and of the assignment results of 2020 all projects scenario. The analysis is focused on the three most important Alpine crossings, the Gotthard, Frejus/Mont-Cenis and the Brenner.

[4] According to the "A European initiative for growth investing networks and knowledge for growth and jobs – Final report to the European Council" document, the end of the works in the Mont Cenis subsection is expected to be in 2017.

Impact on the Gotthard crossing

In case of freight transport, the Gotthard is considered as distinct sub-section of priority project no. 24: Railway line Lyon / Genova /-Basel-Duisburg-Rotterdam / Antwerp (as sub-section P24.7: Gotthard). In the Reference 2 scenario, the Gotthard is considered open only in case of passenger transport. The approach for freight is different because the consideration of the project in Reference 2 will bias the P24 (exactly the same Origin – Destination relations are found on P24.2 Genova-Milan / Novara-Swiss border and P24.7 Gotthard), and it is difficult to make a precise distribution of the effects of the two projects. However, the Gotthard project is considered in the distribution of impacts across priority projects and sub-sections in the all projects scenario. The traffic flows on the crossing are as follows:

Year 2002

Road:	7.5 mln tons
Rail:	14.2 mln tons of which 0.5 mln tons RO-LA (ROLLING ROAD)

Forecast 2020

Road:	6.8 mln tons in All projects scenario, including RO-LA
Rail:	19.1 mln tons in Reference 2 scenario (old route)
	25.9 mln tons in P24 scenario (new route)
	24.2 mln tons in All projects scenario (new route)
RO-LA:	30% of the road flows (2.04 Mln tons) are shifted to rolling road, thus the new resulted flows are:
Road:	4.76 mln tons in All projects scenario
Rail:	26.24 mln tons in All projects scenario

It is observed that the rail corridor on the Gotthard is in competition with other rail projects and/or modes, as can be seen in the difference between the P24 traffic flows and the All projects scenario, in the latter 1.5 mln tons are shifted to other routes/modes.

Concerning the results of the all projects scenario, the road traffic flows expected in year 2020 are lower than the traffic flows of year 2002, a possible cause could be the re-routing on other alternative crossings. For rail transport, a growth of 5.14 Mln tons or 36% is expected. How much the rail traffic will grow in reality depends of the level of competition with other parallel routes. Specific constraints for road traffic crossing the Alps, on the Gotthard and/or on other parallel routes, such as the Brenner, could increase the rail traffic flows. However, these alternative evolutions are not considered for further analysis in the TEN-STAC project.

Impact on the the Frejus/Mont-Cenis and Mont Blanc crossings

The Frejus/Mont-Cenis Alpine crossing is part of the sub-section P06.1 of the priority project P06: Railway line Lyon-Trieste/Koper-Ljubljana-Budapest-Ukrainian border. This project is considered as realised in P06 and All projects scenarios, and it is not included in Reference 2. With respect to the road traffic flows, there is a strong correlation between this Alpine crossing and the Mont Blanc one, both serving mainly the same routes. This fact has been observed by the shifting of road flows that occurred during the closure of Mont Blanc tunnel due to the fire incident. The traffic flows on the crossing are as follows:

Year 2002

Road: 24.1 mln tons (24.4 Mln tons together with Mont Blanc)
Rail: 8.6 mln tons

Forecast 2020

Road: 22.7 mln tons (38.1 Mln tons together with Mont Blanc), including RO-LA

Rail: 5.6 mln tons in Reference 2 scenario (old route)
13.1 mln tons in P06 scenario (new route)
7.7 mln tons in All projects scenario (new route)

RO-LA: 20% of the road flows (4.54 mln tons) are shifted to rolling road, thus the new resulted flows are:
Road: 18.16 mln tons in All projects scenario
Rail: 12.24 mln tons in All projects scenario

Impact on the Mont Blanc crossing

The traffic flows on the crossing are as follows:

Year 2002

Road: 1.3 mln tons (14.3 mln tons in 1994, thus before the accident)
Rail: n.a.

Forecast 2020

Road: 15.4 mln tons (max. capacity is around 15 mln tons due to the traffic safety measures)
Rail: n.a.

It is observed that the rail project on the Frejus / Mont-Cenis is in strong competition with other rail projects, especially with P24.7 Gotthard, and/or modes, as can be seen in the difference between the P06 traffic flows and All projects scenario, in the latter 5.4 mln tons are shifted to other routes/modes.

The road traffic flows expected in year 2020 are decreasing with 6 mln tons/ 25%, after also considering the shift to RO-LA. However, this figure is questionable, because in year 2002 the Mont Blanc flows were re-routed on the Frejus/Mont-Cenis. Comparing the cumulated road flows of both crossings, we than have a growth of 9.16 mln tons or 37.5% after applying the shift to RO-LA. For rail transport, a growth of 3.64 mln tons or 42% is expected, RO-LA included. How much the rail traffic will grow depends of the level of competition with other parallel routes, like in case of the Gotthard. Specific constraints for road traffic crossing the Alps, on the Gotthard and/or on other parallel routes as the Brenner, could increase the rail traffic flows. However, these alternative evolutions are not considered for further analysis in the TEN-STAC project.

Impact on the Brenner crossing

Brenner Pass is part of the sub-section P01.2 of the priority project P01: Railway line Berlin-Verona/Milano-Bologna-Napoli-Messina. This project is considered as realised in P01 and All projects scenarios, and it is not included in Reference 2 at the new parameters. The traffic flows on the crossing are as follows:

Year 2002

Road:	25.8 mln tons
Rail:	10.1 mln tons (3.3 mln tons RO-LA)

Forecast 2020

Road:	55.4 mln tons, in All projects scenario (including RO-LA)
Rail:	7.9 mln tons in Reference 2 scenario (old route) 14.4 mln tons in P01 scenario (new route) 10.6 mln tons in All projects scenario (new route)
RO-LA:	15% of the road flows (8.31 Mln tons) are shifted to rolling road, thus the new resulted flows are:
Road:	47.09 mln tons in All projects scenario
Rail:	18.91 mln tons in All projects scenario

It is observed that the rail corridor on the Brenner is in competition with other rail projects and/or modes of transport, as can be seen in the difference between the P01 traffic flows and All projects scenario, in the latest 3.8 mln tons are shifted to other routes / modes.

The road traffic flows expected in year 2020 are increasing with 21.3 Mln tons, thus 83%, after considering the shift to RO-LA. The rail traffic flows are growing with 8.8 mln tons or 87%, RO-LA included. How much the rail traffic will grow depends of the level of competition with other parallel routes, especially with the Gotthard.

6 ASSESSMENT OF THE GLOBAL IMPACT OF THE PRIORITY PROJECTS

6.1 Introduction

In this chapter a standardised presentation is given for 22 priority projects. These 22 priority projects all include sections not yet completed due to the reference 2 scenario. The chapter includes:

- description of the priority project
- maps on the impact at traffic flow level
- estimated impacts in a table by indicator, and
- comments on the main results

All indicators on freight flows are related to interregional transport, so local intraregional transport is excluded. With regard to passenger transport the zoning system is more detailed, so local flows are partially included here.

In the tables of the indicators the results of the “all projects” scenario are presented firstly. In those cases where the value of the indicator differs from the “all projects” scenario in the “project only” scenario, the value in the “project only” scenario is mentioned between brackets.

6.2 P01 RAILWAY LINE BERLIN-VERONA/MILANO-BOLOGNA-NAPOLI-MESSINA

6.2.1 Description of the priority project

Priority Project	Priority Project name	Sub-sections		Sections	Sub-section start date	Sub-section end date
P01	Railway line Berlin-Verona/Milano-Bologna-Napoli-Messina	P01.1	Berlin & Halle/Leipzig-Nürnberg	P01 D Berlin Lehrter Bahnhof Berlin/Ludwigsfede	1994	2008
				P01 D Halle/Leipzig–Nürnberg	1996	2012
		P01.2	München-Kufstein-Innsbruck-Brenner	P01 D München–Kufstein	2010	2015
				P01 A Kufstein-Innsbrück	2003	2009
				P01 A - I Brenner Tunnel	2007	2015
		P01.3	Rail/road bridge over the Strait of Messina	P01 I Bridge over the Strait of Messina	2005	2015

The sub-sections aim to improve one of the main North-South railway axes in Europe.

The envisaged direct benefits of these sub-sections are an increase of speed of travelling and a significant increase of rail freight capacity in the North-South trade corridors. Indirectly these projects are expected to attract new passengers and freight at the expense of road transport along the whole of the North-South corridor. Therefore a substantial modal shift is expected both in freight as well as in passenger transport. Specifically the Brenner Tunnel project also is expected to contribute positively to the environment in the (environmentally) vulnerable Alpine region.

Table 6.1 *Project fiche P01*

Project	Description			
P01 Railway line Berlin – Verona/ Milano – Bologna – Napoli – Messina	Ongoing improvements to one of Europe's major rail axes will enable both people and goods to travel much more rapidly between Northern Europe and Italy. The construction of a new rail basis tunnel under the Brenner pass will encourage the development of intermodal transport in the Alps. Besides the bridge over the Strait of Messina will connect the second most populated island of Europe (5 millions inhabitants) to the rest of Europe.			
Sections of the Project	Objectives	Description	Start date	End date
P01.1 Berlin – Halle/ Leipzig – Nürnberg	The project aims to shift transport performance from road (and air) to rail. It will promote modal shifts to rail (3 billion tkm/ year from road to rail, 250 million pkm/ year from air to rail and about 490 pkm/ year from road to rail). The project will gain an improvement of accessibility, environmental benefits and the improvement of transport safety.	The project is constituted by 3 sections: Berlin – Leipzig Halle/ Leipzig – Erfurt Erfurt – Nürnberg The Berlin – Leipzig_section is already completed. The Halle/ Leipzig – Erfurt_section is a new construction of 99 km double track high-speed line (300km/h). The line has the following design and interoperability standards: TSI, ECE: E51. The line has 3 tunnels (total length: 25 km) and 6 bridges (total length: 16 km).	1996	2012

		The Erfurt – Nürnberg section is divided into the construction of two additional tracks (beside the existing 2) for high-speed (200km/ h) between Nürnberg and Ebensfeld (96 km) and the new construction of a double track high-speed line between Ebensfeld and Erfurt (122 km). 22 tunnels (total 41 km length) and 29 bridges (total 12 km length) are part of this section. Design and interoperability is the same as for the Halle/ Leipzig – Erfurt section.		
P01.2 München – Kufstein – Innsbruck – Brenner	The ongoing improvements to one of Europe's major rail axes will enable both people and goods to travel much more rapidly between Northern Europe and Italy. The construction of a new rail basis tunnel under the Brenner pass will encourage the development of intermodal transport in the Alps. It will cut rail journey times significantly. The additional capacity and improved quality of service will attract new rail traffic, helping to reduce road congestion by shifting freight and passengers to the railway. This is especially important in the ecologically sensitive Alpine region, where heavy road traffic causes serious environmental impacts.	The project is constituted by 3 sections: München – Kufstein; Kufstein – Innsbruck; Brenner tunnel. The München – Kufstein__section comprises the upgrading of the 97 km existing line München – Kiefersfelden with 2 additional tracks for high-speed. The existing line is a 2 tracks railway. The Kufstein – Innsbruck is constituted by 62.5 km of new infrastructure. The line complies with design and interoperability standards (EU and UN/ ECE standards). 4 tracks, 2 new and 2 already existing will form it. The existing facilities are electrified, 15 kV/ 16.7 Hz. There are some permanent structures involved in the project of this section, mainly tunnels. They are the following with the correspondent length: Tunnel Radfeld/ Wiesing with a length of 11.4 km; Tunnel Wiesing/ Jenbach with a length of 4.5 km; Tunnel Stans/ Terfens with a length of 10.6 km; Gallery Terfens with a length of 1.3 km; Cut and cover tunnel Fritzens/ Baumkirchen with a length of 3.9 km; Inntal tunnel (in service since 1994) with a length of 12.8km (Innsbruck bypass). The section will contribute to reduce significantly the travel/ transit time and it will increase the capacity and reliability of operations and services. The Brenner base tunnel (Austrian part) has a length of 32.5 km and together with part I (Italian part) reaches a total length of 55.3 km. It will be composed by 2 tubes, 1 track per tube. The design and interoperability standards will be HS-TSI, AGC, AGTC.	2003	2015
P01.3 Rail/Road bridge over the Strait of Messina	The project consists of long mixed use bridge over the Strait of Messina, which will connect the second most populated island of Europe (5 million inhabitants) to	The section is a part of an essential transnational axis, since it will connect Sicily to the mainland and to the intermodal transeuropean corridors	2005	2015

	the rest of Europe. This link will constitute a landmark infrastructure for Europe with a magnitude comparable with that of the Oresund bridge. The project will achieve the following objectives: drastic reduction in exhaust gas emissions; important time savings in crossing the Strait; large reduction in urban area congestion; higher degree of socio-economic integration of urban areas along the Strait; positive effects on the economy and the employment.	(specifically, Corridor V and Corridor VII). The project consists of mixed use bridge with a distance of 3.3 km between the 2 main piers over the Strait of Messina. The project adopts a single-span suspension bridge with a central span of 3,300 meters. The total length of the deck is 3,666 meters and 60 meters wide, (side spans included). The deck is formed of a three boxes section, two for the roadway and the central one for the railway. The roadway deck is composed of three lanes for each carriageway (two driving lanes and one emergency lane), each 3.75 meters wide, while the railway section is composed of two tracks and two pedestrian sidewalks. The height of the two towers is 382.6 meters. Most of the accesses, which are not part of the priority project (20.3 km of roads links and 19.8 km of railways links), will be developed in tunnels connecting directly the bridge to the new routes. On the mainland, the bridge will connect to the new section of the Salerno - Reggio Calabria motorway (A3) and to the planned Naples – Reggio Calabria High-speed railway line. On the Sicilian side, to the Messina – Catania (A18) and Messina – Palermo (A20) motorways as well as the Messina railway station.		

6.2.2 Impact on the level of traffic flows

The impact at the level of traffic flows is identified at infrastructure level as follows:

- Rail passenger flows P01, total interregional,
- Rail passenger flows P01, international,
- Rail freight flows P01, total interregional,
- Rail freight flows P01, international.

The impact at the level of traffic flows is illustrated by the figures hereunder.

Figure 6.1 *Rail passenger flows P01, total interregional*

Figure 6.2 *Rail passenger flows P01, international*

Figure 6.3 *Rail freight flows P01, total interregional*

Figure 6.4 *Rail freight flows P01, international*

6.2.3 Estimated aggregated impacts of the priority project

In the following table, the impact variables for the all projects scenario are presented for all sub-sections of the priority project. Between brackets, the values of the individual project scenarios are given. The methodology of the impact variables is described in D6, Chapter 3.6.

Table 6.2 *Impact variables P01: Railway line Berlin-Verona/Milano-Bologna-Napoli-Messina*

Objective	Indicator	P01.1	P01.2	P01.3	P01 Total
ECONOMIC IMPACTS IN THE TRANSPORT SECTOR					
IMPROVEMENT OF ROAD LEVEL SERVICE	(1) Changes in time costs caused by road congestion, mln. € / year	-7.6 (N/a)	-4.1 (-36.1)	-0.3 (0)	-12.0 (-36.1)
REDUCTION OF TRAVEL TIME	(2a) Changes in monetary value of the reduction of passenger travel time, mln. € / year	-326.1 (-329.6)	-226.8 (-240.1)	-383.1 (-358.8)	-936.0 (-928.4)
	(2b) Changes in passenger travel time , mln hour / year	-24.9 (-26.7)	-13.8 (-15.5)	-39.0 (-38.5)	-77.7 (-80.6)
	(3) Changes in monetary value of the reduction of freight travel time, mln. € / year	-113.0 (-117.5)	-27.3 (-36.5)	-41.3 (-41.1)	-181.5 (-195.1)
ENVIRONMENTAL SUSTAINABILITY					
GLOBAL WARMING	(4a) Change (in monetary value) of the transport contribution to global warming, mln. € / year	-10.789 (-10.224)	-3.126 (-2.605)	0.000 (0.054)	-14.236 (-12.775)
	(4b) Change of the transport contribution to global warming, 1000 kg CO2 / year	-459090 (-435071)	-133027 (-110849)	-13674 (2302)	-605791 (-543618)
ATMOSPHERIC POLLUTION	(5a) Change (in monetary value) of the NOX transport emission, mln. € / year	-5.297 (-6.353)	-2.253 (-4.593)	-2.000 (-1.873)	-9.351 (-12.819)
	(5b) Change of the NOX transport emission, 1000 kg NOx / year	-937 (-1100)	-298 (-574)	-204 (-212)	-1439 (-1886)
	(6a) Change (in monetary value) of particulates' emissions of transport, mln. € / year	-0.134 (-0.014)	0.057 (-0.005)	0.000 (0)	-0.059 (-0.019)
	(6b) Change of particulates' emissions of transport, 1000 kg particulates / year	-7 (-1)	4 (0)	1 (0)	-2 (-1)
TRANSPORT SAFETY	(7) Variation on monetary value of accidents, mln. € / year	-40.1 (-5.1)	-13.1 (-14.2)	5.1 (13.4)	-48.2 (-5.8)
INVESTMENT COST					
INVESTMENT COST	(8) Total project costs, mln. €	7436	7712	4491	19639
GENERAL TRANSPORT RELEVANCE					
TOTAL TRAFFIC VOLUME ON THE PROJECT	(10) Total passenger traffic on the project section, mln. passengers / year	10.1 (10.6)	8.7 (9.1)	20.7 (20.6)	- -
	(11a) Maximum freight traffic on the project section, mln. ton / year	37.2 (40.8)	12.8 (26.9)	19.2 (19.5)	37.2 (40.8)
	(11b) Average freight traffic on the project section, mln. ton / year	16.1 (19.3)	10.5 (19)	19.5 (19.5)	- -
	(11c) Total freight traffic on the project section, mln. ton km /year	5268 (6317)	2106 (3797)	371 (371)	7745 (10485)
INTERMODALITY	(12) Quantitative appraisal of the project's contribution for an intermodal transport system, mln. ton	4.7 (5.3)	1.0 (1.1)	0.1 (0.1)	5.8 (6.5)
CREATION OF EUROPEAN VALUE ADDED					
DEVELOPMENT OF INTERNATIONAL PASSENGER TRAFFIC	(13) Share of international passenger traffic on total traffic on the project, %	13.0 (14.1)	74.3 (74.6)	10.4 (10.2)	- -
	(14) Volume of international passenger traffic on the project, mln. passengers / year	1.3 (1.5)	6.5 (6.8)	2.1 (2.1)	- -
DEVELOPMENT OF INTERNATIONAL FREIGHT TRAFFIC	(15) Share of international freight traffic on total traffic on the project, %	24.9 (29.9)	92.0 (94)	34.0 (34.1)	- -
	(16) Volume of international freight traffic on the project, mln. tons / year	4.0 (5.8)	9.7 (17.8)	6.7 (6.7)	- -
INTEROPERABILITY	(17) Reduction of passengers waiting time at borders for international traffic	N/a	N/a	N/a	-
	(18) Reduction of freight waiting time at borders for international traffic	N/a	Yes	N/a	-
	(19) Length of networks becoming interoperable because of the project	N/a	N/a	N/a	-

Objective	Indicator	P01.1	P01.2	P01.3	P01 Total
IMPROVEMENT OF ACCESSIBILITY					
PASSENGER ACCESSIBILITY	(20) Variation of the STAC centrality index for passenger transport, %	0.14 (0.31)	0.49 (0.74)	0.10 (0.1)	- -
FREIGHT ACCESSIBILITY	(21) Variation of the STAC centrality index for freight transport, %	0.11 (0.14)	0.10 (0.14)	0.25 (0.25)	- -
PERIPHERAL ACCESSIBILITY	(22) Variation of the STAC centrality index for passenger transport in regions identified as peripheral, %	0.11 (0.25)	0.35 (0.62)	0.12 (0.16)	- -
	(23) Variation of the STAC centrality index for freight transport in regions identified as peripheral, %	0.07 (0.13)	0.05 (0.13)	0.21 (0.25)	- -
ENVIRONMENTAL SUSTAINABILITY					
MODAL REBALANCING	(24) Volume of road freight traffic shifted to rail, IWW or sea transport, mln. t·km / year	4916 (3768)	1986 (1529)	215 (119)	7117 (5416)
	(25) Volume of road and air passenger traffic shifted to rail, mln. passenger·km / year	947 (1156)	155 (595)	-289 (-340)	813 (1411)
LEVEL OF CONCERN :TRAFFIC TRANSFER	(26) Transfer of traffic from infrastructure lying in sensitive zones to the projected infrastructure, % of road traffic transferred from sensitive areas	3.9% (-0,5%)	0.8% (-1,0%)	0.6% (1,8%)	- -
LEVEL OF CONCERN: DISTANCE	(27) Percentage of the length of the project lying in a sensitive area, % length	50.0%	0.0%	0.0%	-
LEVEL OF CONCERN: EMISSIONS	(28a) Changes of inhabitants' level of concern caused by emissions of NOx, % NOx	-0.9% (-0,9%)	-0.2% (-0,6%)	0.6% (1,8%)	- -
	(28b) Changes of inhabitants' level of concern caused by emissions of particulates, % particulates	-1.0% (-0,9%)	-0.4% (-0,6%)	0.4% (1,5%)	- -
LEVEL OF CONCERN: PROXIMITY	(29) Synthetic appreciation of the proximity of the project from specially protected areas (SPAs) or densely populated areas. Proximity of the project from SPA, km	6.0%	0.0%	0.0%	-
MATURITY AND COHERENCE OF THE PROJECT					
DEVELOPMENT OF THE PROJECT	(30) Appraisal of the project planning status	5	2	3	-
INSTITUTIONAL SOUNDNESS	(31) Qualitative appraisal of the project's compliance with national plans	5	5	5	-
COHERENCE OF THE PROJECT	(32) Qualitative appraisal of the project's coherence with main international traffic corridors	2	2	4 / 5	-

Comments on the main results

Sub-section P01.3 is multi-modal. When interpreting the results, one has to be aware that the values refer to all modes concerned by the infrastructure measure. Therefore, especially the values referring to transport volumes on a sub-section tend to be higher for multi-modal sub-sections than for uni-modal ones.

Impact on passenger volumes and modal shift

- Passenger transport volumes vary in average between 8.7 mln passengers/year in case of P01.2 and 20.7 mln. passengers/year in case of P01.3. The comparatively high volume for P01.3 (Rail/ road bridge over the Strait of Messina) is due to the fact that the value represents both road and rail transport volumes. Furthermore, it has to be considered that no charges were assumed for the usage of the new bridge, which is a rather unrealistic assumption. If road charges were applied, a considerable share of the road passenger volume would be shifted to cheaper ferry services.
- The priority project is expected to result in a decrease of road passenger by 813 mln pkm per year at the expense of road and air passenger transport. The multi-modal sun-section P01.3 causes an increase in road passenger transport performance.
- The values for changes in (potential) passenger transport costs reflect two dimensions: the demand on the sub-sections and the dimension of the infrastructure project in terms of length of transport infrastructure subject to improvements and type of infrastructure

measures (e.g. upgrade versus new construction). These dimensions have to be taken into account for the interpretation of the results: large sub-sections with a high level of expected demand, like P01.1 and P01.2 highlight with strong performances due to relatively high demand levels and the large-scale dimension of the infrastructure investments.

Impact on freight volumes and modal shift

- The average interregional freight transport volumes on sub-sections of the priority project are: P01.1: 16.1 mln ton, P01.2: 10.5 mln ton and P01.3: 19.5 mln ton. On average 50-60% of which is international freight transport (however the distribution is skew: especially P01.2 has a high share of international transport: 92%, while in P01.1 and P01.3 the shares of international transport are only 25-34% of total freight transport).
- The priority project will result in an increase in the transported interregional rail freight tonnage of 5.8 mln ton at the expense of (primarily) road freight transport.
- The total shift to rail of the P01 priority project is 7.1 bill. ton-km, mostly from road transport.

Impact on infrastructure network use

The detailed analysis carried out by the consortium has revealed the following impacts on infrastructure use:

- The increase of freight transport flows in the Northern-part of this corridor (Germany, Austria and Northern Italy) is much more substantial than in the southern part (Milan-Napoli-Messina).
- One explanation of this modest increase of rail freight in the South is the fact that the most important sub-section in this part of the priority project (Messina Bridge) is a mixed road / rail bridge.
- For passenger transport, significant higher loads on the rail links belonging to P01 are expected between Berlin and Roma, whereas between Salerno and Sicilia a slight increase in road passenger transport volumes are expected due to the multi-modal Messina bridge.

Impact on accessibility

- P01.2 highlights a relative strong improvement of centrality values of relatively poor and peripheral regions due to its significant effect on travel/ transportation times from/ to regions in the Southern part of Italy and Slovenia.

Impact on environmental sustainability

- The reduction in emissions results in a marginal decrease (less than 1%) of human health risks along the corridor.
- Some road traffic will be transferred away from sensitive areas.
- Half of the project length in the sub-section Berlin& Halle/Leipzig-Nürnberg may be located within sensitive areas.

Impact on emissions

The overall impact on emission is quantified from the impact at the network level and the differences between the all project scenario and the reference 2 scenario are as follows:

- CO_2: net reduction with 606 thousand tonnes,
- NO_x: net reduction with almost 1,500 tonnes ,
- Particulates: marginal decrease.

Development of the project

- P01.1: Berlin - Halle/Leipzig-Nürnberg. The interventions on the 2 sections forming this sub-section have the 100% of funding available and the project is ongoing. Therefore the final score for this sub-section is +5.
- P01.2: München – Kufstein – Innsbruck – Brenner. The interventions on this sub-section present different level of development. It is divided in 3 sections. The sections "Brenner Tunnel" and "Kufstein - Innsbrück" have the design studies achieved and approved by the relevant authorities, but there are no decisions on funding yet. So, the score is +3 while the score of the section München – Kufstein is 0, because either design studies or decision of funding have not been taken yet. Therefore the score for the entire sub-section has been calculated as an average of the scores of the sections as a weight. The final result is +2.
- P01.3: Bridge over the Strait of Messina. This section is formed by a unique section. Planning and funding status corresponds to a +3 final score.

6.3 P02 HIGH-SPEED RAILWAY LINE PARIS-BRUXELLES/BRUSSEL-KÖLN AMSTERDAM-LONDON

6.3.1 Description of the priority project

Priority Project	Priority Project name	Sub-sections		Sections	Sub-section start date	Sub-section end date
P02	High-speed railway line Paris-Bruxelles/Brussel-Köln-Amsterdam-London	P02.1	Liège - Aachen - Koln	P02 B Liege – Aachen	2001	2007
				P02 D Aachen – Koln	1996	2007

Table 6.3 *Project fiche P02*

Project	Description			
P02 Highspeed railway line Paris – Bruxelles/ Brussel – Köln – Amsterdam – London	It is a part of a corridor that is the first cross-border high-speed project in Europe, launched in 1989 to link the capitals and major cities of France, Belgium, The Netherlands, Germany and U.K. It will be reserved for passenger traffic, offering substantial reductions in journey times between the five countries and attracting passengers away from air travel and the roads. It will also provide improved connections between some of Europe's key airports – Brussels, Frankfurt, Köln/ Bonn, Paris Charles de Gaulle and Amsterdam Schiphol. This will make a significant contribution to the promotion of intermodal air – rail journeys, in line with Community transport policy objectives.			
Sections of the Project	Objectives	Description	Start date	End date
P02.1 Liège – Aachen – Köln	It is the Belgian – German side of the first cross border high-speed project in Europe. This section will reduce the journey times in passengers traffic and it will improve the connection between the most important cities in the North of Europe, especially Bruxelles, Köln and Bonn.	The section concerns Belgium and Germany. There are some existing facilities connecting to Belgian network in Liege and to the rail network at La Calamine. Regarding the German side the presence of 2 tracks between Köln and Aachen has to be highlighted as well. Concerning the Belgian side, there are some sections to be upgraded and some others to be built. In particular, the parts of the section between Liège and Vesdre (0.9 km) and between Raeren and the German border (1.89 km) have to be upgraded, while the part of section between Vesdre and Raeren (35.29 km) has to be built. Concerning the German side, the part of the section needs an upgrading of the existing double track 69 km line (Köln – Düren: 250 km/h and Düren – Aachen 200 km/h). Therefore, the total length of the section is 107.08 km. The German side is about 69 km while the Belgian is 38.08 km. Concerning the technical features, the tracks planned are 2 for the Belgian side, while for the German side are 4 between Köln and Düren and 2 between Düren and Aachen. The design and interoperability standards will be ETCS level 2 and GSMR for the Belgian side, while for the German one will be TSI, ECE, E 10, E 20.	1996	2007

6.3.2 Impact on the level of traffic flows

The impact at the level of traffic flows is identified at infrastructure level as follows:

- Rail passenger flows P02, total interregional,
- Rail passenger flows P02, international.

The impact at the level of traffic flows is illustrated by the figures hereunder.

Figure 6.5 *Rail passenger flows P02, total interregional*

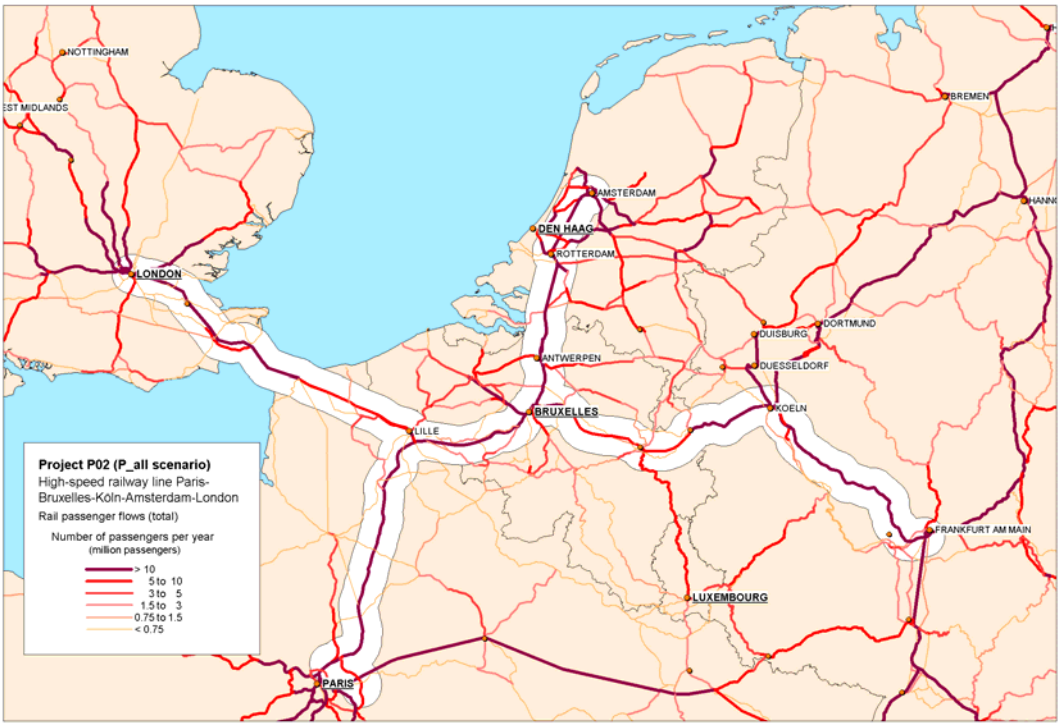
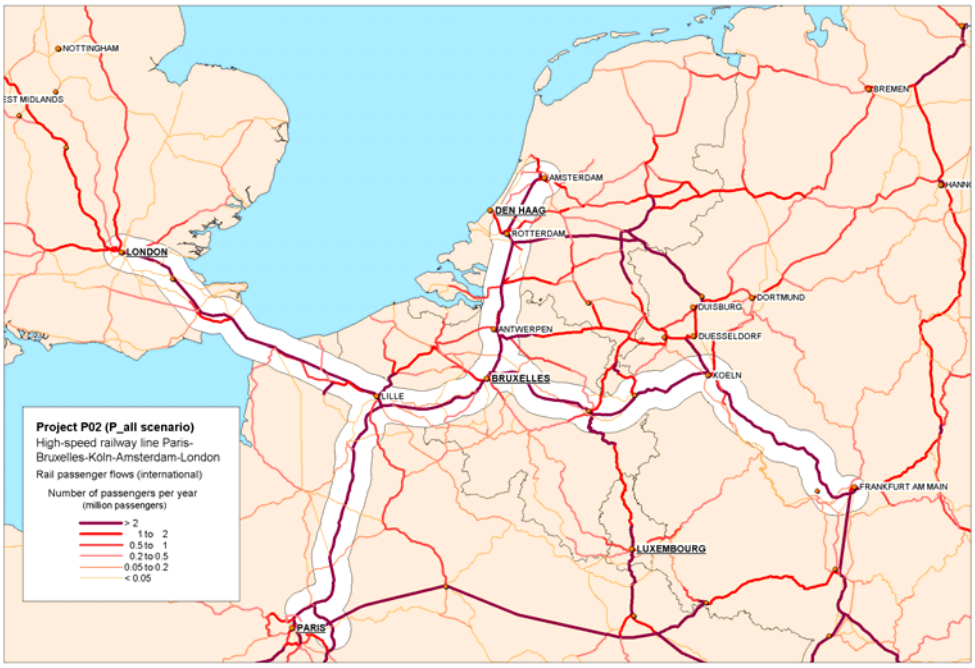


Figure 6.6 *Rail passenger flows P02, international*



6.3.3 Estimated aggregated impacts of the priority project

In the following table, the impact variables for the all projects scenario are presented for all sub-sections of the priority project. Between brackets, the values of the individual project scenarios are given. The methodology of the impact variables is described in D6, Chapter 3.6.

Table 6.4 *Impact variables P02: High-speed railway line Paris-Bruxelles/Brussel-Köln-Amsterdam-London*

Objective	Indicator	P02.1	P02 Total
ECONOMIC IMPACTS IN THE TRANSPORT SECTOR			
IMPROVEMENT OF ROAD LEVEL SERVICE	(1) Changes in time costs caused by road congestion, mln. € / year	-9.0 (-1.4)	-9.0 (-1.4)
REDUCTION OF TRAVEL TIME	(2a) Changes in monetary value of the reduction of passenger travel time, mln. € / year	-108.3 (-101.6)	-108.3 (-101.6)
	(2b) Changes in passenger travel time, mln hour / year	-6.6 (-5.4)	-6.6 (-5.4)
	(3) Changes in monetary value of the reduction of freight travel time, mln. € / year	-4.9 (-5.3)	-4.9 (-5.3)
ENVIRONMENTAL SUSTAINABILITY			
GLOBAL WARMING	(4a) Change (in monetary value) of the transport contribution to global warming, mln. € / year	-4.653 (-0.424)	-4.653 (-0.296)
	(4b) Change of the transport contribution to global warming, 1000 kg CO2 / year	-198013 (-18034)	-198013 (-18034)
ATMOSPHERIC POLLUTION	(5a) Change (in monetary value) of the NOX transport emission, mln. € / year	-0.796 (-0.62)	-0.796 (-0.62)
	(5b) Change of the NOX transport emission, 1000 kg NOx / year	-92 (-108)	-92 (-108)
	(6a) Change (in monetary value) of particulates' emissions of transport, mln. € / year	0.166 (0.035)	0.166 (0.035)
	(6b) Change of particulates' emissions of transport, 1000 kg particulates / year	8 (1)	8 (1)

Objective	Indicator	P02.1	P02 Total
TRANSPORT SAFETY	(7) Variation on monetary value of accidents, mln. € / year	-13.3 (-3.4)	-13.3 (-3.4)
INVESTMENT COST			
INVESTMENT COST	(8) Total project costs, mln. €	2108	2108
GENERAL TRANSPORT RELEVANCE			
TOTAL TRAFFIC VOLUME ON THE PROJECT	(10) Total passenger traffic on the project section, mln. passengers / year	10.5 (9.9)	- -
	(11a) Maximum freight traffic on the project section, mln. ton / year	22.4 (26.4)	22.4 (26.4)
	(11b) Average freight traffic on the project section, mln. ton / year	2.2 (5.7)	- -
	(11c) Total freight traffic on the project section, mln. ton km /year	259 (657)	259 (657)
INTERMODALITY	(12) Quantitative appraisal of the project's contribution for an intermodal transport system, mln. ton	0.0 (0)	0.0 (0)
CREATION OF EUROPEAN VALUE ADDED			
DEVELOPMENT OF INTERNATIONAL PASSENGER TRAFFIC	(13) Share of international passenger traffic on total traffic on the project, %	46.8 (50.2)	- -
	(14) Volume of international passenger traffic on the project, mln. passengers / year	4.9 (5)	- -
DEVELOPMENT OF INTERNATIONAL FREIGHT TRAFFIC	(15) Share of international freight traffic on total traffic on the project, %	93.1 (97.3)	- -
	(16) Volume of international freight traffic on the project, mln. tons / year	2.1 (5.5)	- -
INTEROPERABILITY	(17) Reduction of passengers waiting time at borders for international traffic	N/a	-
	(18) Reduction of freight waiting time at borders for international traffic	N/a	-
	(19) Length of networks becoming interoperable because of the project	N/a	-
IMPROVEMENT OF ACCESSIBILITY			
PASSENGER ACCESSIBILITY	(20) Variation of the STAC centrality index for passenger transport, %	0.09 (0.05)	- -
FREIGHT ACCESSIBILITY	(21) Variation of the STAC centrality index for freight transport, %	0.00 (0)	- -
PERIPHERAL ACCESSIBILITY	(22) Variation of the STAC centrality index for passenger transport in regions identified as peripheral, %	0.10 (0.07)	- -
	(23) Variation of the STAC centrality index for freight transport in regions identified as peripheral, %	0.00 (0)	- -
ENVIRONMENTAL SUSTAINABILITY			
MODAL REBALANCING	(24) Volume of road freight traffic shifted to rail, IWW or sea transport, mln. t·km / year	0 (0)	0 (0)
	(25) Volume of road and air passenger traffic shifted to rail, mln. passenger·km / year	411 (245)	411 (245)
LEVEL OF CONCERN :TRAFFIC TRANSFER	(26) Transfer of traffic from infrastructure lying in sensitive zones to the projected infrastructure, % of road traffic transferred from sensitive areas	-1.7% (-0,1%)	- -
LEVEL OF CONCERN: DISTANCE	(27) Percentage of the length of the project lying in a sensitive area, % length	63.0%	-
LEVEL OF CONCERN: EMISSIONS	(28a) Changes of inhabitants' level of concern caused by emissions of NOx, % NOx	-0.8% (-0,1%)	- -
	(28b) Changes of inhabitants' level of concern caused by emissions of particulates, % particulates	-0.8% (-0,1%)	- -
LEVEL OF CONCERN: PROXIMITY	(29) Synthetic appreciation of the proximity of the project from specially protected areas (SPAs) or densely populated areas. Proximity of the project from SPA, km	3.0%	-
MATURITY AND COHERENCE OF THE PROJECT			
DEVELOPMENT OF THE PROJECT	(30) Appraisal of the project planning status	5	-
INSTITUTIONAL SOUNDNESS	(31) Qualitative appraisal of the project's compliance with national plans	5	-
COHERENCE OF THE PROJECT	(32) Qualitative appraisal of the project's coherence with main international traffic corridors	2	-

Comments on the main results

Impact on passenger volumes and modal shift

- The average passenger transport volume on the sub-section P02.1 (Liége – Aachen – Köln) is 10.5 mln. passengers per year.
- The priority project is expected to decrease the road passenger transport performance by 411 million pkm per year.

Impact on infrastructure network use

A realisation of the sub-section P02.1 is expected to result in an increase in rail passenger demand on most of the links belonging to the PBKAL project, as well as on the link between Brussels and Luxembourg. Slight decreases are expected on the relations Köln – Frankfurt, and Paris – Baudrecourt – Mannheim.

Impact on environmental sustainability

- The reduction in emissions results in a marginal decrease (less than 1%) of human health risks along the corridor.
- Some road traffic (around 1%) will in be transferred to sensitive areas.
- Two thirds of the priority project length is located in potentially sensitive areas.

Impact on emissions

The overall impact on emission is quantified from the impact at the network level and the differences between the all project scenario and the reference 2 scenario are as follows:

- CO2: net reduction with 198 thousand tonnes,
- NOx: net reduction with 92 tonnes ,
- Particulates: marginal net reduction

Development of the project

- P02.1: Liege - Koln – Aachen. This section is formed by 2 sections Liege – Aachen and Aachen – Koln, which have the same level of development. In fact the start of works was in 2001 and, currently, the project is ongoing. Hence, the final score for the sub-section is +5.

6.4 P03 HIGH-SPEED RAILWAYLINES OF SOUTH-WEST EUROPE

6.4.1 Description of the priority project

Priority Project	Priority Project name	Sub-sections		Sections	Sub-section start date	Sub-section end date
P03	High-speed railway lines of south-west Europe	P03.1	Lisboa - Badajoz - Madrid	P03 P Lisboa/Porto – Madrid P03 E Lisboa/Porto – Madrid	2006	2011
		P03.5	Aveiro - Salamanca			
		P03.6	Lisboa - Porto			
		P03.2	Barcelona-Figueras-Perpignan-Montpellier-Nimes	P03 E – F Figueras – Perpignan	2004	2008
				P03 F Perpignan–Montpellier	2003	2015
				P03 F Montpellier–Nîmes	2007	2010
		P03.3	Madrid-Vitoria-Irun/Hendaye - Bordeaux	P03 E Madrid – Vitoria – Irún/Hendaye	2002	2010
				P03 F Hendaye/Irún–Dax	2008	2010
				P03 F Dax–Bordeaux	2010	2020
		P03.4	Bordeaux-Tours	P03 F Bordeaux–Tours	2008	2015

These sub-section improvements are part of an effort to improve accessibility of the Iberian Peninsula by rail (across the Pyrenees) by construction of high-speed rail lines; namely an Atlantic and a Mediterranean line and linking these with the French high-speed rail network. It involves extensions of a former Essen priority project (number 3) and largely corresponds with project number 7 on the list of priority projects in the High Level group report.

The envisaged direct benefits of these projects are a significant increase of speed of transport and a significant increase of rail freight capacity in the priority project. This is the reason why two sub-sections are subject to improvement of rail freight services, namely P03.2 Barcelona – Figueras – Perpignan – Montpellier – Nîme and P03.3 Madrid – Vitoria – Irún/ Hendaye – Bordeaux.

Indirectly these projects are expected (by quality improvement and cost reduction) to attract new passengers and freight at the expense of road transport and air transport and contribute to the economic development of the region. Therefore a substantial modal shift is expected both in freight as well as in passenger transport. Specifically the projects also aim to contribute to protect the environment in the (environmentally) vulnerable Pyrenees region.

Table 6.5 *Project fiche P03*

Project	Description			
P03 High-speed railway lines of south west Europe	The additional capacity and higher quality of service ensured by this project will improve the connection of Portugal, Spain and the South of France to North and Central Europe, contributing to a better accessibility of the Iberian Peninsula through the natural barrier of Pyrenees. Journey times within the areas will be considerably reduced. Additional capacity and improved quality of service will make a significant contribution to sustainable development by shifting road and rail traffic to rail. The extension of the standard gauge to the Spanish and Portuguese network will smooth international trade by removing the barrier at the Spanish/French border.			
Sections of the Project	Objectives	Description	Start date	End date
P03.1 Lisboa – Badajoz – Madrid	Reduce journey times between Lisboa and Madrid by a new high-speed link at European standard gauge. Strength the connection with peripheral regions. Promotion of interoperability of the Iberian network with the rest of Europe.	The new high-speed link will run from Lisboa to Madrid via Evora, Badajoz and Cáceres, according to the agreement signed on 7-8 November 2003 by the Spanish and Portuguese governments. The maximum speed will be at least 250 km/ h. The Lisboa – Madrid travel time will be reduced for passengers from more than 10 hours presently to 2h45.	n.a.	2010
P03.2 Barcelona – Figueras – Perpignan – Montpellier – Nîmes	An objective of this section is to reduce journey times. This time saving is expected to increase the number of rail passengers on this route (10% of the expected rail traffic is estimated to be traffic shifted form air to rail and 25-30% shifted from road to rail), contributing to the sustainable development objective of shifting road and air traffic to more environmentally friendly transport modes. Specifically, the extension of the European standard to the Spanish network will stimulate international trade by allowing trains to cross for the first time the French border without having to change gauge. The Mediterranean branch between Barcelona and the French border will carry freight as well as passenger traffic, boosting capacity to 6 Million tonnes per year initially, and to as much as 25 Million tonnes per year once the high-speed Montpellier – Nîmes link is completed (forecast 2012), reducing pressure on the existing conventional line. All the French and Iberian communities will benefit of a better accessibility. Especially the population of peripheral regions, Portugal and Spain, will be better connected with the rest of Europe.	The Mediterranean branch of P03 runs from Madrid, via Zaragoza and Barcelona, to Perpignan and Montpellier. An extension to Nîmes is proposed, in order to link with France's TGV Méditerranée, from Marseilles to Paris. Specifically, the Mediterranean branch is composed of several sub-sections: Madrid – Lleida – Barcelona (already achieved); Barcelona – Figueras; Figueras – Perpignan; Perpignan – Montpellier; Montepellier – Nîmes. The Spanish section of the line, joint to the existing Madrid – Sevilla line, defines a diagonal of high-speed railway lines. It aims to provide a direct connection between the Spanish and the other European high-speed railways. This section's expected capacity is 25 Million passengers/ year in the year 2015. The Figueras – Perpignan international section, with a length of 45 km, will be a new high-speed line with an expected traffic of 4.2 million tons/ year and 2.6 million passengers/ year in the in the first year of operation. End of works is expected by 2009. The new infrastructure Perpignan – Montpellier is a two-tracks electrified line for mixed traffic, bringing to a total of four tracks the rail infrastructures on the corridor. It will have a speed of 350 km/h for TGV. The tunnel gauge will	2003	2015

		allow rolling highway services. This section will eliminate the bottleneck between Montpellier and Narbonne and it will increase the capacity of the railway node of Perpignan. A time reduction of 50 minutes is expected for passenger journeys. Time savings are expected also for freight. Concerning the Montpellier – Nîmes section, the rail bypass of Nîmes and Montpellier will consist in 71 km of electrified two-tracks line, and 9 km of connections to the existing line. The expected capacity for this section will be 200 trains.		
P03.3 Madrid – Vitoria – Irun/ Hendaye – Bordeaux	The objective of this section is to reduce journey times. This time saving is expected to increase the number of rail passengers on this route (10% of the expected rail traffic is estimated to be traffic shifted form air to rail and 25-30% shifted from road to rail), contributing to the sustainable development objective of shifting road and air traffic to more environmentally friendly transport modes. The extension of the European standard to the Spanish network will stimulate international trade by allowing trains to cross for the first time the French border without having to change gauge. This section will help to create an added value in Europe, by increasing the overall capacity of the corridor, by improving interoperability with the Spanish and Portuguese rail networks. Besides, it improves accessibility for the involved population and it encourages the shift between road and rail.	This project runs from Madrid, via Vitoria, to Dax, where it joins the French rail network. It also connects with the Multimodal Link Portugal-Spain-Central Europe. Specifically, the Atlantic branch Madrid – Vitoria – Dax includes the Valladolid – Vitoria sub-section and the new line Vitoria – Dax in the Basque Region, divided as follows: Madrid – Segovia; Segovia – Valladolid – Medina del Campo; Valladolid – Burgos; Burgos – Vitoria; New Vitoria – Irún railway in the Basque region; Irun – Hendaye, cross-border section (upgrading) Dax – Bordeaux (new line). The section's expected capacity is 25 million passengers/ year in the year 2015. The cross-border section constituted by the Irún – Dax link, which is a border connection between France (Aquitaine) and Spain (Pais Vasco). Expected capacity of this side will be 250 trains per day. The line has two tracks electrified at 1.5 KV direct current. The new French Dax – Hendaye section will be 85 km long with two tunnels at the Southern egress from Bayonne. The whole link will be at the European standard gauge.	2001	2010
P03.4 Bordeaux – Tours	This section is an essential element of an international axe. It is a relevant part of a freight and passengers corridor linking the North of Europe with Spain and Portugal: Amsterdam – Brussels/ London – Lille – Paris – Bordeaux – Madrid – Valencia –	The project includes the construction of a new line and upgrading of the existing line. The total length of the section is 304 km and the start of work is expected to be within 2008 and the end of them within 2015. The intervention will include two phases:	2008	2015

	Lisbon. This branch will serve the West of France via Bordeaux and Tours, connecting with the existing high-speed line between Paris and Tours. The project will contribute to increase the capacity along the corridor Tours – Bordeaux – Dax. As a result of this, the total capacity will be increased by 100 trains per day (upgrading of the existing line only) and by 200 – 300 additional trains per day with the new LGV line. The project will contribute also to rebalance between the transport modes, generating a modal shift of 2.46 million passengers from road to rail transport mode and 3.5 tkm of freight from road to rail (this figures concerning the entire link Tours – Bordeaux – Dax with all LGV South East Atlantic in service).	the upgrade of the existing line Angoulême – Bordeaux; the 1st phase of the LGV South Europe Atlantic (also between Angouleme and Bordeaux); the 2nd phase of the LGV South Europe Atlantic between Tours and Angoulême. The new LGV line will have two tracks electrified at 1500 kV d.c., as for the existing line. Concerning the LGV South Atlantic Europe preliminary studies have been approved. The preliminary projects (APS) for the 1st phase are going to be approved.		
P03.5 Aveiro – Salamanca	Completion of the high-speed connection between Portugal and Spain (and to the rest of Europe) by a new high-speed and standard gauge link. Increase of the interoperability of the Iberian rail networks. Improvement of the accessibility of the involved regions.	New high-speed link link at Europen standard gauge (1435 mm), linking Aveiro on the Lisboa – Porto line, with Valladolid via Salamanca. This link is part of the the agreement signed on 7-8 November 2003 by the Spanish and Portuguese governments on the rail connections between the two countries.		2010 / 11
P03.6 Lisboa – Porto	Reduction of journey times between the two Portuguese main cities. Improvement of accessibility. Reduction of the congestion on the existing railway line (currently problems of capacity arise in the section near the urban areas). Promotion of the modal shift from road to rail (passenger traffic).	New double-track high-speed link of around 300 km between Lisbon and Porto via Aveiro link at European standard gauge. Around 70 km of tunnels (mainly on the branches for the access to Lisbon and Porto), and 75 km of bridges or viaduct over the main rivers.		2010 / 11

6.4.2 Impact on the level of traffic flows

The impact at the level of traffic flows is identified at infrastructure level as follows:

- Rail passenger flows P03, total interregional,
- Rail passenger flows P03, international,
- Rail freight flows P03, total interregional,
- Rail freight flows P03, international.

The impact at the level of traffic flows is illustrated by the figures hereunder.

Figure 6.7 *Rail passenger flows P03, total interregional*

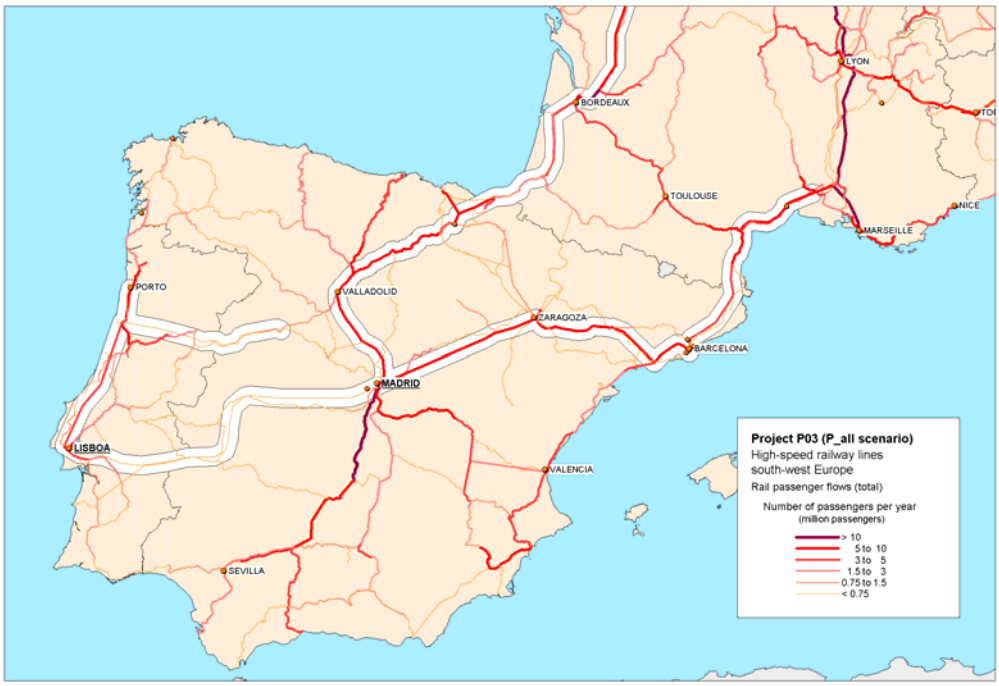


Figure 6.8 *Rail passenger flows P03, international*

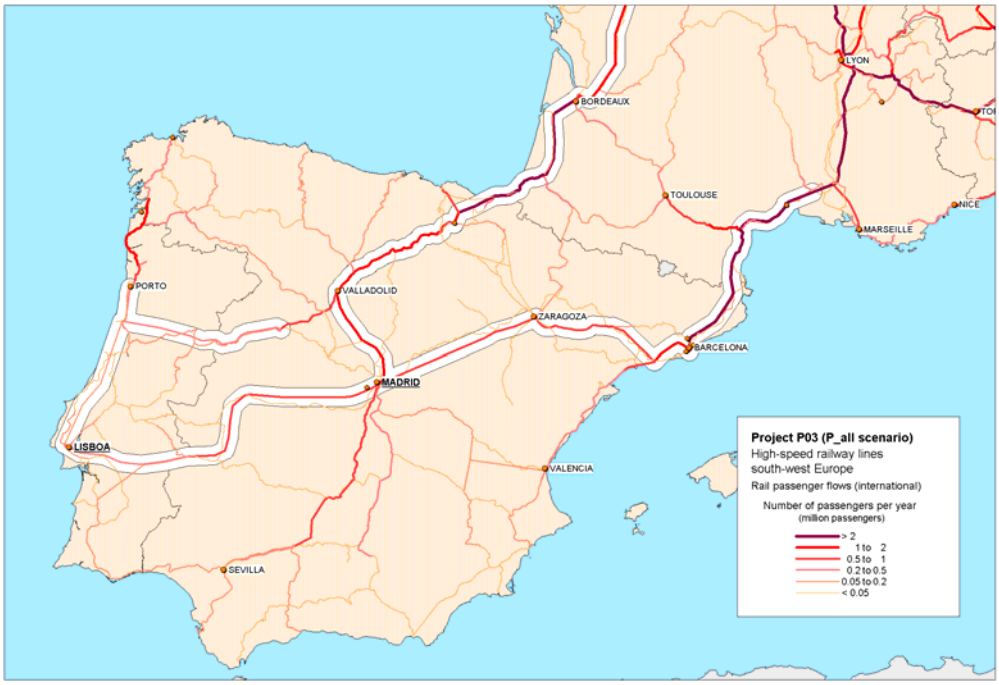


Figure 6.9 *Rail freight flows P03, total interregional*

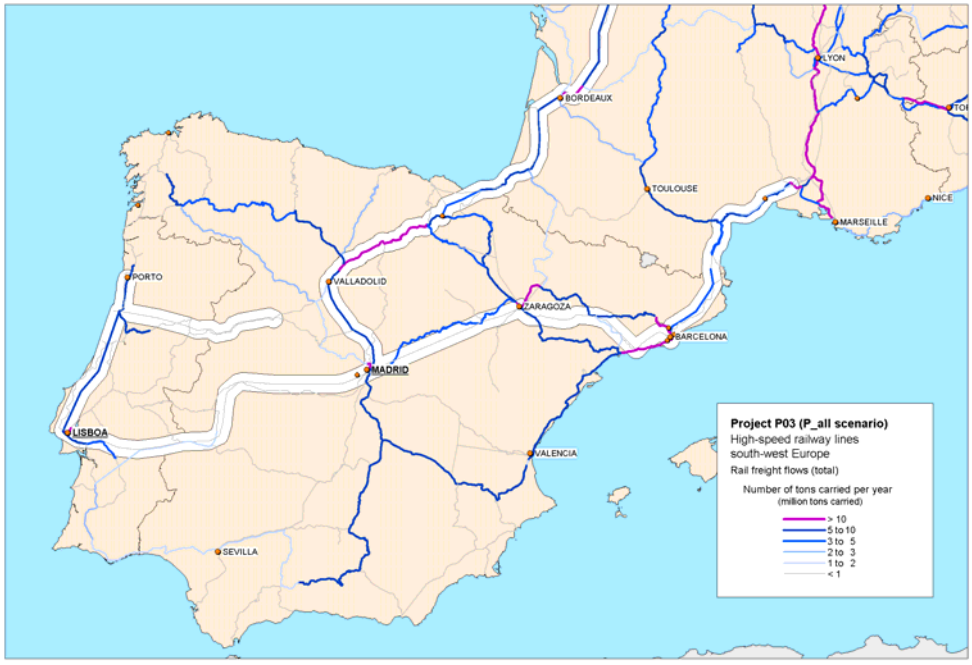
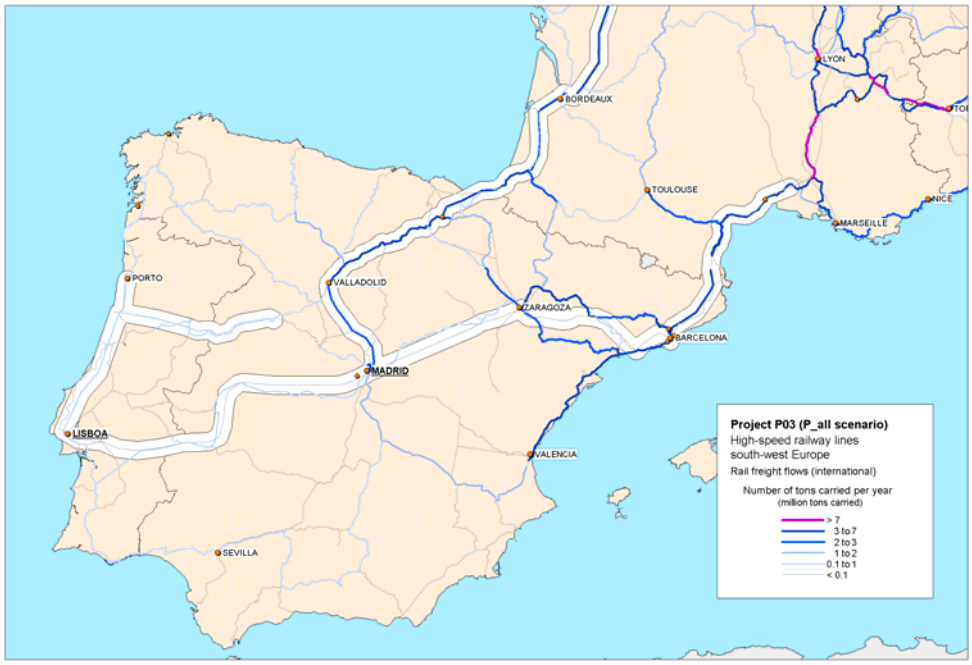


Figure 6.10 *Rail freight flows P03, international*



6.4.3 Estimated aggregated impacts of the priority project

In the following table, the impact variables for the all projects scenario are presented for all sub-sections of the priority project. Between brackets, the values of the individual project scenarios are given. The methodology of the impact variables is described in D6, Chapter 3.6.

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Table 6.6 *Impact variables P03:High-speed railway lines of south-west Europe*

Objective	Indicator	P03.1	P03.2	P03.3	P03.4	P03.5	P03.6	P03 Total
ECONOMIC IMPACTS IN THE TRANSPORT SECTOR								
IMPROVEMENT OF ROAD LEVEL SERVICE	(1) Changes in time costs caused by road congestion, mln. € / year	-0.4 (-0.6)	-6.9 (-4.8)	-3.6 (-21.9)	-4.3 (-9.1)	-0.5 (-3.6)	-0.5 (-2.8)	-16.2 (-42.7)
REDUCTION OF TRAVEL TIME	(2a) Changes in monetary value of the reduction of passenger travel time, mln. € / year	-5.1 (-4.2)	-149.7 (-128.6)	-216.8 (-184.2)	-55.9 (-49.1)	-0.2 (-0.3)	-0.3 (-0.4)	-428.0 (-366.8)
	(2b) Changes in passenger travel time, mln hour / year	-0.6 (-0.6)	-11.0 (-9.4)	-17.8 (-15.5)	-4.1 (-3.9)	0.0 (0)	0.0 (-0.1)	-33.6 (-29.5)
	(3) Changes in monetary value of the reduction of freight travel time, mln. € / year	0.0 (0)	-8.9 (-8.9)	-25.1 (-33.2)	0.0 (0)	0.0 (-0.7)	-0.3 (-0.7)	-34.3 (-43.5)
ENVIRONMENTAL SUSTAINABILITY								
GLOBAL WARMING	(4a) Change (in monetary value) of the transport contribution to global warming, mln. € / year	-0.987 (-0.296)	-21.441 (-3.064)	-7.063 (-5.647)	-12.692 (-3.36)	-0.197 (0.037)	-0.447 (-2.922)	-42.827 (-15.252)
	(4b) Change of the transport contribution to global warming, 1000 kg CO2 / year	-42001 (-12577)	-912393 (-130391)	-300558 (-240286)	-540091 (-142976)	-8392 (1571)	-19026 (-124324)	-1822461 (-648983)
ATMOSPHERIC POLLUTION	(5a) Change (in monetary value) of the NOX transport emission, mln. € / year	-0.539 (-0.186)	-8.593 (-1.314)	-3.700 (-2.823)	-6.227 (-2.579)	-0.378 (-0.379)	0.228 (-0.453)	-19.209 (-7.734)
	(5b) Change of the NOX transport emission, 1000 kg NOx / year	-77 (-29)	-975 (-161)	-418 (-412)	-654 (-350)	-40 (-57)	72 (-74)	-2092 (-1083)
	(6a) Change (in monetary value) of particulates' emissions of transport, mln. € / year	-0.004 (-0.058)	-0.264 (-0.004)	-0.047 (0.025)	-0.102 (0.032)	-0.001 (0.069)	0.061 (0.126)	-0.357 (0.19)
	(6b) Change of particulates' emissions of transport, 1000 kg particulates / year	0 (-5)	-15 (1)	0 (6)	-5 (3)	1 (8)	9 (16)	-9 (28)
TRANSPORT SAFETY	(7) Variation on monetary value of accidents, mln. € / year	-5.4 (1.6)	-33.6 (-8.8)	-19.5 (-23.5)	-12.6 (-8.7)	-2.5 (-2.5)	-18.4 (-10.9)	-91.9 (-52.8)
INVESTMENT COST								
INVESTMENT COST	(8) Total project costs, mln. €	N/a	3994	8522	3900	N/a	N/a	16416
GENERAL TRANSPORT RELEVANCE								
TOTAL TRAFFIC VOLUME ON THE PROJECT	(10) Total passenger traffic on the project section, mln. passengers / year	0.5 (0.4)	5.5 (4.9)	6.0 (5)	7.6 (7.7)	0.4 (0.5)	5.2 (4.6)	- -
	(11a) Maximum freight traffic on the project section, mln. ton / year	0.1 (0.1)	4.0 (4)	12.9 (13.1)	9.2 (9.1)	0.6 (0.6)	9.9 (8.9)	12.9 (13.1)
	(11b) Average freight traffic on the project section, mln. ton / year	0.0 (0)	3.0 (3.1)	7.5 (7.8)	9.2 (9.1)	0.6 (0.6)	8.9 (8.4)	- -
	(11c) Total freight traffic on the project section, mln. ton km /year	18 (18)	1152 (1174)	5573 (5805)	2496 (2475)	152 (149)	2441 (2307)	11832 (11928)
INTERMODALITY	(12) Quantitative appraisal of the project's contribution for an intermodal transport system, mln. ton	0.0 (0)	0.5 (0.6)	1.4 (1.9)	0.4 (0.8)	0.0 (0)	2.2 (3.5)	4.5 (6.8)

Objective	Indicator	P03.1	P03.2	P03.3	P03.4	P03.5	P03.6	P03 Total
CREATION OF EUROPEAN VALUE ADDED								
DEVELOPMENT OF INTERNATIONAL PASSENGER TRAFFIC	(13) Share of international passenger traffic on total traffic on the project, %	100.0 (93.1)	49.8 (45)	31.4 (36.7)	23.8 (24.7)	99.4 (86.5)	3.7 (4.4)	- -
	(14) Volume of international passenger traffic on the project, mln. passengers / year	0.5 (0.4)	2.7 (2.2)	1.9 (1.8)	1.8 (1.9)	0.4 (0.4)	0.2 (0.2)	- -
DEVELOPMENT OF INTERNATIONAL FREIGHT TRAFFIC	(15) Share of international freight traffic on total traffic on the project, %	69.1 (71.9)	82.3 (82.6)	63.1 (62.3)	68.7 (68.9)	100.0 (100)	6.9 (5.7)	- -
	(16) Volume of international freight traffic on the project, mln. tons / year	0.0 (0)	2.5 (2.6)	4.7 (4.9)	6.3 (6.3)	0.6 (0.6)	0.6 (0.5)	- -
INTEROPERABILITY	(17) Reduction of passengers waiting time at borders for international traffic	N/a	N/a	N/a	N/a	N/a	N/a	-
	(18) Reduction of freight waiting time at borders for international traffic	N/a	Yes	0.5	N/a	N/a	N/a	-
	(19) Length of networks becoming interoperable because of the project	N/a	N/a	N/a	N/a	N/a	N/a	-
IMPROVEMENT OF ACCESSIBILITY								
PASSENGER ACCESSIBILITY	(20) Variation of the STAC centrality index for passenger transport, %	0.28 (0.27)	2.71 (0.52)	2.92 (1.52)	0.30 (0.62)	0.10 (0.35)	0.05 (0.14)	- -
FREIGHT ACCESSIBILITY	(21) Variation of the STAC centrality index for freight transport, %	0.00 (0)	0.00 (0)	0.01 (0.04)	0.00 (0)	0.00 (0.07)	0.03 (0.04)	- -
PERIPHERAL ACCESSIBILITY	(22) Variation of the STAC centrality index for passenger transport in regions identified as peripheral, %	1.17 (0.71)	5.23 (1.19)	6.01 (2.89)	0.59 (1.19)	0.16 (0.43)	0.13 (0.15)	- -
	(23) Variation of the STAC centrality index for freight transport in regions identified as peripheral, %	0.00 (0)	0.00 (0)	0.01 (0.06)	0.00 (0)	0.01 (0.13)	0.05 (0.13)	- -
ENVIRONMENTAL SUSTAINABILITY								
MODAL REBALANCING	(24) Volume of road freight traffic shifted to rail, IWW or sea transport, mln. t·km / year	674 (65)	8921 (1328)	3861 (2284)	5413 (1158)	440 (-2)	1479 (1330)	20789 (6162)
	(25) Volume of road and air passenger traffic shifted to rail, mln. passenger·km / year	175 (-53)	900 (380)	711 (1055)	229 (724)	-65 (172)	646 (350)	2596 (2628)
LEVEL OF CONCERN :TRAFFIC TRANSFER	(26) Transfer of traffic from infrastructure lying in sensitive zones to the projected infrastructure, % of road traffic transferred from sensitive areas	-0.1% (0,1%)	-1.5% (-0,7%)	-1.2% (-1,2%)	-3.5% (-0,9%)	1.2% (-0,5%)	-1.3% (-2,9%)	- -
LEVEL OF CONCERN: DISTANCE	(27) Percentage of the length of the project lying in a sensitive area, % length	0.0%	7.0%	12.0%	6.0%	0.0%	0.0%	-
LEVEL OF CONCERN: EMISSIONS	(28a) Changes of inhabitants' level of concern caused by emissions of NOx, % NOx	-2.3% (0,1%)	-2.5% (-0,4%)	-2.1% (-0,8%)	-2.7% (-0,8%)	0.1% (-0,6%)	-4.4% (-1,9%)	- -
	(28b) Changes of inhabitants' level of concern caused by emissions of particulates, % particulates	-2.4% (0,0%)	-2.2% (-0,4%)	-2.1% (-0,9%)	-2.3% (-0,9%)	-0.5% (-0,6%)	-4.8% (-2,1%)	- -
LEVEL OF CONCERN: PROXIMITY	(29) Synthetic appreciation of the proximity of the project from specially protected areas (SPAs) or densely populated areas. Proximity of the project from SPA, km	4.0%	13.0%	20.0%	5.0%	0.0%	0.0%	-
MATURITY AND COHERENCE OF THE PROJECT								
DEVELOPMENT OF THE PROJECT	(30) Appraisal of the project planning status	N/a	2	3	2	N/a	1	-
INSTITUTIONAL SOUNDNESS	(31) Qualitative appraisal of the project's compliance with national plans	1	3	3	5	1	2	-
COHERENCE OF THE PROJECT	(32) Qualitative appraisal of the project's coherence with main international traffic corridors	1	3	2	1	N/a	N/a	-

Comments on the main results

Impact on passenger volumes and modal shift

- The forecasted passenger transport volumes vary between 0.4 mln passengers per year on P03.5 (Aveiro – Salamanca) and 7.6 mln. on P3.4 (Bordeaux – Tour).
- The priority project is expected to result in a total decrease of 2.6 billion pkm on road and in the air. The strongest decrease in road and air transport is expected to be caused by P03.2 (Barcelona – Figueras – Perpignan – Montpellier – Nîmes).
- The values for changes in (potential) passenger transport costs reflect two dimensions: the demand on the sub-sections and the dimension of the infrastructure project in terms of length of transport infrastructure subject to improvements and type of infrastructure measures (e.g. upgrade versus new construction). These dimensions have to be taken into account for the interpretation of the results: large sub-sections with a high level of expected demand, like P03.3 highlights with strong performances due to relatively high demand levels and the large-scale dimension of the infrastructure investments.
- Reasons for relatively low transport volumes in P03.1 are low demand levels.
- The share of international volumes on a sub-section inform about the sub-section's relevance for international transport flows. For the interpretation of the performance values, the scope and the definition of the sub-sections have to be considered: A relatively short border-crossing sub-section is more likely to represent a high value than a large sub-section with a border-crossing link. Some sub-sections with a low share of international traffic volumes. P03.6 suggests the conclusion that their significance is mainly at national level, for passenger (and freight).

Impact on freight volumes and modal shift

- The average interregional freight transport volumes across sub-sections in this priority project vary significantly from almost 0 (P03.1) to 9.2 mln ton (P03.4). Except for P03.6 (share of international traffic is 6.9%) the share of international transport in total freight transport is always in the range 63 – 100%, the latest for P03.5.
- The priority project will result in an increase in the transported rail freight tonnage in the priority project of 4.5 mln ton almost all tons transferred to rail from road.
- Total transport performance of freight shifted from road to rail is 20.8 bill. ton-km.

Impact on infrastructure network use

The detailed analysis carried out by the consortium has revealed the following impacts on infrastructure use:

- The rail traffic flows of both passenger and freight increase on both Atlantic and Mediterranean branches of the priority project due to an increase in the quality of the rail service. The Atlantic route, however, seems to grow with a higher rate than the Mediterranean one for passengers, while the opposite trend is observed for freight.

- Rail passenger transport flows are expected to increase along an axis Rotterdam/ London/ Mannheim – Paris – Bordeaux – Madrid – Portugal/ Andalucía. Further increases are expected along Lyon – Nîmes – Barcelona and between Narbonne and Bordeaux via Toulouse.
- Rail freight traffic increases on the relations of Spain / S-W Portugal with S-W and middle France with extensions to Brussels, Rotterdam and even Southern Germany and Luxembourg.

Impact on accessibility

- Sub-sections P03.2 and P03.3 highlight a relative strong improvement of centrality values of relatively poor and peripheral regions: due to positive impacts on the regions Galicia, Asturias, País Vasco, Communidad Foral de Navarra, La Rioja, Castilla y León, Castilla-la Mancha, Extremadura, Comunidad Valenciana, Murcia and several Portuguese regions

Impact on environmental sustainability

- The reduction in emissions results in a marginal decrease (between 1% and 4%) of human health risks along the corridor.
- In some sub-sections road traffic will be transferred away from sensitive areas and in other sub-sections there will be a transfer of road traffic to sensitive areas. However, in all sub-sections the changes are marginal (less than 2%).
- In half of the sub-sections parts are located within potentially sensitive areas, but in no section with more than 12% of the part length.

Impact on emissions

The overall impact on emission is quantified from the impact at the network level and the differences between the all project scenario and the reference 2 scenario are as follows:

- CO2: net reduction with 1,822 thousand tonnes,
- NOx: net reduction with 2.09 thousand tonnes ,
- Particulates: net reduction of 9 tons - not significant.

Development of the project

- P03.1: Lisbon - Badajoz –Madrid. It includes a Spanish and a Portuguese side. There is not information available on the Spanish one; therefore it is not possible to define the level of development of the entire section.
- P03.2: Barcelona-Figueras-Perpignan-Montpellier-Nimes. This section includes 3 sections: Figueras – Perpignan, Perpignan–Montpellier and Montpellier–Nîmes. They present different level of development. The first one is at a good level of planning and funding development. The project is ongoing and the funds are available. Therefore the score is +5. The Perpignan – Montpellier has either no decision on funding or designed studies achieved, consequently the score is +1. The Montpellier – Nimes has designed achieved but no decisions on funding. Hence, the score is +2. The overall score for the sub-section is the average score taking as weights the costs of every sections.

- P03.3: Madrid-Vitoria-Irun/Hendaye – Bordeaux. This section involves 3 sections. Madrid – Vitoria – Irún/Hendaye, Hendaye/Irún–Dax and Dax–Bordeaux. Interventions on Madrid – Vitoria – Irun/Hendaye are ongoing, therefore the score is +5, while interventions on the other 2 sections did not start yet and neither the decision on funding have been taken and design studies achieved. The score is +1. Hence, the average score for the sub-section, depending on the cost of each sub-section, is +3.
- P03.4: Bordeaux-Tours. Planning and funding status corresponds to a +2 final score.
- P03.5: Aveiro – Salamanca. Two sections, a Portuguese and a Spanish, form this sub-section. There is no information available; therefore it is not possible to define the level of development of the entire sub-section.
- P03.6: Lisboa – Porto. There are no decisions on funding and design studies are ongoing. Therefore, the overall score is +1.

6.5 P06 RAILWAY LINE LYON-TRIESTE/KOPER-LJUBLJANA-BUDAPEST-UKRANIAN BORDER

6.5.1 Description of the priority project

Priority Project	Priority Project name	Sub-sections		Sections	Sub-section start date	Sub-section end date
P06	Railway line Lyon-Trieste/Koper-Ljubljana-Budapest-Ukrainian border	P06.1	Lyon-Mont-Cenis-Torino-Milano	P06 F Lyon–St-Jean-de-Maurienne	2007	2015
				P06 F – I Mont Cenis Tunnel	2006	2016
				P06 I Bussoleno-Torino	2003	2011
				P06 I Torino-(Novara)-Milano	2003	2008
		P06.2	Milano - Venezia	P06 I Milano-(Verona)-Padova	2005	2011
				P06 I Padova-Mestre-(Venezia)	2003	2017
		P06.3	Venezia - Ljubljana - Budapest	P06 I Venezia – Trieste	2003	2015
				P06 SI Divaca - Koper	2007	2015
				P06 SI Budapest – Ljubljana	2006	2015
				P06 HU Budapest – Ljubljana	2006	2015

These sub-section improvements involve railway line upgrades, construction of new tracks, tunnel construction, and electrification of existing lines between Italy and Slovenia and Hungary.

These improvements aim to double capacity and cut travel times for both passengers and freight on the whole trajectory from Lyon-Budapest. The objective is to achieve a substantial modal shift (by improved capacity, improving service quality and the competitiveness of rail transport in general) and thereby contribute to the reduction of the negative environmental impacts of transport in the Alpine region and the Pannonian Basin. Of course the projects also pursue various regional and local economic development objectives (like stimulating the port development of Koper).

Table 6.7 *Project fiche P06*

Project	Description			
P06 Railway line Lyon – Trieste/Koper – Ljubljana – Budapest – Ukrainan border	The construction of this new rail line will encourage the development of intermodal freight transport in the Alpine Valleys suffering from high traffic densities and serious pollution. Its extension eastward will improve the connections to new Member States while reinforcing the access to the Adriatic Sea.			
Sections of the Project	Objectives	Description	Start date	End date
P06. 1 Lyon – Mont Cenis – Torino – Milano	The construction of this new rail line will encourage the development of intermodal freight transport in the Alpine Valleys suffering from high traffic densities and serious pollution. The project will bring very significant reductions in travelling time for both passengers and freight services. Along the route the capacity will be more than doubled to accommodate future demand. Increased capacity and the possibility of higher quality services offered by the new infrastructure are expected to enhance rail's competitive position and increase its market share on this route, especially for freight traffic. In terms of accessibility and cohesion, the main benefits will concern: Improving of the accessibility of the French and Italian regions. Improving of the connections with the peripheral EU regions like South of Italy, Greece, Spain, Portugal, UK and Ireland.	This project is formed by 4 main sections: Lyon – Saint Jean de Maurienne; Mont Cenis tunnel; Bussoleno – Turin; Torino – Milano The Lyon – St Jean de Maurienne has the following features for the new lines, which have to be built: Lyon – Sillon Alpin: freight line 57 km (+ 33 km are of existing line to be upgraded) and the LGV (passengers) of about 80 km. Sillon Alpin – St Jean de Maurienne: 33 km. In total 170 km of new line have to be built, with some important tunnels: Chartreuse (on the Lyon – Sillon Alpin freight line. 20-22 km); Belledonne (on the Sillon Alpin – St.Jean –de M. line); Dullin and of l'Epin (on the Lyon – Sillon Alpin passenger line). Concerning the number of tracks the features are the following: Lyon – Sillon Alpin: 2 new tracks for freight and 2 new tracks for passengers. Sillon Alpin – St Jean de Maurienne: 2 new tracks for passengers and freight. The Mont-Cenis Tunnel is the cross-border section of the international axis that links Italy and France, and it will improve the connection between the majority of the European countries. The new line has 2 new tracks for mixed passengers and freight traffic. It includes the following works: Basis tunnel between St –Jean deMaurienne and the Venaus (Val Cenischia viaduct), 52.7 km, two single-track tubes; Val Cenischia Viaduct, 2 tracks, linking the Eastern portal of the basis tunnel with the Bussoleno tunnel's Western portal; Bussoleno tunnel between Val Cenischia Viaduct and Bruzolo, 12 km, consisting of two single-track tubes. The information presented here concern the realization of the works in one phase. According to the "A European initiative for growth investing networks and knowledge for growth and jobs – Final report to the European Council" document, the start of works for this sub-section is expected to be	2007	2015 or 2017[4]

		in 2006 while the end is expected to be in 2017. The Torino – Milano sub-section is a 125 km high-speed railway line, starting from the Turin "Stura" station and ending in the Milan "Certosa" station. The track lies along the A4 Torino – Milano motorway, in order to reduce the impact of the new infrastructure. Three interconnections with the existing line will be built between the existing and the new line. The link aims at reducing the congestion on the existing line (on the Turin-Chivasso and Rho-Milano sections, the present traffic is 238 trains/ day in front of a maximum capacity of the line of 240 trains/ day). The track's development is 85% (about 100 km) plain; 15% (20 km) bridges; 5% (5 km) tunnels.		
P06.2 Milano – Venezia	The project will bring very significant reductions in travelling time for both passengers and freight services. Along the route the capacity will be more than doubled to accommodate future demand. Increased capacity and the possibility of higher quality services offered by the new infrastructure are expected to enhance rail's competitive position and increase its market share on this route, especially for freight traffic. In terms of accessibility and cohesion, the main benefits will concern the strengthening of the cohesion with some accession countries like Slovenia, Hungary, Romania, Bulgaria.	The Milano – Verona sub-section comprises the construction of a 112 km double track high-speed line. In order to minimise interferences with the existing buildings and to preserve the land consuming, the tracks lie along the existing or planned roads/motorways. Seven interconnections will be built between the existing and the new line (Milan Treviglio, Bergamo, Treviglio East, Brescia West, Brescia East, Calcinato and Verona). The Verona - Venezia 100 km sub-section, is composed of 2 tracks: Verona – Padova Padova – Venezia – Mestre While the 75 km Verona – Padova track will lie along the existing line and the A4 motorway, the 25 km Padova – Venezia – Mestre track is a completely new track.	2007	2015
P06.3 Venezia – Lubljiana – Budapest	The project will bring very significant reductions in travelling time for both passengers and freight services. Along the route the capacity will be more than doubled to accommodate future demand. In terms of accessibility and cohesion, the main benefits will concern the strengthening of the cohesion with some accession countries like Slovenia, Hungary, Romania, and Bulgaria.	This section will be a cross border section passing through Italy, Slovenia and Hungary. In Italy, the Venezia – Trieste sub-section will include works for a new line and upgrading of the existing line. The length of this sub-section will be 125 km. This high-speed and high capacity railway line will connect the Italian sections of the "Corridor 5" (Torino – Milano and Padova – Mestre are already in construction, while project of the Milano – Verona is ready for approval, and the one of the Verona – Padova is going to be finalised) with Slovenia and Hungary. The Eastern section (Ronchi – Trieste) will run mainly in tunnel, because of the difficult conditions of the morphology. In Ronchi the line will directly connect the airport "Ronchi dei Legionari" (main airport of the Friuli	2004	2015

		region). This section has the priority in the realization, because of the bottleneck on the existing line. The preliminary project of the Ronchi – Trieste line is expected to be presented within 2003. For the remaining section, it exists a Feasibility Study prepared by Italferr. The start of works for the Venezia – Ronchi sub-section's part is not scheduled yet, while for the Ronchi – Trieste part is expected to be within the end of 2004. The end of works is expected to be achieved within 2015 for the Venezia – Ronchi part while for the Ronchi – Trieste part is expected to be achieved in 2010. Between Ljubljana and Budapest there will be a rail upgrade. According to the "A European initiative for growth investing in networks and knowledge for growth and jobs – Final report to the European Council" document the start of works is expected to be in 2006 and the end in 2015.		

6.5.2 Impact on the level of traffic flows

The impact at the level of traffic flows is identified at infrastructure level as follows:

- Rail passenger flows P06, total interregional,
- Rail passenger flows P06, international,
- Rail freight flows P06, total interregional,
- Rail freight flows P06, international.

The impact at the level of traffic flows is illustrated by the figures hereunder.

Figure 6.11 *Rail passenger flows P06, total interregional*

Figure 6.12 *Rail passenger flows P06, international*

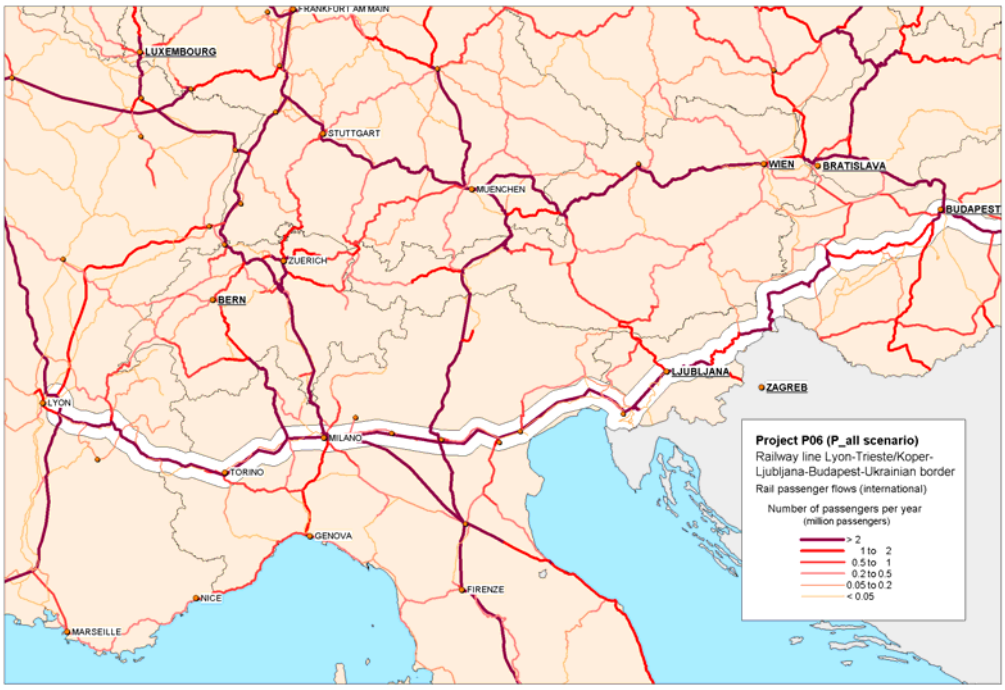


Figure 6.13 *Rail freight flows P06, total interregional*

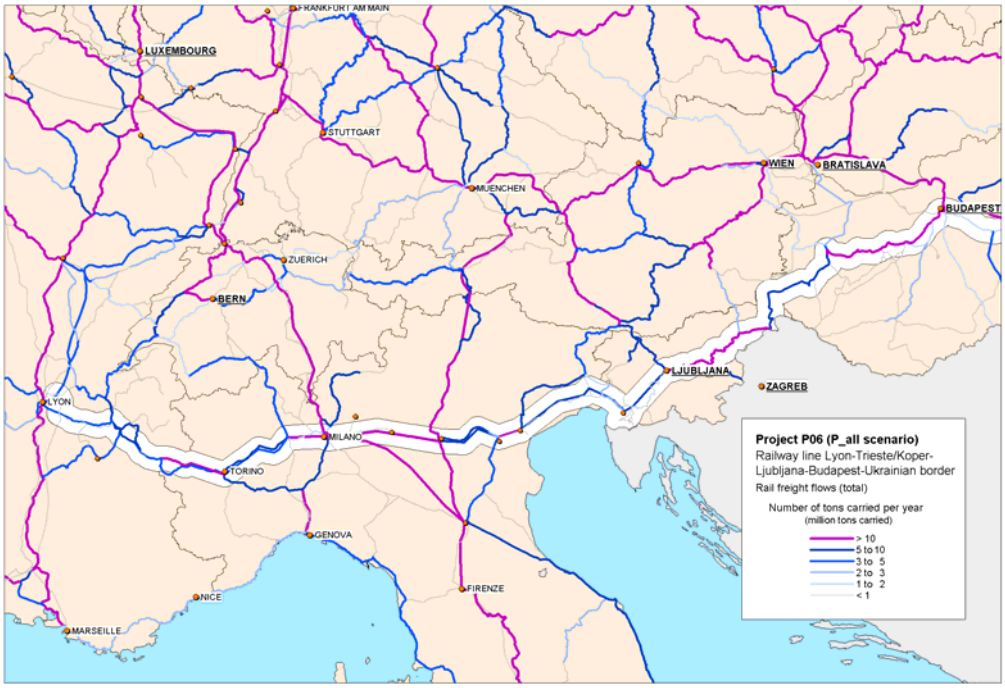
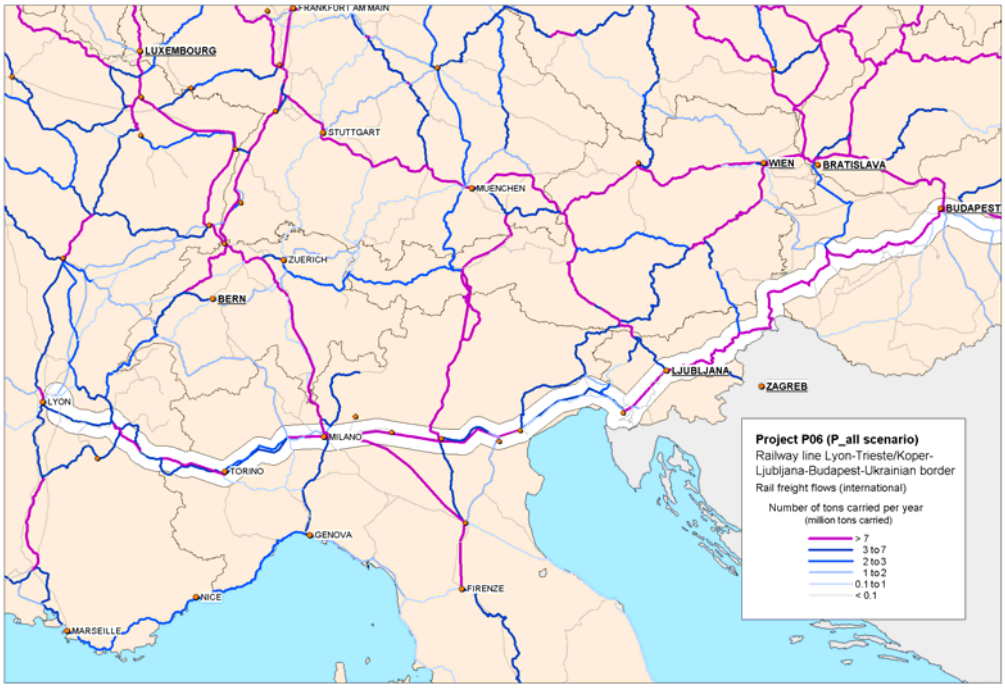


Figure 6.14 *Rail freight flows P06, international*



6.5.3 Estimated aggregated impacts of the priority project

In the following table, the impact variables for the all projects scenario are presented for all sub-sections of the priority project. Between brackets, the values of the individual project scenarios are given. The methodology of the impact variables is described in D6, Chapter 3.6.

Table 6.8 *Impact variables P06: Railway line Lyon-Trieste/Koper-Ljubljana-Budapest-Ukrainian border*

Objective	Indicator	P06.1	P06.2	P06.3	P06 Total
ECONOMIC IMPACTS IN THE TRANSPORT SECTOR					
IMPROVEMENT OF ROAD LEVEL SERVICE	(1) Changes in time costs caused by road congestion, mln. € / year	-6.0 (-26.1)	-6.1 (-70.5)	-2.0 (-12.2)	-14.2 (-108.8)
REDUCTION OF TRAVEL TIME	(2a) Changes in monetary value of the reduction of passenger travel time, mln. € / year	-240.0 (-269.1)	-145.7 (-143.5)	-154.2 (-157.3)	-539.9 (-569.8)
	(2b) Changes in passenger travel time, mln hour / year	-15.6 (-18.3)	-10.1 (-10.5)	-11.5 (-12.3)	-37.3 (-41.1)
	(3) Changes in monetary value of the reduction of freight travel time, mln. € / year	-38.9 (-45.9)	-23.1 (-25.7)	-23.8 (-27.8)	-85.8 (-99.4)
ENVIRONMENTAL SUSTAINABILITY					
GLOBAL WARMING	(4a) Change (in monetary value) of the transport contribution to global warming, mln. € / year	-13.383 (-6.241)	-3.637 (-4.636)	-1.733 (-3.509)	-18.753 (-14.386)
	(4b) Change of the transport contribution to global warming, 1000 kg CO2 / year	-569484 (-265585)	-154780 (-197297)	-73737 (-149329)	-798001 (-612211)
ATMOSPHERIC POLLUTION	(5a) Change (in monetary value) of the NOX transport emission, mln. € / year	-7.644 (-4.882)	-1.840 (-3.384)	-0.503 (-1.722)	-9.987 (-9.988)
	(5b) Change of the NOX transport emission, 1000 kg NOx / year	-828 (-591)	-220 (-446)	65 (-181)	-983 (-1218)
	(6a) Change (in monetary value) of particulates' emissions of transport, mln. € / year	-0.085 (-1.266)	0.086 (-0.834)	0.150 (0.882)	0.151 (-1.218)
	(6b) Change of particulates' emissions of transport, 1000 kg particulates / year	-4 (-55)	6 (-20)	15 (96)	17 (21)
TRANSPORT SAFETY	(7) Variation on monetary value of accidents, mln. € / year	-22.0 (-26.3)	-15.5 (-25.3)	-14.9 (-27.8)	-52.4 (-79.4)
INVESTMENT COST					
INVESTMENT COST	(8) Total project costs, mln. €	21578	7440	3926	32944
GENERAL TRANSPORT RELEVANCE					
TOTAL TRAFFIC VOLUME ON THE PROJECT	(10) Total passenger traffic on the project section, mln. passengers / year	8.4 (8.5)	9.2 (8.3)	3.8 (3.9)	- -
	(11a) Maximum freight traffic on the project section, mln. ton / year	16.6 (23.3)	18.3 (17.7)	21.5 (21.2)	21.5 (23.3)
	(11b) Average freight traffic on the project section, mln. ton / year	6.8 (11.1)	15.2 (15.3)	10.0 (10.6)	- -
	(11c) Total freight traffic on the project section, mln. ton km /year	2551 (4169)	3703 (3721)	7455 (7893)	13709 (15783)
INTERMODALITY	(12) Quantitative appraisal of the project's contribution for an intermodal transport system, mln. ton	1.2 (2.2)	2.0 (2.8)	3.2 (4.7)	6.4 (9.7)
CREATION OF EUROPEAN VALUE ADDED					
DEVELOPMENT OF INTERNATIONAL PASSENGER TRAFFIC	(13) Share of international passenger traffic on total traffic on the project, %	52.8 (54.2)	46.0 (43.7)	70.7 (71.1)	- -
	(14) Volume of international passenger traffic on the project, mln. passengers / year	4.4 (4.6)	4.2 (3.6)	2.7 (2.8)	- -
DEVELOPMENT OF INTERNATIONAL FREIGHT TRAFFIC	(15) Share of international freight traffic on total traffic on the project, %	82.6 (86.6)	74.6 (74.7)	87.2 (87.6)	- -
	(16) Volume of international freight traffic on the project, mln. tons / year	5.6 (9.6)	11.4 (11.4)	8.7 (9.3)	- -
INTEROPERABILITY	(17) Reduction of passengers waiting time at borders for international traffic	N/a	N/a	N/a	-
	(18) Reduction of freight waiting time at borders for international traffic	1 hour	N/a	N/a	-
	(19) Length of networks becoming interoperable because of the project	300 km	N/a	202 km	-

Objective	Indicator	P06.1	P06.2	P06.3	P06 Total
IMPROVEMENT OF ACCESSIBILITY					
PASSENGER ACCESSIBILITY	(20) Variation of the STAC centrality index for passenger transport, %	1.65 (1.48)	0.08 (0.15)	0.05 (0.18)	- -
FREIGHT ACCESSIBILITY	(21) Variation of the STAC centrality index for freight transport, %	0.02 (0.04)	0.02 (0.04)	0.01 (0.04)	- -
PERIPHERAL ACCESSIBILITY	(22) Variation of the STAC centrality index for passenger transport in regions identified as peripheral, %	1.98 (1.27)	0.07 (0.05)	0.02 (0.02)	- -
	(23) Variation of the STAC centrality index for freight transport in regions identified as peripheral, %	0.01 (0)	0.01 (0)	0.00 (0)	- -
ENVIRONMENTAL SUSTAINABILITY					
MODAL REBALANCING	(24) Volume of road freight traffic shifted to rail, IWW or sea transport, mln. t·km / year	5826 (2801)	2321 (2628)	1685 (2118)	9832 (7547)
	(25) Volume of road and air passenger traffic shifted to rail, mln. passenger·km / year	941 (1048)	431 (687)	252 (633)	1625 (2368)
LEVEL OF CONCERN :TRAFFIC TRANSFER	(26) Transfer of traffic from infrastructure lying in sensitive zones to the projected infrastructure, % of road traffic transferred from sensitive areas	-1.4% (-0,8%)	-0.3% (-0,7%)	3.5% (-1,2%)	- -
LEVEL OF CONCERN: DISTANCE	(27) Percentage of the length of the project lying in a sensitive area, % length	46.0%	16.0%	11.0%	-
LEVEL OF CONCERN: EMISSIONS	(28a) Changes of inhabitants' level of concern caused by emissions of NOx, % NOx	-1.4% (-0,7%)	-0.4% (-0,6%)	-0.7% (-0,8%)	- -
	(28b) Changes of inhabitants' level of concern caused by emissions of particulates, % particulates	-1.4% (-0,8%)	-0.4% (-0,7%)	-0.8% (-0,9%)	- -
LEVEL OF CONCERN: PROXIMITY	(29) Synthetic appreciation of the proximity of the project from specially protected areas (SPAs) or densely populated areas. Proximity of the project from SPA, km	16.0%	5.0%	18.0%	-
MATURITY AND COHERENCE OF THE PROJECT					
DEVELOPMENT OF THE PROJECT	(30) Appraisal of the project planning status	2	3	1	-
INSTITUTIONAL SOUNDNESS	(31) Qualitative appraisal of the project's compliance with national plans	5	5	4	-
COHERENCE OF THE PROJECT	(32) Qualitative appraisal of the project's coherence with main international traffic corridors	3	2	2	-

Comments on the main results

Impact on passenger volumes and modal shift

- The forecasted passenger transport volumes vary between 3.8 mln. passenger per year in case of P06.3 (Venezia – Ljubljana – Budapest) and 9.2 mln passenger per year in case of P06.2 (Milano – Venezia).
- The priority project result in a decrease of road and air passenger by 1.6 billion pkm, with the sub-section P06.1 providing the strongest potential for reducing road and air passenger transport demand.
- The values for changes in (potential) passenger transport costs reflect two dimensions: the demand on the sub-sections and the dimension of the infrastructure project in terms of length of transport infrastructure subject to improvements and type of infrastructure measures (e.g. upgrade versus new construction). These dimensions have to be taken into account for the interpretation of the results: large sub-sections with a high level of expected demand, like P06.1 highlights with strong performances due to relatively high demand levels and the large-scale dimension of the infrastructure investments.

Impact on freight volumes and modal shift

- The average interregional rail transport volumes on sub-sections of the this priority project are respectively: P06.1: 6.8 mln ton, P06.2: 15.2 mln ton, P06.3: 10.0 mln ton;
- The expected modal shift in 2020 to rail transport in the priority project is approximately 6.4 mln tonnes which is almost completely realised by a reduction in transported tonnage in road transport in the priority project;

- The TEN-STAC modal shift estimate is substantially lower than the national project estimates which indicate for rail freight on the trajectory Lyon-Torino a shift of about 11 mln ton in 2015 and more than 25 mln ton in 2030. In addition there are estimates on the growth of freight transport of the Koper-Divaca project (second track) of about 6 mln tonnes from 1996-2015. The latter could however also include some rerouting estimates and need not be purely a shift of flows from road to rail;
- Average border waiting times reduce by 1 hour approximately.
- Total shift from road to rail is 9.8 bill. ton-km.

Impact on infrastructure network use

The detailed analysis carried out by the consortium has revealed the following impacts on infrastructure use:

- In many sections on the trajectory from Lyon-Budapest traffic volumes of freight increase by more than 5 mln tonnes annually;
- This increase can also be observed at some of the important connecting lines like Paris-Lyon;
- Considerable rerouting takes place by this priority project. The railway line attracts freight transport from other railway lines, causing traffic to decrease on those lines, as for example the rail freight route through Gotthard.
- The priority project will make approximately 300 km interoperable between Lyon-Turin and an additional 202 km in Slovenia will be made interoperable.
- For passenger transport P06 results in an increase in passenger flows – apart from the links belonging to the priority project itself – on the North-South axis Rotterdam – Brussels – Paris – Lyon – Marseille, as well as in Italy between Verona and Napoli via Bologna and Roma as well as along the railway line along the Adriatic Sea.

Impact on accessibility

- Sub-section P06.1 highlights a relative strong improvement of centrality values of relatively poor and peripheral regions because of improvement in centrality of Slovenia, and the Hungarian regions Közép-Dunántúl, Nyugat-Dunántúl and Dél-Dunántúl;

Impact on environmental sustainability

- The reduction in emissions results in a marginal decrease (up to a little more than 1%) of human health risks along the corridor.
- There will only be marginal transfer of road traffic away from sensitive areas or transfer of traffic to sensitive areas. In all sub-sections the changes are between -2% and 3%.
- In all sub-sections parts are located within potentially sensitive areas. The shares vary from 11% to 46%.

Impact on emissions

The overall impact on emission is quantified from the impact at the network level and the differences between the all project scenario and the reference 2 scenario are as follows:

- CO2: net reduction with 798 thousand tonnes,
- NOx: net reduction with almost one thousand tonnes ,
- Particulates: net increase with 17 tonnes due to the use of diesel engines for rail.

Development of the project

- P06.1: Lyon-Mont-Cenis-Turin-Milan. It includes 3 sections. All of them have the same level of planning and funding development. Design studies have been achieved but no decisions on funding have been taken. The score of the entire sub-section is +2.
- P06.2: Milan – Venice. Sub-sections of this sub-section present different level of development. On the Turin-Milan section the interventions are ongoing, while on the Milan – Padova and Padova – Venice the design studies have been achieved and the score is +3. Therefore, the score, +3, on the entire section, is an average score based on the cost of the single sections.
- P06.3: Venice - Ljubljana – Budapest. It is divided in different section but all of them present a low level of planning and funding development. The design studies concerning this part of the priority project are ongoing. Hence, the total score is +1.

6.6 P07 MOTORWAY ROUTE IGOUMENITSA/PATRA-ATHINA-SOFIA-BUDAPEST

6.6.1 Description of the priority project

Priority Project	Priority Project name	Sub-sections		Sections	Sub-section start date	Sub-section end date
P07	Motorway route Igoumenitsa/Patra-Athina-Sofia-Budapest	P07.1	Pathe: Patras - Athen section	P07 EL Pathe	1998	2008
		P07.2	Athen - Greek/Bulgarian border - Kulata - Sofia	P07 BG Sofia-Kulata	2003	2010

This project consists of the extension of a Greek motorway project "Pathe" (formerly Essen project number 7) and the upgrading of the Sofia Kulata trajectory (part of the TEN priority project number 17).

The principal aim of these projects is to improve accessibility by the connection of main Greek motorways to the European road network and the furthering of regional economic development.

Table 6.9 *Project fiche P07*

Project	Description			
P07 Motorway route Igoumenitsa/ Patra – Athina – Sofia – Budapest	The main road axis of Greece, with a total length of 730 km, after taking account of an anticipated shortening by 40 km due to new alignment, connects Patra, Athens, Thessaloniki and the Border (PATHE), belongs to the Trans-European Roadway Network and will be upgraded to a modern highway. This road axis has been redesigned as a restricted entry highway in accordance with European Standards. Upon completion of the works, the road axis will consist of 2-lane or 3-lane dual Highway, with emergency lanes, central median with metal or New Jersey safety barriers, a large number of interchanges, tunnels, bridges, major and minor structures, overpasses and underpasses and also an extended service road network.			
Sections of the Project	Objectives	Description	Start date	End date
P07. 1 Pathe: Patras – Athen section	This section constitutes the main road link of Western and central Greece, connecting the two most important ports of the country. The project will increase the capacity of the road, reduce the travelling time and will considerably improve safety.	The project includes the connection of an important Greek port (Patra) situated at the west part of Greece with Athens. More specifically the project includes: The Rion – Antirion Bridge, which will be the longest cable stayed bridge in the world with a continuous deck of 2,250 meters. The bridge will connect the regions of Pelonese and Hipirus and will replace the existing – time consuming - ferry connection. The project is completed. The Patra's bypass. The section has a length of 9 km with two lanes plus emergency lane in each direction and includes 3 junctions. The project is	2000	2006

		completed. The Patra – Korinthos section. This section has a total length of 120 km with two lanes plus emergency lane in each direction. The upgrade of the Elefsina – Athens section, to a restricted entry highway in accordance with European Standards. The section has a length of 16 km, with two lanes plus emergency lane in each direction and a service road network along its urban segment.		
P07.2 Athen – Greek/ Bulgarian border – Kulata – Sofia	The project aims at improving the road connection of the country with the rest of Europe and at dealing with the increasing traffic volumes of passengers an freight in the area. The project will result in significant reduction in travelling time as well as in considerable improvement of road safety.	The project includes: The upgrade to a restricted entry highway of the road sections Ag. Theodori– Evangelismos (21 Km, with 3 junctions) and Rapsani-Platamonas (7 km). The construction of the section Tempi – Rapsani of a total length of 14.3 km with two lanes plus emergency lane in each direction. This new section bypasses the environmentally sensitive area of Tempi. The construction of the section Platamonas – Scotinaa of a total length of 5.7 km with two lanes plus emergency lane in each direction. This new section bypasses cultural sensitive areas. The construction of the section Chalkida Bridge – Sximatari Junction of a total length of 10 km with two lanes plus emergency lane in each direction. Bypass of the urban areas of Ag. Konstantinos and Kamena Vourla of a total length of 17 km with two lanes plus emergency lane in each direction.	2000	2006

6.6.2 Impact on the level of traffic flows

The impact at the level of traffic flows is identified at infrastructure level as follows:

- Road passenger flows P07, total interregional,
- Road passenger flows P07, international,
- Road freight flows P07, total interregional,
- Road freight flows P07, international.

The impact at the level of traffic flows is illustrated by the figures hereunder.

Figure 6.15 *Road passenger flows P07, total interregional*

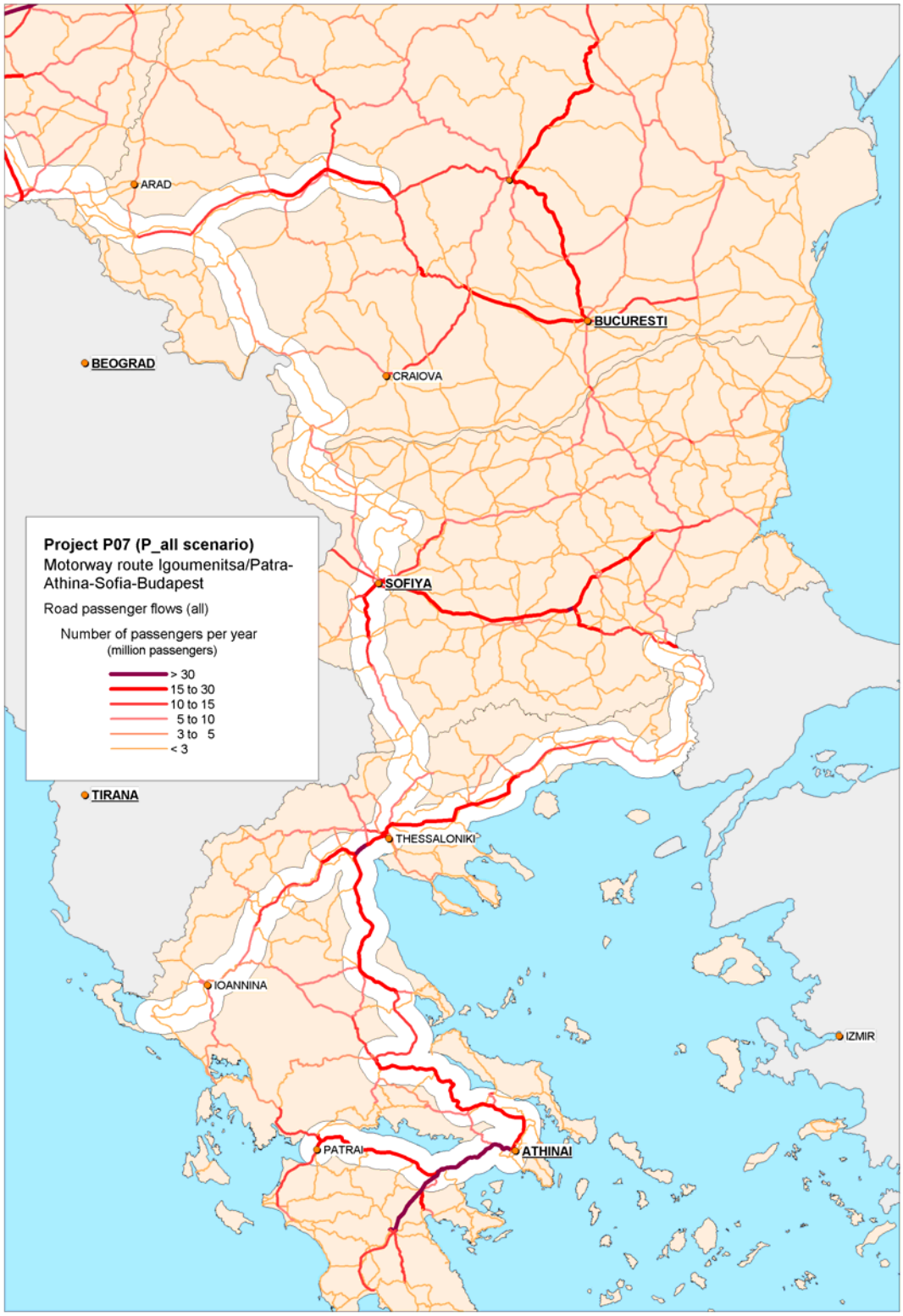


Figure 6.16 *Road passenger flows P07, international*

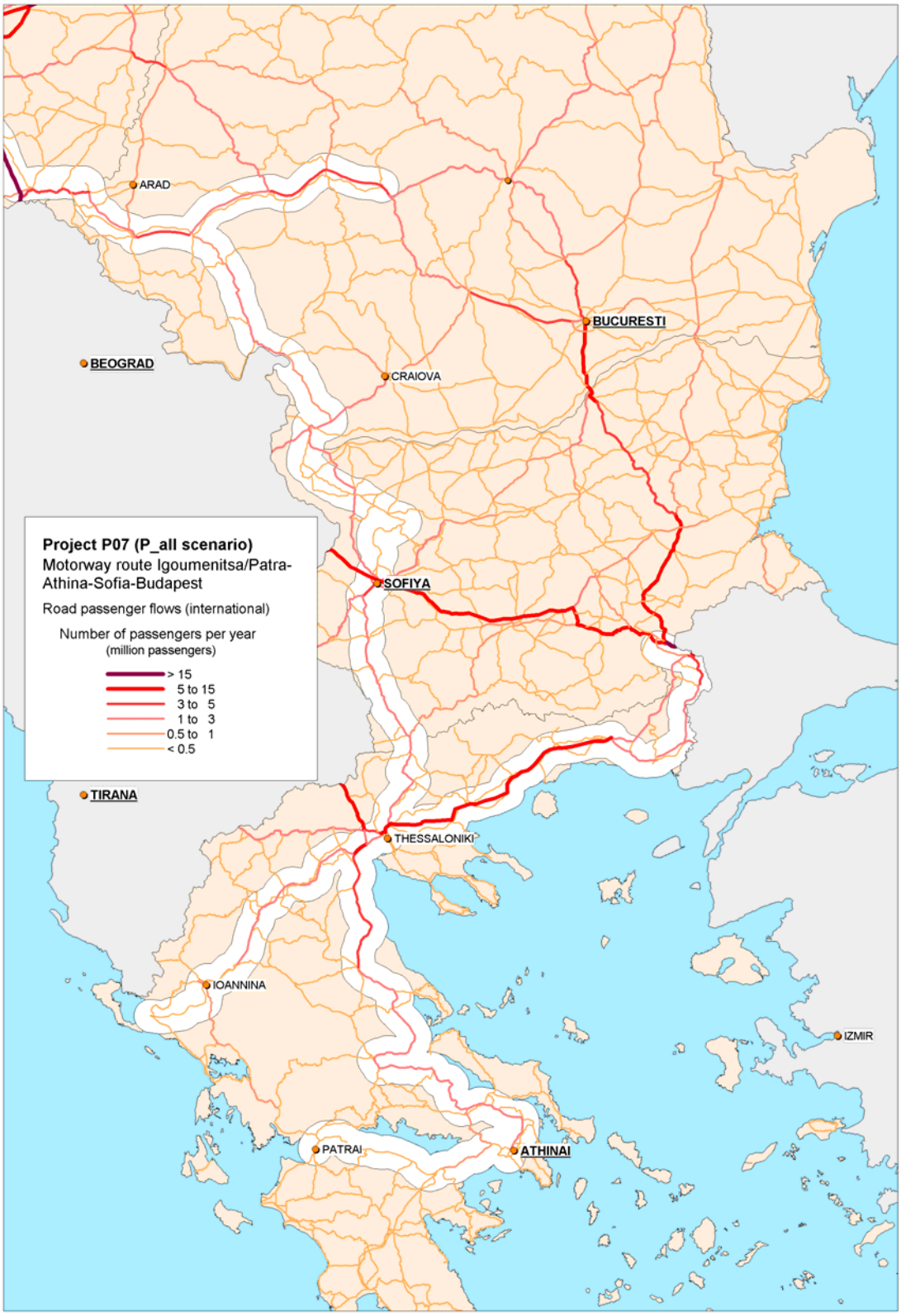


Figure 6.17 *Road freight flows P07, total interregional*

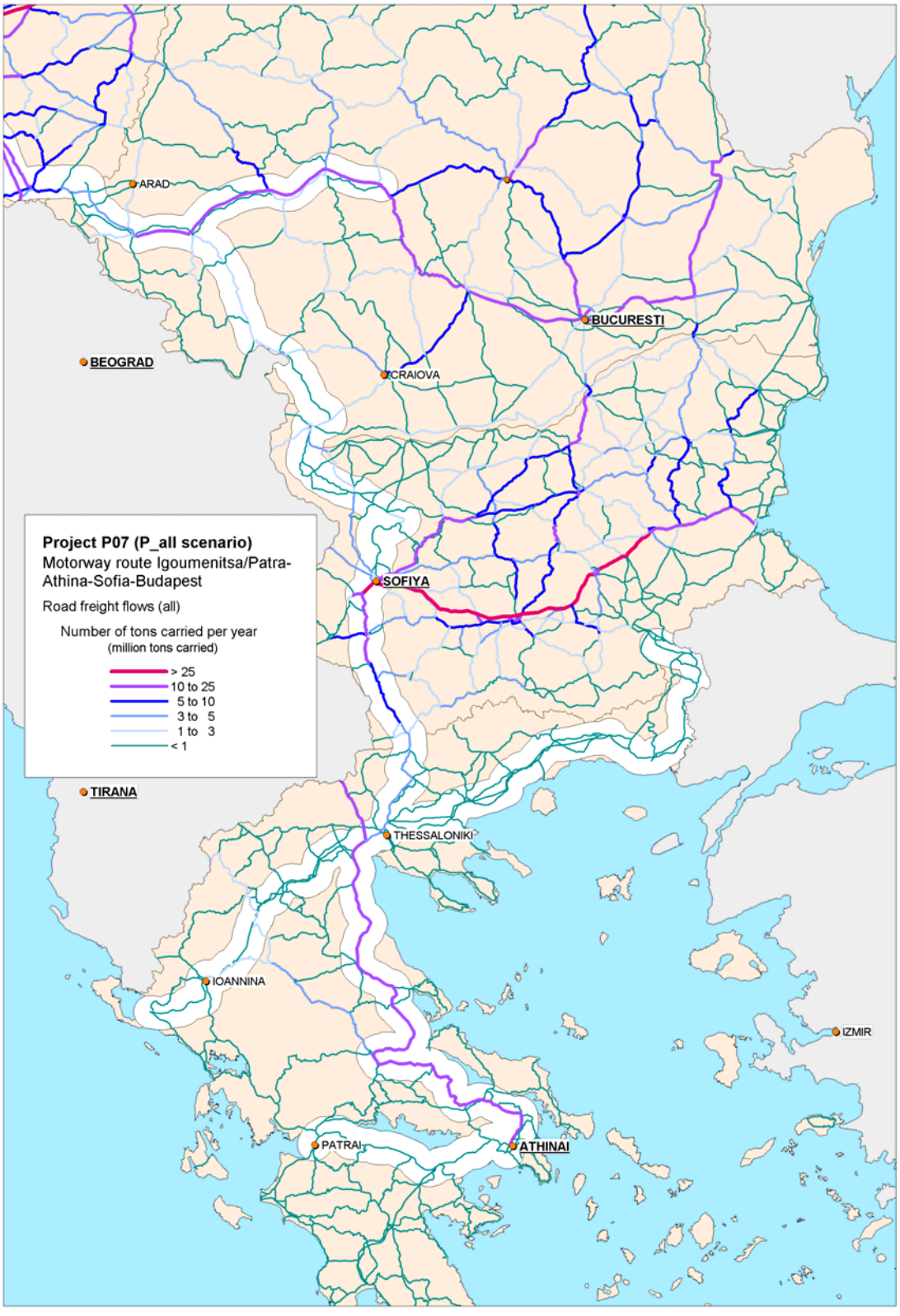
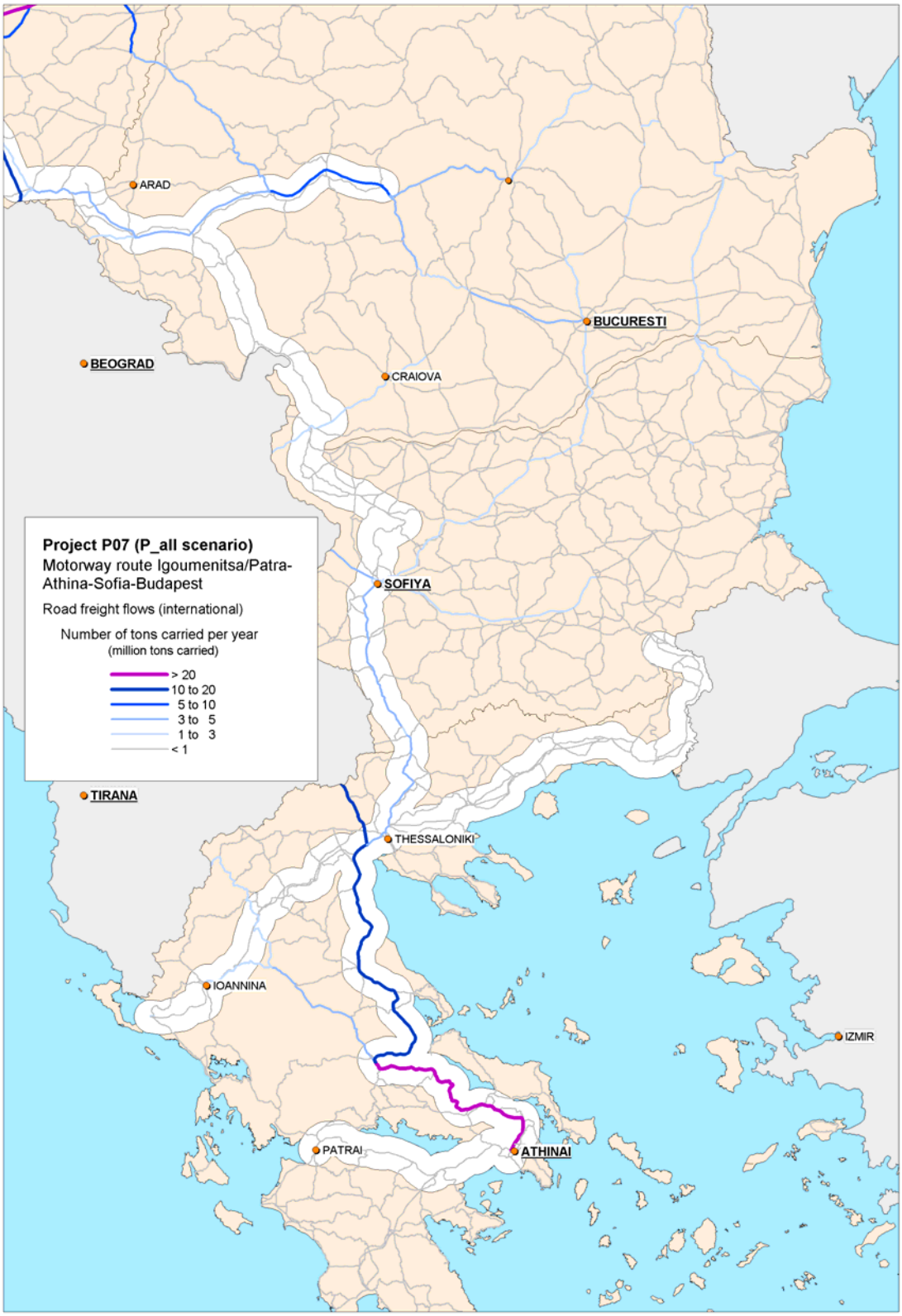


Figure 6.18 *Road freight flows P07, international*



6.6.3 Estimated aggregated impacts of the priority project

In the following table, the impact variables for the all projects scenario are presented for all sub-sections of the priority project. Between brackets, the values of the individual project scenarios are given. The methodology of the impact variables is described in D6, Chapter 3.6.

Table 6.10 *Impact variables P07: Motorway route Igoumenitsa/Patra-Athina-Sofia-Budapest*

Objective	Indicator	P07.1	P07.2	P07 Total
ECONOMIC IMPACTS IN THE TRANSPORT SECTOR				
IMPROVEMENT OF ROAD LEVEL SERVICE	(1) Changes in time costs caused by road congestion, mln. € / year	-5.2 (-14.8)	-10.7 (-16.9)	-15.9 (-31.7)
REDUCTION OF TRAVEL TIME	(2a) Changes in monetary value of the reduction of passenger travel time, mln. € / year	0.0 (0)	-15.8 (-14.8)	-15.8 (-14.8)
	(2b) Changes in passenger travel time, mln hour / year	0.0 (0)	-2.1 (-2.1)	-2.1 (-2.1)
	(3) Changes in monetary value of the reduction of freight travel time, mln. € / year	0.0 (0)	-27.6 (-27.7)	-27.7 (-27.7)
ENVIRONMENTAL SUSTAINABILITY				
GLOBAL WARMING	(4a) Change (in monetary value) of the transport contribution to global warming, mln. € / year	-0.013 (1.134)	0.272 (4.409)	0.259 (5.543)
	(4b) Change of the transport contribution to global warming, 1000 kg CO2 / year	-569 (48247)	11574 (187627)	11005 (235874)
ATMOSPHERIC POLLUTION	(5a) Change (in monetary value) of the NOX transport emission, mln. € / year	-0.241 (-0.021)	-0.938 (0.613)	-1.179 (0.592)
	(5b) Change of the NOX transport emission, 1000 kg NOx / year	-29 (-49)	-155 (-78)	-184 (-127)
	(6a) Change (in monetary value) of particulates' emissions of transport, mln. € / year	0.001 (-0.002)	0.002 (-0.007)	0.003 (-0.009)
	(6b) Change of particulates' emissions of transport, 1000 kg particulates / year	1 (-1)	1 (-1)	1 (-2)
TRANSPORT SAFETY	(7) Variation on monetary value of accidents, mln. € / year	-1.2 (-2)	-14.0 (-19.7)	-15.2 (-21.7)
INVESTMENT COST				
INVESTMENT COST	(8) Total project costs, mln. €	8389	675	9064
GENERAL TRANSPORT RELEVANCE				
TOTAL TRAFFIC VOLUME ON THE PROJECT	(10) Total passenger traffic on the project section, mln. passengers / year	39.8 (40)	11.9 (12)	- -
	(11a) Maximum freight traffic on the project section, mln. ton / year	0.5 (0.5)	36.8 (37.5)	36.8 (37.5)
	(11b) Average freight traffic on the project section, mln. ton / year	0.3 (0.4)	13.7 (14)	- -
	(11c) Total freight traffic on the project section, mln. ton km /year	52 (64)	4741 (4848)	4793 (4912)
INTERMODALITY	(12) Quantitative appraisal of the project's contribution for an intermodal transport system, mln. ton	0.0 (0)	0.0 (0)	0.0 (0)
CREATION OF EUROPEAN VALUE ADDED				
DEVELOPMENT OF INTERNATIONAL PASSENGER TRAFFIC	(13) Share of international passenger traffic on total traffic on the project, %	0.2 (0.2)	17.0 (17)	- -
	(14) Volume of international passenger traffic on the project, mln. passengers / year	0.1 (0.1)	2.0 (2)	- -
DEVELOPMENT OF INTERNATIONAL FREIGHT TRAFFIC	(15) Share of international freight traffic on total traffic on the project, %	100.0 (100)	55.2 (55.1)	- -
	(16) Volume of international freight traffic on the project, mln. tons / year	0.3 (0.4)	7.5 (7.7)	- -
INTEROPERABILITY	(17) Reduction of passengers waiting time at borders for international traffic	N/a	N/a	-
	(18) Reduction of freight waiting time at borders for international traffic	N/a	N/a	-
	(19) Length of networks becoming interoperable because of the project	N/a	N/a	-

Objective	Indicator	P07.1	P07.2	P07 Total
IMPROVEMENT OF ACCESSIBILITY				
PASSENGER ACCESSIBILITY	(20) Variation of the STAC centrality index for passenger transport, %	0.00 (0)	0.12 (0.15)	- -
FREIGHT ACCESSIBILITY	(21) Variation of the STAC centrality index for freight transport, %	0.00 (0)	0.08 (0.11)	- -
PERIPHERAL ACCESSIBILITY	(22) Variation of the STAC centrality index for passenger transport in regions identified as peripheral, %	0.00 (0)	0.19 (0.26)	- -
	(23) Variation of the STAC centrality index for freight transport in regions identified as peripheral, %	0.00 (0)	0.10 (0.06)	- -
ENVIRONMENTAL SUSTAINABILITY				
MODAL REBALANCING	(24) Volume of road freight traffic shifted to rail, IWW or sea transport, mln. t·km / year	125 (-352)	471 (-712)	596 (-1064)
	(25) Volume of road and air passenger traffic shifted to rail, mln. passenger·km / year	-23 (-15)	27 (-522)	4 (-537)
LEVEL OF CONCERN :TRAFFIC TRANSFER	(26) Transfer of traffic from infrastructure lying in sensitive zones to the projected infrastructure, % of road traffic transferred from sensitive areas	1.6% (2,6%)	4.7% (4,4%)	- -
LEVEL OF CONCERN: DISTANCE	(27) Percentage of the length of the project lying in a sensitive area, % length	0.0%	7.0%	-
LEVEL OF CONCERN: EMISSIONS	(28a) Changes of inhabitants' level of concern caused by emissions of NOx, % NOx	0.0% (0,0%)	-0.3% (0,0%)	- -
	(28b) Changes of inhabitants' level of concern caused by emissions of particulates, % particulates	-0.5% (0,0%)	-0.1% (0,0%)	- -
LEVEL OF CONCERN: PROXIMITY	(29) Synthetic appreciation of the proximity of the project from specially protected areas (SPAs) or densely populated areas. Proximity of the project from SPA, km	0.0%	21.0%	-
MATURITY AND COHERENCE OF THE PROJECT				
DEVELOPMENT OF THE PROJECT	(30) Appraisal of the project planning status	5	3	-
INSTITUTIONAL SOUNDNESS	(31) Qualitative appraisal of the project's compliance with national plans	5	5	-
COHERENCE OF THE PROJECT	(32) Qualitative appraisal of the project's coherence with main international traffic corridors	2	3	-

Comments on the main results

Impact on passenger volumes and modal shift

- The passenger transport volumes vary on average between 11.9 and 39.2 mln passengers per year.
- In the project only scenario an increase in road transport can be observed. The priority project is forecasted in the all projects scenario to result in a small decrease of road and air passenger transport performance of 4 mln pkm at the expense of rail passenger transport; this is a result of strong competition with other rail projects.
- Reasons for relatively low transport volumes in P07.1 are the marginal differences of infrastructure situations between the Reference 2 scenario and the situation, in which the sub-section is assumed to be finalised.
- The share of international volumes on a sub-section inform about the sub-section's relevance for international transport flows. For the interpretation of the performance values, the scope and the definition of the sub-sections have to be considered: A relatively short border-crossing sub-section is more likely to represent a high value than a large sub-section with a border-crossing link. Some sub-sections with a low share of international traffic volumes. P07.1 suggests the conclusion that their significance is mainly at national level, for passenger.

Impact on freight volumes and modal shift

- The priority project will result in increase in the transported road freight tonkm (1064.4 mln) at the expense of rail and inland waterways freight transport in the project only scenario. However, in the all projects scenario a decrease of 596 mln ton-km is observed for road, as a result of a stronger competition from rail.
- The quantitative appraisal of the priority project's contribution for an intermodal transport system is zero in case of the project scenario, because the priority projects attract tonnes from rail.

Impact on infrastructure network use

Two main effects can be observed, one being the (modest) increase of road traffic flows for both passenger and freight, and the second one the rerouting effect of road traffic. A decrease of rail freight flows is observed on the whole corridor route up to Sofia and Bulgarian Black Sea ports. For passenger transport the strongest increase is expected on the road section between Thessaloniki and Sofija.

Impact on environmental sustainability

- The reduction in emissions results in a marginal decrease (below 1%) of human health risks along the corridor.
- Up to 4% of road traffic will be transferred away from sensitive areas.
- In the Northern sub-sections 7% is located within potentially sensitive areas.

Impact on emissions

The overall impact on emission is quantified from the impact at the network level and the differences between the all project run and the reference 2 scenario are as follows:

- CO_2: net increase with 11 thousand tonnes due to the increase of road traffic flows,
- NO_x: net reduction with 184 tonnes,
- PM-10: no significant changes.

Development of the project

- P07.1: Pathe. Interventions are ongoing. Therefore, the score is +5.
- P07.2: Sofia-Kulata-Greek/Bulgarian border. The design studies have been achieved as well as approved by the relevant authorities. No decisions on funding have been taken. Therefore the score is +3.

6.7 P08 MULTIMODAL LINK PORTUGAL/SPAIN-REST OF EUROPE

6.7.1 Description of the priority project

Priority Project	Priority Project name	Sub-sections		Sections	Sub-section start date	Sub-section end date
P08	Multimodal link Portugal/Spain-rest of Europe	P08.1	Railway line Coruña-Lisboa-Sines	P08 E Railway Coruña –Lisboa – Sines	2003	2010
				P08 P Railway Coruña –Lisboa - Sines	2001	2010
		P08.2	Railway line Lisboa-Valladolid	P08 E Railway Lisboa-Valladolid	2003	2007
				P08 P Railway Lisboa-Valladolid	2003	2010
		P08.3	Lisboa-Valladolid motorway	P08 P Road Lisboa-Valladolid	2001	2010
				P08 E Road Lisboa-Valladolid	2004	2010
		P08.4	New Lisboa airport.	P08 P Lisboa new airport	2000	2015

The improvements are part of former priority project number 8. They consist in freight railway improvements and new railway sections, motorway capacity expansion (4-lane) and airport development.

A better linkage of Portugal to Spain, improving economic development of peripheral regions by increasing access to the European infrastructure networks but also achieving modal shift (and contributing to a better environment) are the principal objectives of these projects.

Table 6.11 *Project fiche P08*

Project	Description			
P08 Multimodal link Portugal/Spain – rest of Europe	This project was already included in the list adopted in the Essen and Dublin councils. It aims at improving the Iberian peninsula's road, rail and air infrastructure, strengthening its connections with the rest of Europe by reducing transport time and cost, both for passenger and freight. For rail, this project involves mainly upgrading of existing links to be achieved in the short term, while other priority projects with longer term (P03, P16 and P19) aim at developing new railway lines			
Sections of the Project	Objectives	Description	Start date	End date
P08.1 Railway line Coruna – Lisboa – Sines	Improvement of the link between Spain and Portugal, between Portuguese regions, and between those peripheral areas and the rest of the European Union. Modal shift from road to rail transport, for passenger and freight traffic	Electrification, upgrading (and where necessary doubling) of the existing 750 km railway line between La Coruna (Spain), Porto, Lisboa and Sines (important freight port south of Lisbon). The section between Ermidas (on the Lisboa – Faro railway) and Sines[5] is also included in project P16.2.	2001	2010
P08.2 Railway line Lisboa – Valladolid	Improvement of the link between Spain and Portugal, and between those peripheral areas and the rest of the European Union.	Electrification and upgrading of the existing km railway lines between Lisboa and Valladolid including the following sections:	2003	2010

[5] For the STAC modelling and assessment, the Ermidas – Sines section is considered within P16.2 only.

	Modal shift from road to rail transport, for passenger and freigh traffic. Contribution to sustainable development.	upgrade of the cross-border line Valladolid – Medina del Campo – Fuentes de Onoro - Villar Formoso upgrade linha da Beira Alta Villar Formoso – Guarda – Pampilhosa (already achieved) upgrade linha da Beira Baixa Entroncamento – Castelo Branco – Guarda: electrification, increase bridge maximum loads, review of the alignment in some sections The interventions on the main line Lisboa – Entroncamento – Pampilhosa (- Porto) are considered within P08.1		
P08.3 Lisboa – Valladolid motorway	Improvement of the link between Spain and Portugal, and between those peripheral areas and the rest of the European Union Reduce of journey times, especially for international traffic.	Motorway link between Valladolid and the Portuguese coastal motorway between Lisboa and Porto. In Portugal, the project includes two sub-sections: Southern Branch via Castelo Branco – Guarda Northern Branch via Viseu – Guarda.	2001	2010
P08. 4 New Lisbon airport	Because of the geographical location of Portugal, air transport is the most effective link between the the country and the rest of Europe, as well as from the ultra peripheral islands and the mainland. An adequate airport serving the most important conurbation in Portugal is therefore crucial to the mobility, accessibility and economic development. In terms of freight transport, the airport will provide an intermodal platform, namely for high value added products and "just in time" delivery. Besides, the objective of this project is to substitute the existing airport, whose traffic is close to its maximum capacity.	The project includes the construction of a new airport, in the Lisbon region, at Ota. There will be 2 runways with 3,600 m each, separated by 1,700 m. In the opening area the available area is 1800 ha and the passenger terminal will be 238,000 m^2. The expected capacity is 19 million passengers (considering the demand at the time of closure of existing airport plus 5 years). The reference plan forecasts up to approximately 35 million passengers. The design and interoperability will be ICAO standards, according to the EU and UN/ECE standards.	2006	2015

6.7.2 Impact on the level of traffic flows

The impact at the level of traffic flows is identified at infrastructure level as follows:

- Rail passenger flows P08, total interregional,
- Rail passenger flows P08, international,
- Rail freight flows P08, total interregional,
- Rail freight flows P08, international,
- Road passenger flows P08, total interregional,
- Road passenger flows P08, international,
- Road freight flows P08, total interregional,
- Road freight flows P08, international.

The impact at the level of traffic flows is illustrated by the figures hereunder.

Figure 6.19 *Rail passenger flows P08, total interregional*

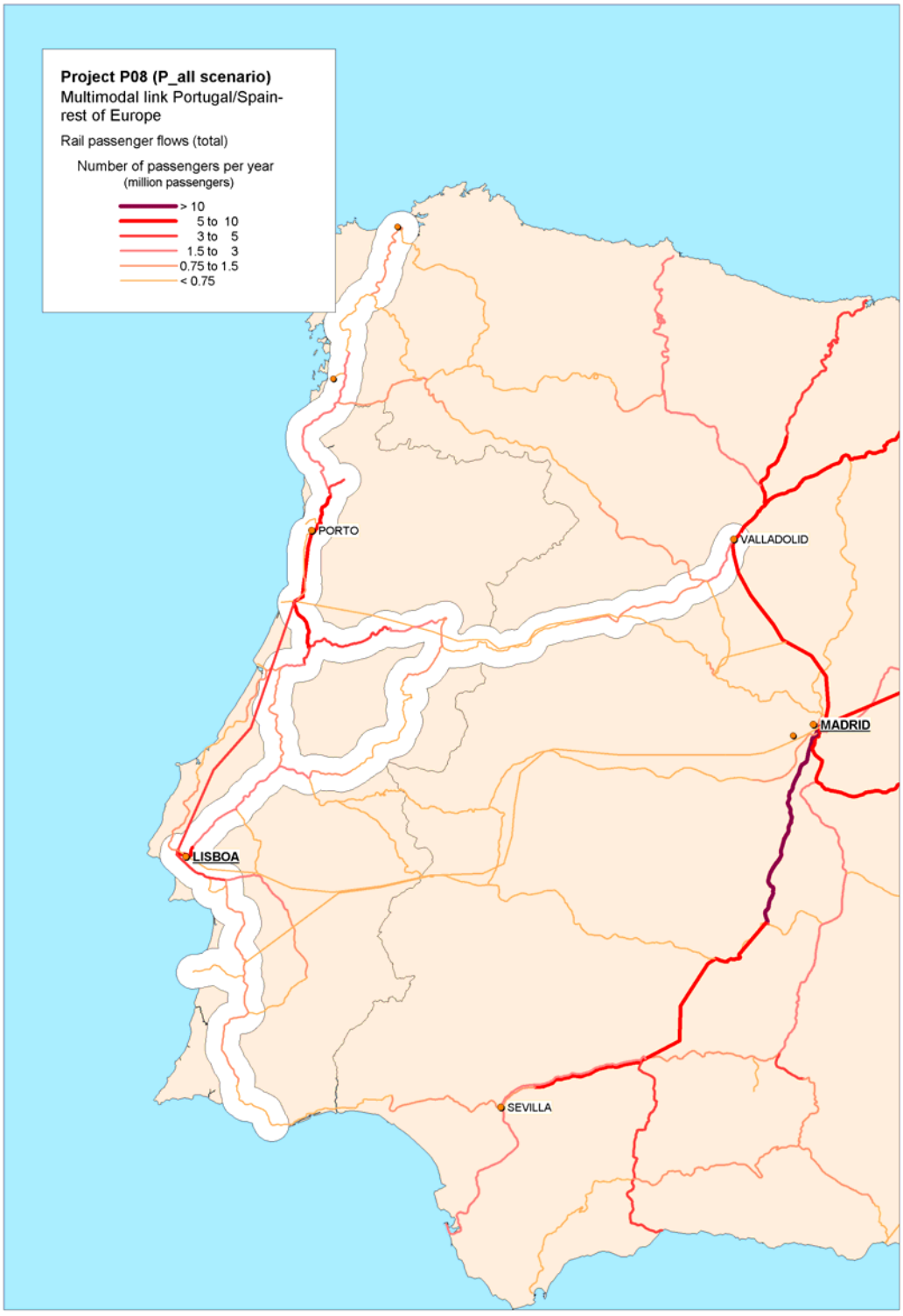


Figure 6.20 *Rail passenger flows P08, international*

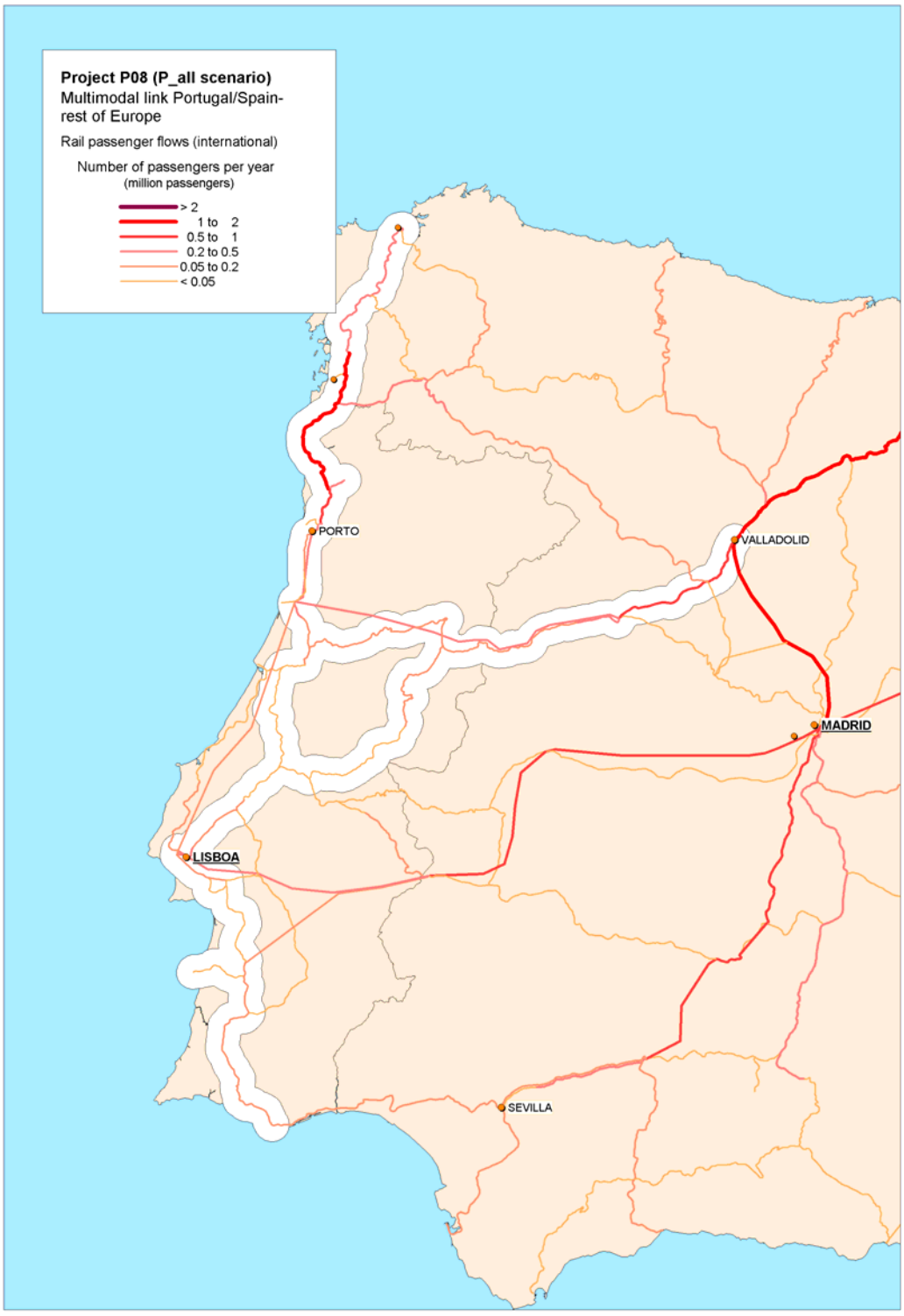


Figure 6.21 *Rail freight flows P08, total interregional*

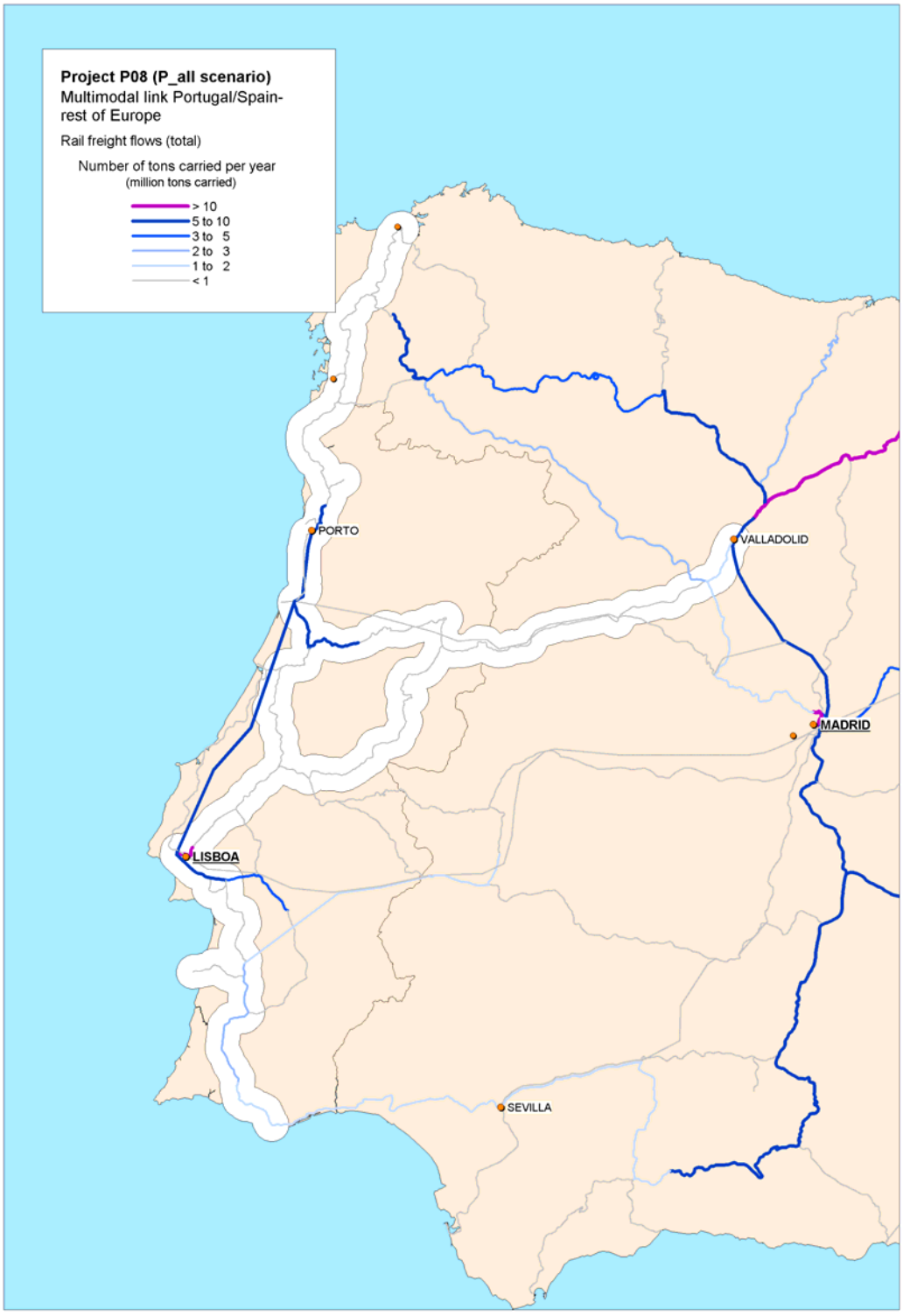


Figure 6.22 *Rail freight flows P08, international*

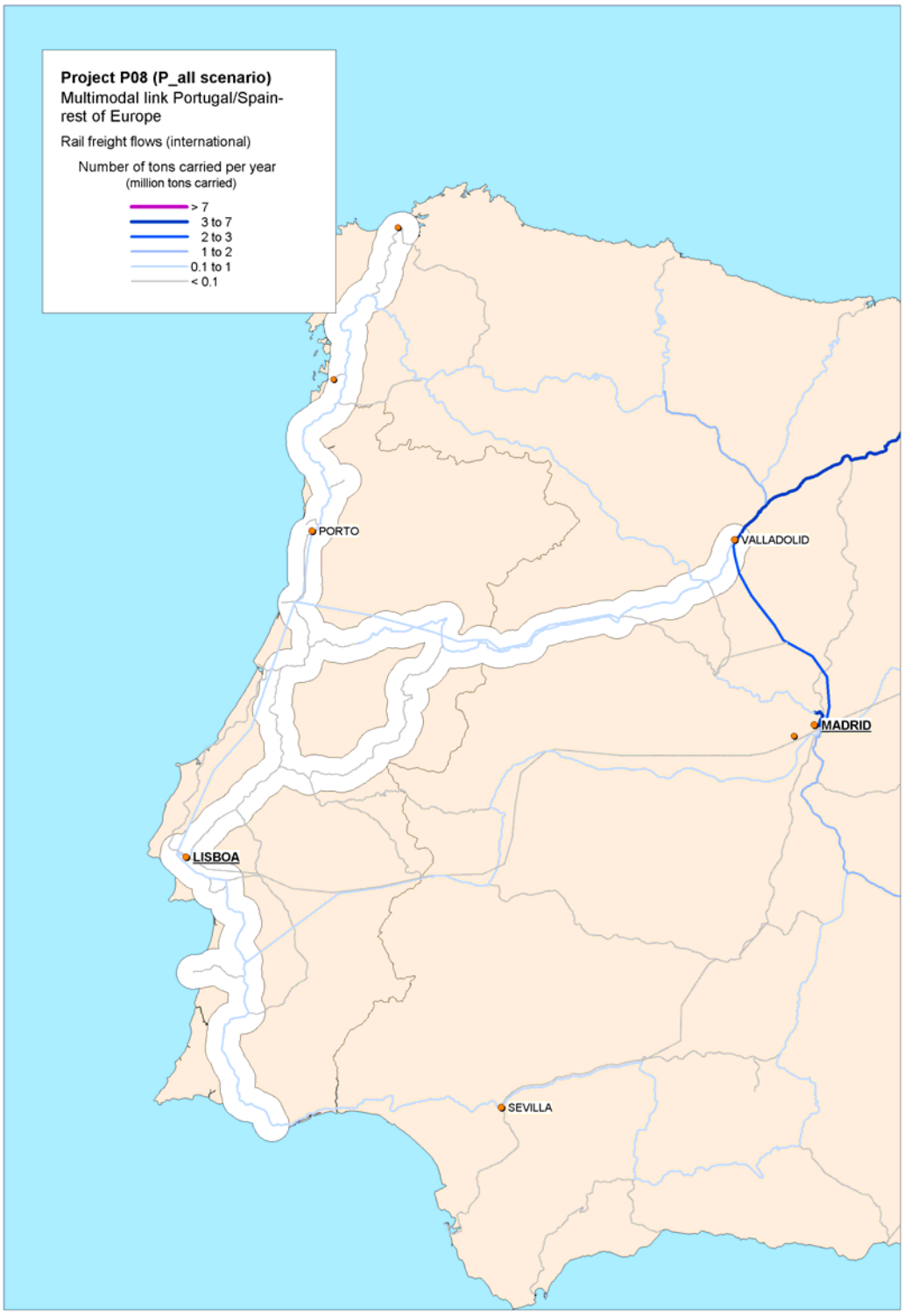


Figure 6.23 *Road passenger flows P08, total interregional*

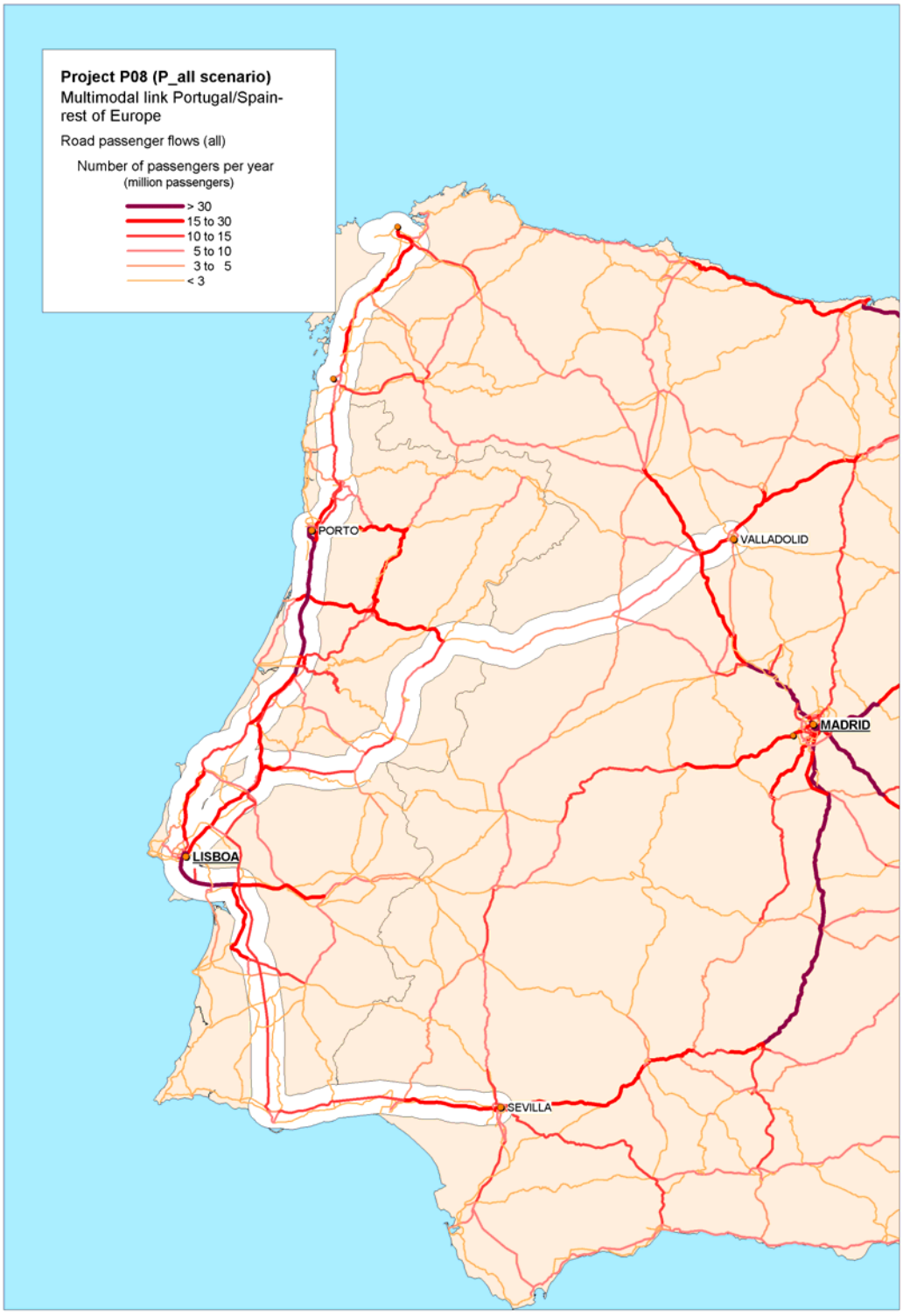


Figure 6.24 *Road passenger flows P08, international*

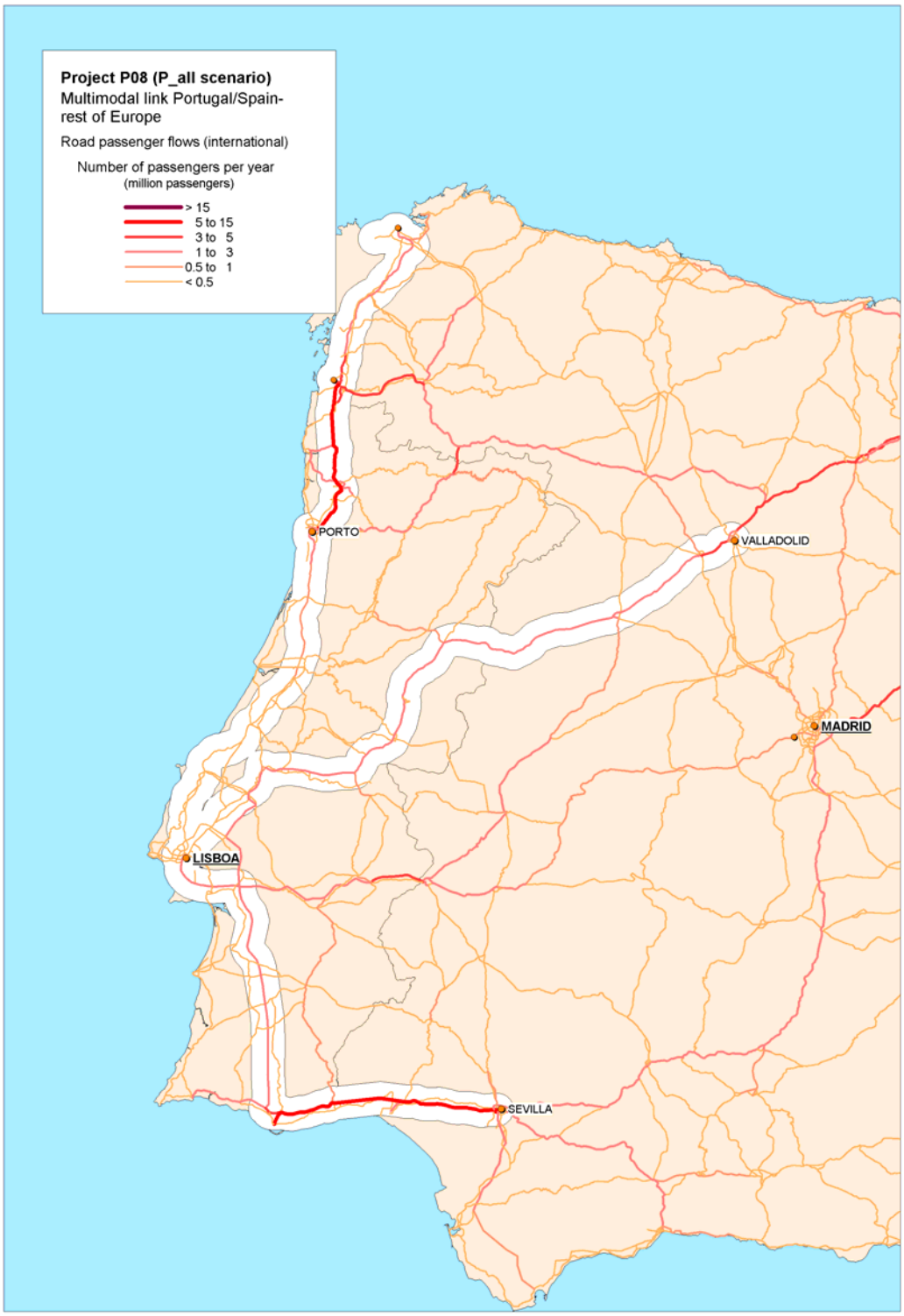


Figure 6.25 *Road freight flows P08, total interregional*

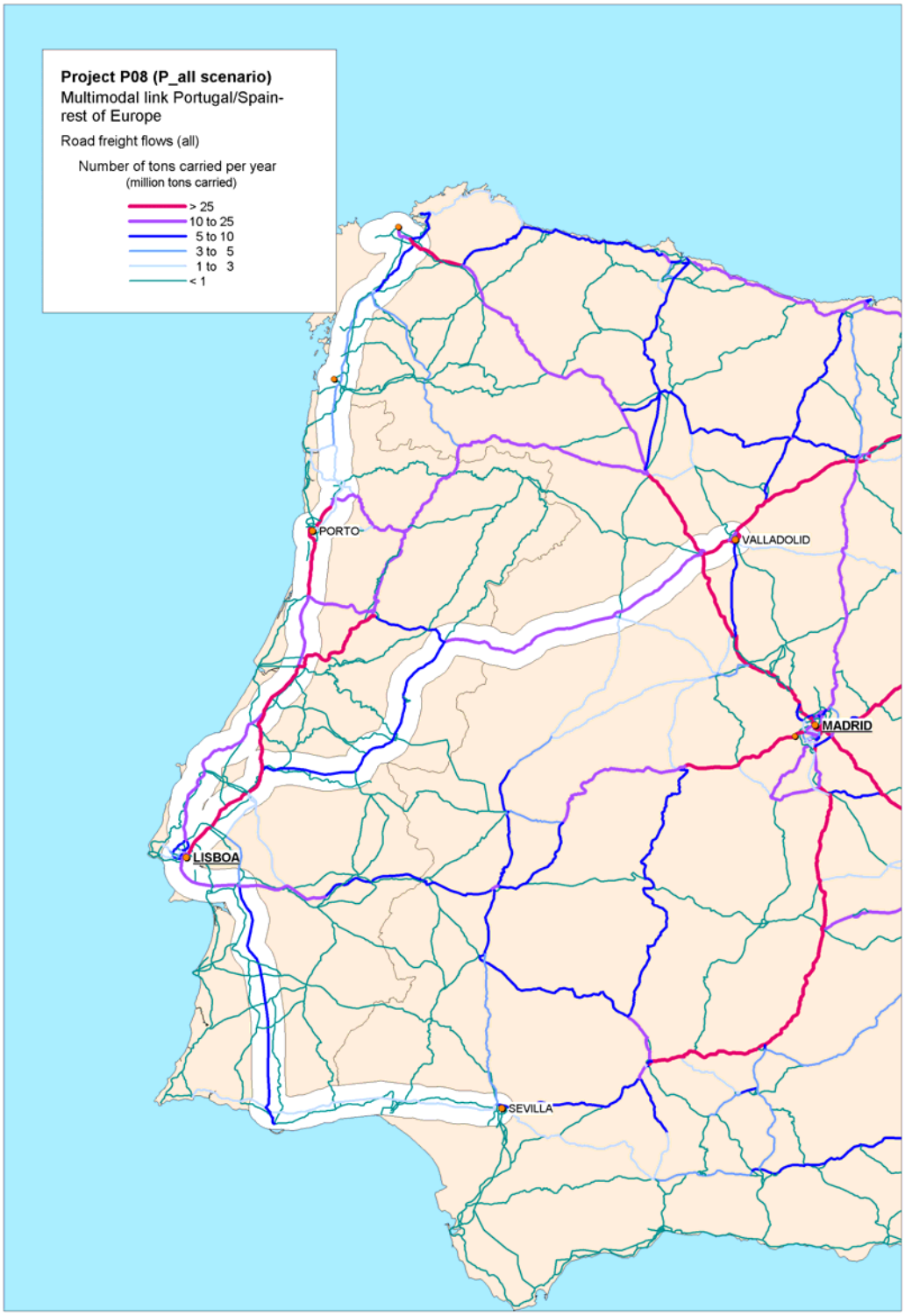
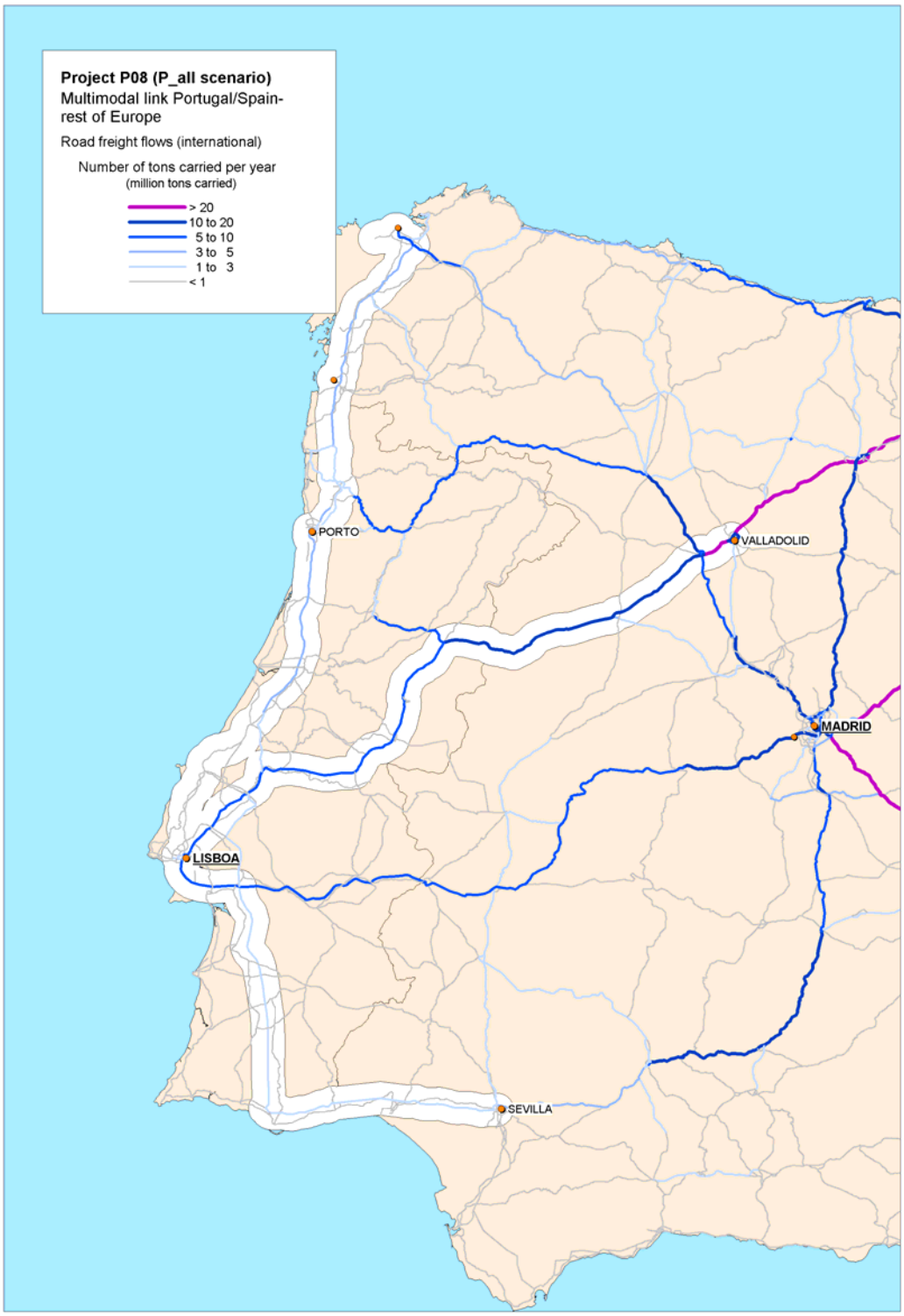


Figure 6.26 *Road freight flows P08, international*



Impact of the new Lisbon airport

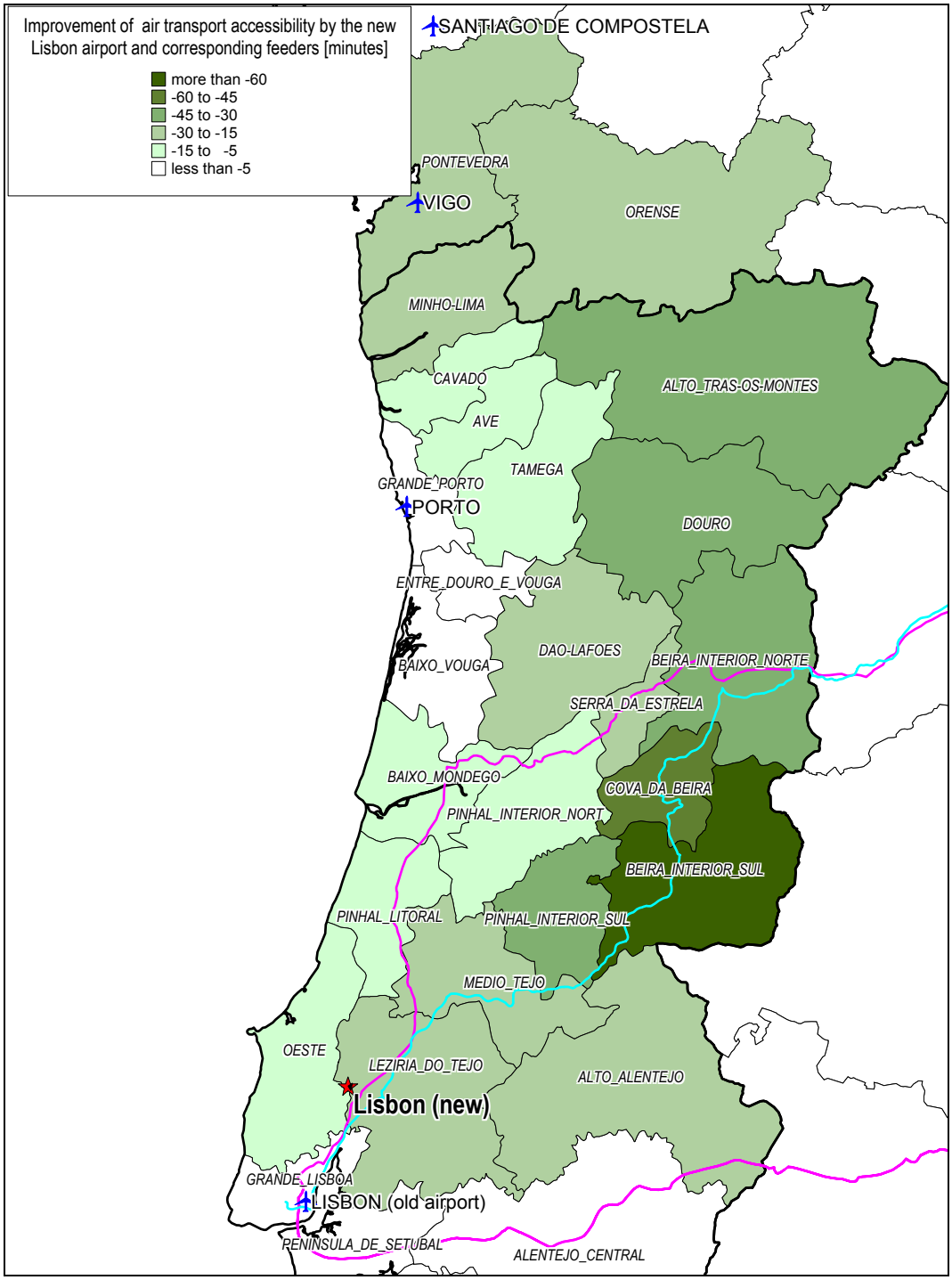
The new Lisbon airport, which is located about 50 km north of the town close to the village of Ota will be connected to the national rail and road network and replacing the existing airport Portela, which lies just a few kilometres from city centre and is limited in capacity (max. possible extension allows up to 14 mill pax p.a.). Due to the new location the travel-times by road to the Lisbon airport decrease from all counties north and east of the Lisbon area while travel-times from the area of Lisbon itself and the counties south of the river Tejo increase slightly. In addition travel-times by rail decrease from all over Portugal to this airport, when comparing it with the status of today, where a change from train to the local bus in Lisbon is necessary to reach the airport.

Figure 6.27 illustrates the total changes in accessibility when using air transport as a main mode, comparing the situation of today, with the airport situated quite close to Portugal's capital, but connected quite poor to public transport and the new airport location outside of the Greater Lisbon area but well connected to the rail and road network, with special focus on connecting the airport to other parts of the country beside Lisbon itself. The figure bases on the assumptions for the year 2020 within the STAC project concerning infrastructure of surface transport as well as the air network which is a result of iterative assignment procedures following the forecasted passenger flows for this year.

This comparison bases on the differences in accessibility of the two situations. In both cases the average accessibility of the regions was calculated as follows. For every region all travel-times to any other region, when using air transport as the main mode – weighted by the population of the destination region – are added. This sum divided by the population of all regions gives an average accessibility in absolute numbers for each region.

It has to be remarked that the regional changes in accessibility accord quite strongly to the explicit alignment the new STAC corridors will have, how and where they are connected with existing rail or road links and concerning rail transport where the trains supposed to serve these new corridors will actually stop. For example for the Portuguese county of" Beira Interior sul" an improvement of accessibility of more than 60 minutes when using air transport is outlined in the map above. This will only apply if the alignment of the high-speed rail link between Madrid and Lisbon will really serve this county and train stops are offered (e. g. at Castelo Branco). Otherwise, if there will be no train stops or an alignment for that link more in the south is chosen (e. g. via Badajoz/Spain as preferred by the Spanish government) the improvement of accessibility will not be realised in the size indicated for that county, but therefore an improvement for the Spanish border area around Badajoz might be realised instead, meaning the next reachable airport from this county with international flights (Badajoz is just connected thrice daily with Madrid) would be Lisbon and not longer Madrid Barajas.

Figure 6.27 *Accessibility changes of the new airport in Lisboa*



While there are very high reductions of travel-time when using air transport as a main mode for trips beginning or ending in the counties in the very east of Portugal, no effective increase of accessibility is indicated for the area around Porto, although travel-times from that area to the airport of Lisbon are shortened as well as for the other regions north of Lisbon. The reason therefore is that the shortest travel-times by air when originating or destinating in the area around Porto can be achieved in using the airport of Porto and not the Lisbon airport. This does not only hold for direct flights to/from Porto airport but also for trips, where passengers just use a feeder flight from Porto to Lisbon and change the plane there to reach their final destination. So the change in accessibility for this area results in a difference between different routings, of which the one using surface transport to the new Lisbon airport instead of a feeder flight, while for the other routing a connecting flight to the old airport of Lisbon forms a part of the whole journey.
Another (minor) effect is the change of the modes used for trips to and from the area of Lisbon, as travel times when using the short haul flights to this two agglomeration rise slightly when considering the whole transport chain, due to the fact that travel-time at Lisbon between the airport and the town increases slightly when using road transport as a feeder mode.

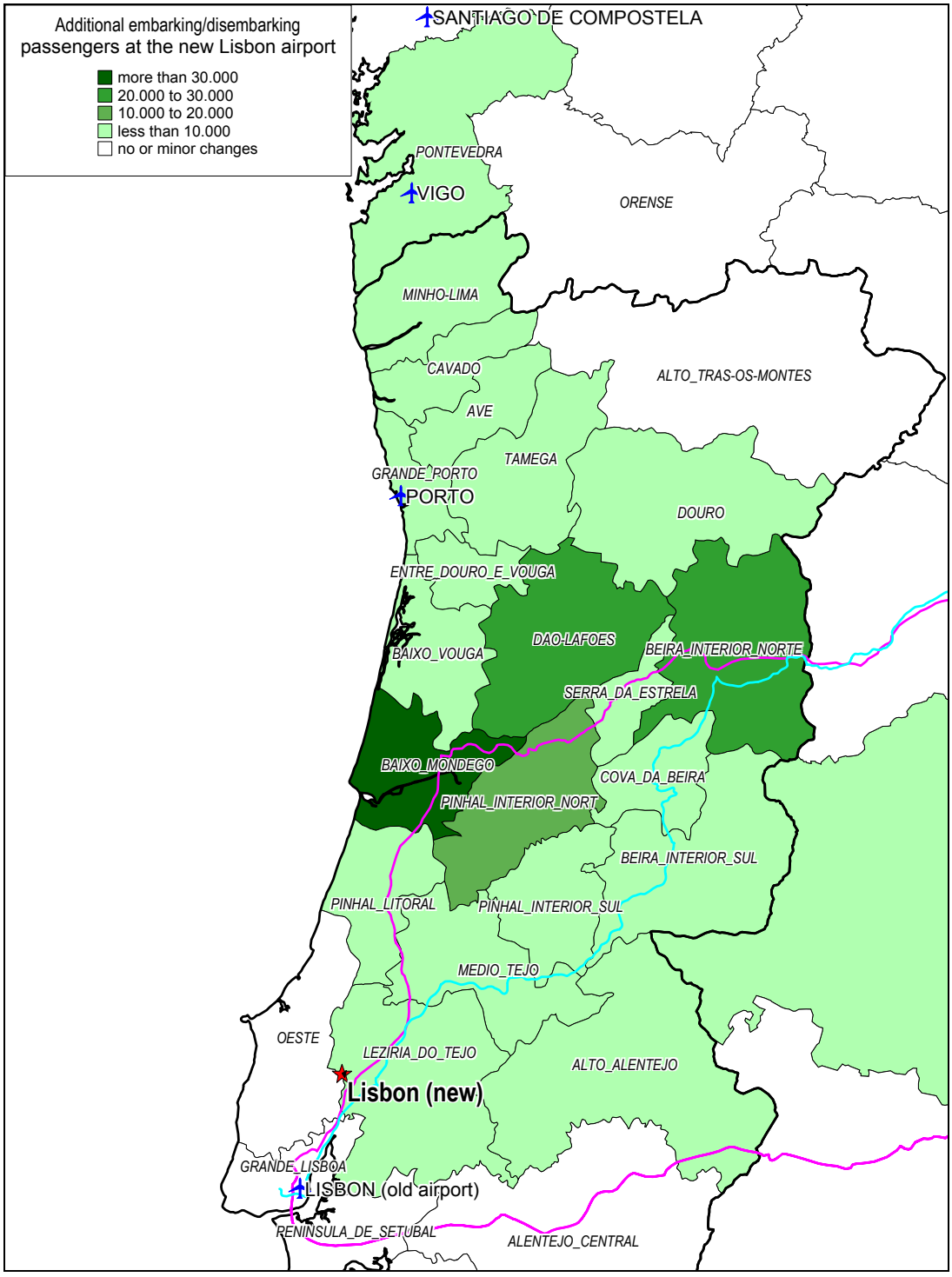
The total effect on changes in travellers' demand concerning the chosen routes and modes, results in the numbers shown in the following table for Lisbon airport.

Change in passenger figures of Lisbon airport (year 2020)	*change in annual passengers demand*
Originating/destinating passengers, who use surface transport instead of a feeder flight to Lisbon airport	+ 130,000
Originating/destinating passengers, who formerly used direct flights from/to another airport (mainly Porto)	+ 40,000
Originating/destinating passengers, who use surface transport as a main mode to/from the Lisbon area	-5,000
Formerly transfer passengers now using surface feeders to/from Lisbon airport	-130,000
Total change for Lisbon airport (departures and arrivals)	+35,000

The spatial distribution of these additional passengers originating/destinating at the new Lisbon airport is shown in the following map. The area affected covers Portuguese counties in the north and east of Lisbon and includes the Spanish counties of Caceres in the east as well as Pontevedra both bordering to Portugal. The highest numbers for additional passengers originating/destinating at Lisbon airport appear at counties situated between Porto and Lisbon where the competition between these two airports is at top and Lisbon can win additional demand due to its improving accessibility when comparing it with the airport of Porto concerning destinations which can be reached by direct flights from Porto and Lisbon. For the other regions (and this applies especially for the county of Greater Porto) the shifts in passengers choice towards Lisbon airport roots mainly on travel to or from destinations which

are connected by non-stop flights with Lisbon but not with Porto. So these customers replace a feeder flight from Porto to Lisbon by the use of surface transport to reach the airport of Lisbon.

Figure 6.28 *Difference embarking / disembarking passengers at the new Lisbon airport*



Concerning the area of Lisbon itself, there are only minor changes in passengers demand, belonging to a shift in mode choice on travel mainly between Porto and Lisbon. Passengers originating in the Lisbon area which are travelling to any other destination still use the Lisbon airport albeit its location changes slightly away from the Portuguese capital.

6.7.3 Estimated aggregated impacts of the priority project

In the following table, the impact variables for the all projects scenario are presented for all sub-sections of the priority project. Between brackets, the values of the individual project scenarios are given. The methodology of the impact variables is described in D6, Chapter 3.6.

Table 6.12 *Impact variables P08: Multimodal link Portugal/Spain-rest of Europe*

Objective	Indicator	P08.1	P08.2	P08.3	P08.4	P08 Total
ECONOMIC IMPACTS IN THE TRANSPORT SECTOR						
IMPROVEMENT OF ROAD LEVEL SERVICE	(1) Changes in time costs caused by road congestion, mln. € / year	-0.5 (-4.6)	-0.7 (-2.7)	-1.1 (-19.6)	N/a (N/a)	-2.4 (-27)
REDUCTION OF TRAVEL TIME	(2a) Changes in monetary value of the reduction of passenger travel time, mln. € / year	-14.3 (-14.3)	-8.0 (-11.1)	-14.5 (-13.6)	N/a (N/a)	-36.7 (-39)
	(2b) Changes in passenger travel time, mln hour / year	-1.5 (-1.6)	-0.9 (-1.2)	-1.4 (-1.4)	N/a (N/a)	-3.8 (-4.2)
	(3) Changes in monetary value of the reduction of freight travel time, mln. € / year	-0.8 (-4)	-0.1 (-0.1)	-156.7 (-157.2)	N/a (N/a)	-157.7 (-161.4)
ENVIRONMENTAL SUSTAINABILITY						
GLOBAL WARMING	(4a) Change (in monetary value) of the transport contribution to global warming, mln. € / year	-1.192 (3.125)	0.216 (3.967)	-0.184 (4.014)	N/a (N/a)	-1.160 (11.106)
	(4b) Change of the transport contribution to global warming, 1000 kg CO2 / year	-50729 (132996)	9205 (168810)	-7811 (170816)	N/a (N/a)	-49335 (472622)
ATMOSPHERIC POLLUTION	(5a) Change (in monetary value) of the NOX transport emission, mln. € / year	0.154 (-0.263)	-0.983 (0.144)	-1.391 (0.05)	N/a (N/a)	-2.220 (-0.069)
	(5b) Change of the NOX transport emission, 1000 kg NOx / year	62 (-52)	-127 (6)	-180 (-12)	N/a (N/a)	-245 (-58)
	(6a) Change (in monetary value) of particulates' emissions of transport, mln. € / year	0.061 (0.022)	-0.005 (0.02)	0.015 (0.018)	N/a (N/a)	0.071 (0.06)
	(6b) Change of particulates' emissions of transport, 1000 kg particulates / year	9 (2)	0 (2)	3 (2)	N/a (N/a)	13 (6)
TRANSPORT SAFETY	(7) Variation on monetary value of accidents, mln. € / year	-15.8 (-48.2)	-10.6 (-71.3)	-16.4 (-76.9)	N/a (N/a)	-42.8 (-196.5)
INVESTMENT COST						
INVESTMENT COST	(8) Total project costs, mln. €	1891	1679	2493	3430	9493
GENERAL TRANSPORT RELEVANCE						
TOTAL TRAFFIC VOLUME ON THE PROJECT	(10) Total passenger traffic on the project section, mln. passengers / year	2.2 (2)	1.4 (1.4)	10.4 (10.6)	N/a (N/a)	- -
	(11a) Maximum freight traffic on the project section, mln. ton / year	10.3 (6.5)	5.6 (3.1)	28.2 (28.9)	N/a (N/a)	28.2 (28.9)
	(11b) Average freight traffic on the project section, mln. ton / year	1.2 (0.9)	0.6 (1.5)	13.8 (14.4)	N/a (N/a)	- -
	(11c) Total freight traffic on the project section, mln. ton km /year	421 (339)	413 (979)	6199 (6459)	N/a (N/a)	7033 (7777)
INTERMODALITY	(12) Quantitative appraisal of the project's contribution for an intermodal transport system, mln. ton	1.6 (0.6)	0.7 (0)	0.0 (0)	0.0 (0)	2.3 (0.6)
CREATION OF EUROPEAN VALUE ADDED						
DEVELOPMENT OF INTERNATIONAL PASSENGER TRAFFIC	(13) Share of international passenger traffic on total traffic on the project, %	31.8 (33.9)	14.2 (18.8)	17.2 (17.3)	N/a (N/a)	- -
	(14) Volume of international passenger traffic on the project, mln. passengers / year	0.7 (0.7)	0.2 (0.3)	1.8 (1.8)	N/a (N/a)	- -
DEVELOPMENT OF INTERNATIONAL FREIGHT TRAFFIC	(15) Share of international freight traffic on total traffic on the project, %	18.7 (18.3)	32.5 (23.8)	60.4 (61.2)	N/a (N/a)	- -
	(16) Volume of international freight traffic on the project, mln. tons / year	0.2 (0.2)	0.2 (0.4)	8.3 (8.8)	N/a (N/a)	- -
INTEROPERABILITY	(17) Reduction of passengers waiting time at borders for international traffic	N/a	N/a	N/a	N/a	-
	(18) Reduction of freight waiting time at borders for international traffic	N/a	N/a	N/a	N/a	-
	(19) Length of networks becoming interoperable because of the project	N/a	N/a	N/a	N/a	-

Objective	Indicator	P08.1	P08.2	P08.3	P08.4	P08 Total
IMPROVEMENT OF ACCESSIBILITY						
PASSENGER ACCESSIBILITY	(20) Variation of the STAC centrality index for passenger transport, %	0.31 (0.03)	0.67 (0.09)	0.05 (0.13)	N/a (N/a)	- -
FREIGHT ACCESSIBILITY	(21) Variation of the STAC centrality index for freight transport, %	0.08 (0.04)	0.01 (0)	0.53 (0.59)	N/a (N/a)	- -
PERIPHERAL ACCESSIBILITY	(22) Variation of the STAC centrality index for passenger transport in regions identified as peripheral, %	0.55 (0.02)	1.22 (0.19)	0.08 (0.26)	N/a (N/a)	- -
	(23) Variation of the STAC centrality index for freight transport in regions identified as peripheral, %	0.17 (0)	0.02 (0)	0.79 (0.94)	N/a (N/a)	- -
ENVIRONMENTAL SUSTAINABILITY						
MODAL REBALANCING	(24) Volume of road freight traffic shifted to rail, IWW or sea transport, mln. t·km / year	1407 (412)	893 (394)	1366 (384)	N/a (N/a)	3667 (1191)
	(25) Volume of road and air passenger traffic shifted to rail, mln. passenger·km / year	646 (20)	28 (59)	387 (-255)	N/a (N/a)	1060 (-176)
LEVEL OF CONCERN :TRAFFIC TRANSFER	(26) Transfer of traffic from infrastructure lying in sensitive zones to the projected infrastructure, % of road traffic transferred from sensitive areas	-0.9% (1,8%)	1.6% (3,5%)	0.3% (5,2%)	N/a (N/a)	- -
LEVEL OF CONCERN: DISTANCE	(27) Percentage of the length of the project lying in a sensitive area, % length	0.0%	8.0%	3.0%	N/a	-
LEVEL OF CONCERN: EMISSIONS	(28a) Changes of inhabitants' level of concern caused by emissions of NOx, % NOx	-2.8% (0,0%)	-0.9% (-0,1%)	-1.4% (-0,1%)	N/a (N/a)	- -
	(28b) Changes of inhabitants' level of concern caused by emissions of particulates, % particulates	-3.0% (0,0%)	-1.2% (0,0%)	-1.6% (0,0%)	N/a (N/a)	- -
LEVEL OF CONCERN: PROXIMITY	(29) Synthetic appreciation of the proximity of the project from specially protected areas (SPAs) or densely populated areas. Proximity of the project from SPA, km	0.0%	8.0%	1.0%	0.0%	-
MATURITY AND COHERENCE OF THE PROJECT						
DEVELOPMENT OF THE PROJECT	(30) Appraisal of the project planning status	N/a	N/a	N/a	1	-
INSTITUTIONAL SOUNDNESS	(31) Qualitative appraisal of the project's compliance with national plans	2	2	2	2	-
COHERENCE OF THE PROJECT	(32) Qualitative appraisal of the project's coherence with main international traffic corridors	1	1	2	N/a	-

Comments on the main results

P08 is a multi-modal priority project. The Lisboa-Valladolid motorway P08.3 is of minor influence in relation to other sub-sections of P08. This effect becomes clear in most of the indicators for P08.3.

Impact on passenger volumes and modal shift

- The average passenger transport volumes vary between 1.4 million passengers per year for P08.2 (Railway line Lisboa-Valladolid) and 10.4 million for P08.3 (Lisboa-Valladolid motorway)
- The multi-modal priority project will result in a decrease of road passenger transport performance of 1060 million pkm.

Impact on freight volumes and modal shift

- Freight transport volumes vary between 0.6 and 13.8 mln ton; however the priority project is multi-modal and the road transport flows are bigger than the rail transport flows.
- The priority project will result in an increase of transported rail freight of 2.3 mln at the expense of road freight transport;

Impact on infrastructure network use

The detailed analysis carried out by the consortium has revealed the following impacts on infrastructure use:

- The (modest) increase of road traffic flows for both passenger and freight, and the second one, the rerouting effect of road traffic. A decrease of rail freight flows is observed on the whole corridor route up to Sofia and Bulgarian Black Sea ports. For passenger transport following re-routing scheme is expected: passenger road transport is forecasted to increase along an axis País Vasco – Valladolid – Salamanca – Guarda – Lisboa – Faro, whereas a decrease is forecasted between the País Vasco and Portugal on the route via Madrid and Badajoz.- Passenger rail flows are expected to increase especially on an axis Lisboa – Guarda – Salamanca – Madrid/ Medina del Campo and between Guarda and La Coruna via Porto.

Impact on accessibility

- Sub-section P08.3 highlights a relative strong improvement of centrality values of relatively poor and peripheral regions (Lisboa – Valladolid motorway), due to the improvement especially in the Portuguese regions Centro and Norte.

Impact on environmental sustainability

- The reduction in emissions results in a decrease (up to 3%) of human health risks along the corridor.
- There will only be marginal transfer of road traffic away from sensitive areas or transfer of traffic to sensitive areas. In all sub-sections the changes are between -1% and 1%.
- In all sub-sections smaller parts are located within potentially sensitive areas. The maximum share is 8%.

Impact on emissions

The overall impact on emission is quantified from the impact at the network level and the differences between the all project run and the reference 2 scenario are as follows:

- CO2: net reduction with 49.3 thousand tonnes due to the increase of road traffic flows,
- NOx: net reduction with 245 tonnes,
- Particulates: slight increase with 13 tonnes due to the high emission factors of the Diesel locomotives.

Development of the project

- P08.1: Railway line Coruña- Lisbon -Sines. No information is available for this sub-section.
- P08.2: Railway line Lisbon-Valladolid. No information is available for this sub-section.
- P08.3: Lisbon-Valladolid motorway. No information is available for this sub-section.
- P08.4: New Lisbon airport. Financial plans are not completely defined and the design studies are ongoing. Therefore the score for this sub-section is +1.

6.9 P12 NORDIC TRIANGLE RAILWAY LINE

6.9.1 Description of the priority project

Priority Project	Priority Project name	Sub-sections		Sections	Sub-section start date	Sub-section end date
P12	Nordic triangle railway line/road	P12.1	Road and railway projects in Sweden	P12 S Road projects in Sweden	1996	2015
				P12 S Rail projects in Sweden	2000	2015
		P12.2	Vaalimaa - Helsinki-Turku motorway	P12 FIN (Turku) – Muurla – Lohja – Lohjanharju – (Helsinki)	2003	2010
				P12 FIN Helsinki–Vaalimaa	2004	2015
		P12.3	Railway line (Helsinki-) Lahti-Vainikkala and other railway projects in Finland	P12 FIN Helsinki– Vainikkala	2004	2014
		P12.4	Railway line Kerava - Lahti	P12 FIN Kerava-Lahti	2003	2006

The improvements are part of the Nordic Triangle scheme. This scheme aims to improve the road, rail, and maritime infrastructure of Sweden and Finland.

Principal objective is to improve the land based access of passengers and freight of the Nordic countries to Central Europe. The project will reduce journey times, increase capacity; better streamlining traffic flows and by means of this also contributes to improving environmental conditions and safety.

Table 6.13 *Project fiche P12*

Project	Description			
P12 Nordic triangle railway line/ road	The Nordic triangle transport scheme is aimed at upgrading road and rail in Sweden and Finland to improve freight and passenger transport between the Nordic countries and Central Europe. It will contribute to overcome the remoteness of Sweden and Finland from the centre of European continent and to help to integrate these outlying regions into the European Union.			
Sections of the Project	Objectives	Description	Start date	End date
P12. 1 Road and railway project in Sweden (including Malmo and Stockholm railway tunnels)	The basic idea of the Nordic Triangle is to enhance the possibilities for transport between Member States Denmark, Sweden, Finland, and the transport to and from Norway and Russia. The project will eliminate bottlenecks and capacity problems of some degrees. The improvement of accessibility will be one of the main results of the project. It can be estimated that 50% of the Swedish	The project is a combined railway and road investment program for the Nordic Triangle in Sweden, connecting the cities Copenhagen, Stockholm, Oslo and Helsinki. Concerning the section to be upgraded some works have to be done in the railway sector and some others in the road sector. Railway sector: Many stations are planned to be upgraded during the period 2004 – 2015: Stockholm, Sodertalje, Gnesta, Flen, Hallsberg, Laxa, Karlstad, Oxnedred, Gothenburg, Varberg, Falkenberg, Angelholm, Malmo, Astorp, Trelleborg, Alvesta, Mjolby and Norrkoping. The plan also includes further upgrading of speed: Astorp – Teckomartop (160 km/h), Malmo – Trelleborg (160 km/h) and Nassjo – Hassleholm (>200 km/h). The upgrading of speed on	2004	2015

	population and at least 25% of the Finnish and Norwegian population will benefit from better access. 80% of the transport between Denmark and Sweden/ Norway/ Finland will benefit from better access. A key element of the project is also the improvement of the connection between peripheral regions and the rest of Europe.	the section Nassjo – Hassleholm also includes the new European signalling system ERMTS/ ETCS. Road sector: The projects in this sector are a combination of upgraded sections as well as new links. Investments in road informatics will also be made on the Nordic Triangle in order to make more efficient use of existing roads. Road E4: The remaining parts are under construction except the bypass Stockholm, which is the National Road Transport Plan 2004 – 2015. Road E6: 5 individual projects with a total length of 71 km are included in the National Road Transport Plan 2004 – 2015. Road E18: 6 individual projects with a total length of 81 km. Additionally, several small projects will be conducted in order to improve the traffic safety on the existing road. The action will consist of road section 2+1 with wire rope safety fence. Concerning the section to be built some works have to be done in the railway sector and some others in the road sector. Railway sector: 4 tracks: Malmo – Lund and Norrkoping – Linkoping; double tracks: Goteborg – Oxnered, Falkenberg and Angelhom – Helsingborg. The improvement of capacity will be done between Jarna – Hallsberg, Linkoping, Hassleholm – Lund, Astorp – Teckomatorp, Kavlinge – Arlov and Malmo – Trelleborg. Road sector: Road E4: bypass Stockholm, 22 km; Road E6: Trelleborg – Vellinge 19 km; Rabbalshede – Tanumshede 13 km; Tanumshede – Vik 22km; Vik – Varmlandsbro 10 km; Varmlandsbro - Hogdal, 7 km; Road E18: Han – Tocksfors 4 km; Kronoparken – Skattkarr 6 km; Lekhyttan – Adolfsberg 18 km; Vastjadra – Vasteras 7 km; Sagan – Enkoping 40 km; Hjulsta – Ulriksdal 6 km. Concerning the railway sector there are some bridges and tunnels involved: Stockholm, tunnel and central station; Malmo City tunnel; Helsingborg – Bastad: tunnel and double track. According to the “A European initiative for growth investing in networks and knowledge for growth and jobs – Final report to the European Council” document the start of works is expected to be in 2004 and the end in 2011. Regarding the road sector there are also some bridges and tunnels involved: Tunnels and bridges on bypass Stockholm, which will cross the lake Malaren. Small tunnels and bridges due to the complex terrain at the northern part of E6. The expected capacity, concerning the railway sector, the planned investment will give a significantly increase in capacity. Plans to increase axle loads from 22,5 to 25 tonnes, the load per meter to 8 tonnes and widen the loading gauge for wide-body containers have been initiated and will improve freight capacity. On the other side, on the road sector, the capacity of motorway or similar is needed and will be reached on E4, E6 and eastern parts of E18. Concerning the railway sector the track varies between		

		1 and 4. Concerning the road sector, the E4 will be improved from 4 to 6 lanes; the E6 will be extended from 2 lanes to 4 lanes high quality road with safety barriers and interchanges; the E18 will be extended from 2 lanes to 4 lanes high quality road with safety barriers and interchanges in some parts. In other parts, traffic safety will be improved by 2+1 lane road with wire rope fence between lanes with different directions of traffic. Design and interoperability standards will be in accordance with EU and UN/ECE standards. Concerning the railway sector the electrification will be 15 kV and 16 2/3 Hz and the rail gauge will be 1435 mm. Concerning the road there will be the normal international standards paying attention on heavy winter conditions.		
P12. 2 Vaalimaa – Helsinki – Turku motorway	A key objective of this section is the promotion of the connections to Turku, Helsinki and other ports and terminals giving to large areas better access to rest of Europe. In fact the Baltic Sea in itself with severe winter conditions makes Finland a hinterland: isolated and peripheral in costs time consumption to/ from other Member States.	This section is totally 350 km long with motorway vision. Some parts of the road already have motorways standards but 142 km of new motorway needs to be constructed. The upgrading is needed for 30 km. Along this section, 7 tunnels with a total length of 5 km are planned. The motorway will have 4 lanes and design and interoperability will be according to international standard, with a special attention on difficult winter conditions.	2004	2015
P12. 3 Railway line (Helsinki) – Lahti – Vainikkala and other railway projects in Finland	The basic idea of the Nordic triangle with its Baltic Sea dimension is to enhance traffic between Finland and other EU Member States. Apart from air traffic and local connections in Lapland, this multimodal concept gives in practice the only traffic connection between Finland and EU. Simultaneously a well functioning link between the EU and a third country is established.	For future high-speed trains from Helsinki to east an upgrading of 143 km is planned. In addition to those, upgrading and electrification of track to Hanko harbour (148 km) and a new rail connection to Helsinki – Vantaa (17 km) are close parts of the Nordic Triangle concept promoting smooth connections to other EU Member States. The design and interoperability will be in accordance with EU and UN/ECE standards.	2005	2014

P12. 4 Railway line Kerava – Lahti	Aim of this project is to solve bottleneck or capacity problems of some degrees. Short cut Kerava – Lahti and bypass of Hamina solve typically a bottleneck. The connection between peripheral regions with the rest of Europe is a key issue of this project. The Baltic Sea with severe winter conditions makes Finland a hinterland: isolated and peripheral in costs time consumption to/ from other Member States. The project promotes smooth connections to Turku, Helsinki and other ports and terminals giving large areas better access to rest of Europe. Another key issue is to reduce the existing travel 5.5 hours time along the itinerary Helsinki – St Petersburg to 1.5 hours.	This section has a length of 63 km. The interventions will regard a second track construction. The design and interoperability will be in accordance with EU and UN/ ECE standards.	2002	2006

6.9.2 Impact on the level of traffic flows

The impact at the level of traffic flows is identified at infrastructure level as follows:

- Rail passenger flows P12, total interregional,
- Rail passenger flows P12, international,
- Rail freight flows P12, total interregional,
- Rail freight flows P12, international,
- Road passenger flows P12, total interregional,
- Road passenger flows P12, international,
- Road freight flows P12, total interregional,
- Road freight flows P12, international.

The impact at the level of traffic flows is illustrated by the figures hereunder.

Figure 6.29 *Rail passenger flows P12, total interregional*

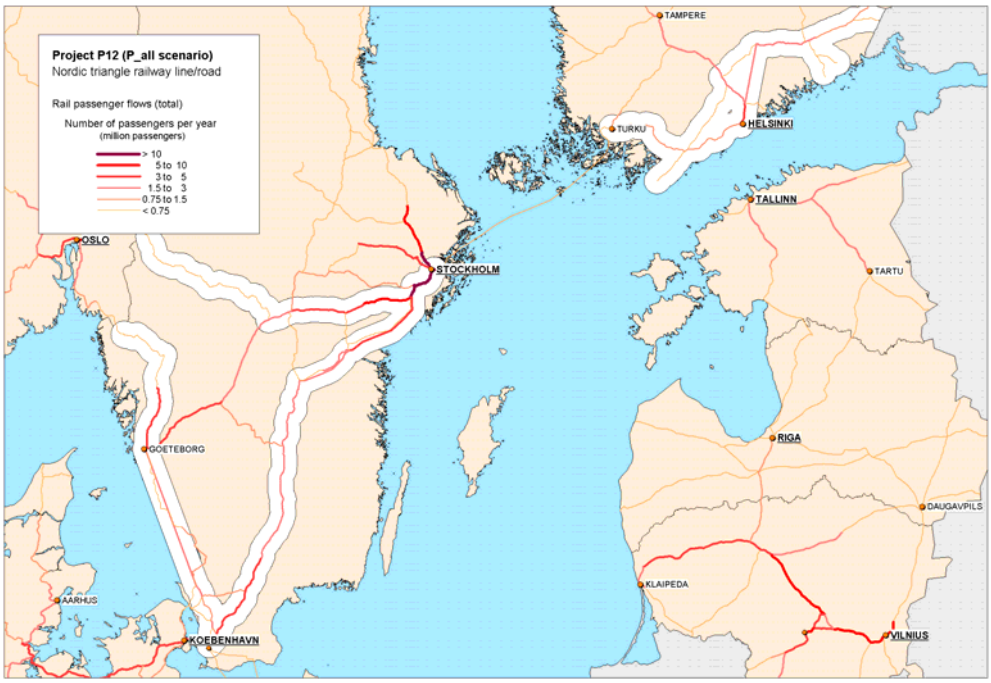


Figure 6.30 *Rail passenger flows P12, international*

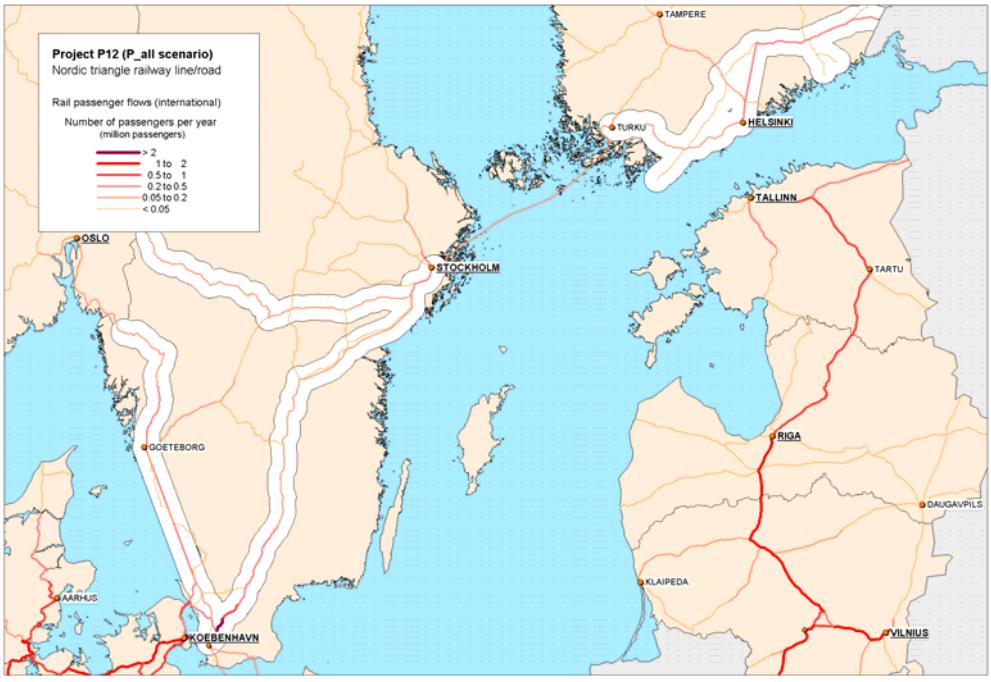


Figure 6.31 *Rail freight flows P12, total interregional*

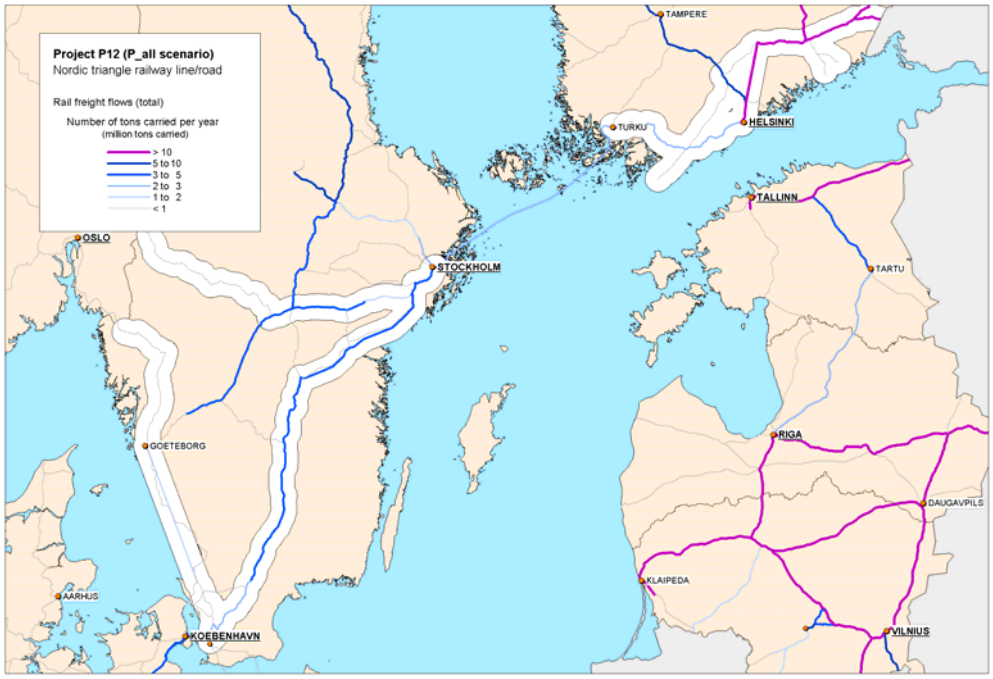


Figure 6.32 *Rail freight flows P12, international*

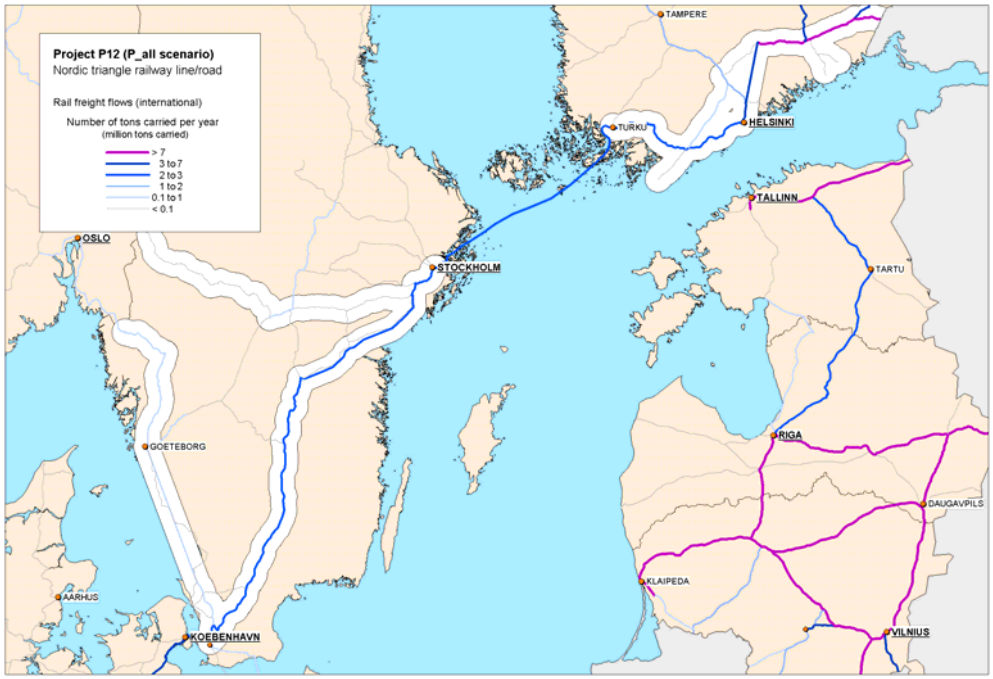


Figure 6.33 *Road passenger flows P12, total interregional*

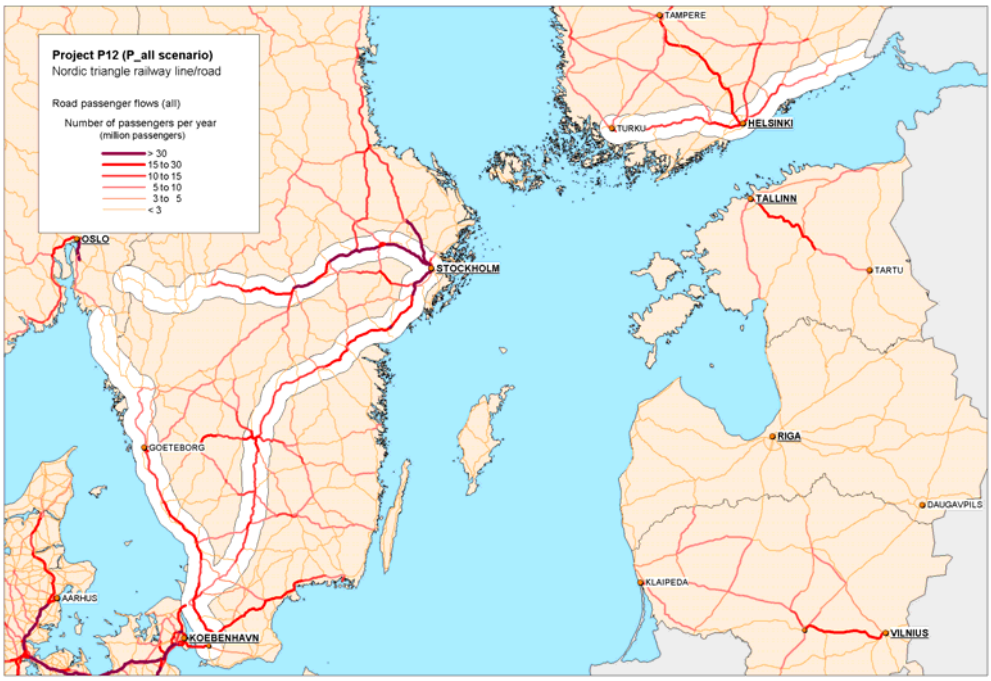


Figure 6.34 *Road passenger flows P12, international*

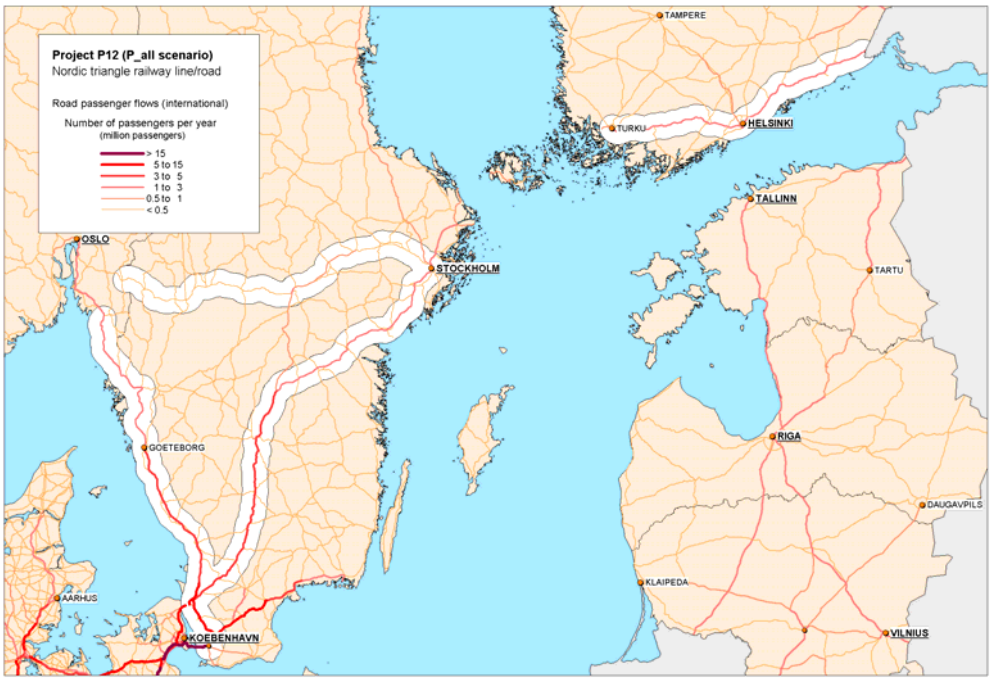


Figure 6.35 *Road freight flows P12, total interregional*

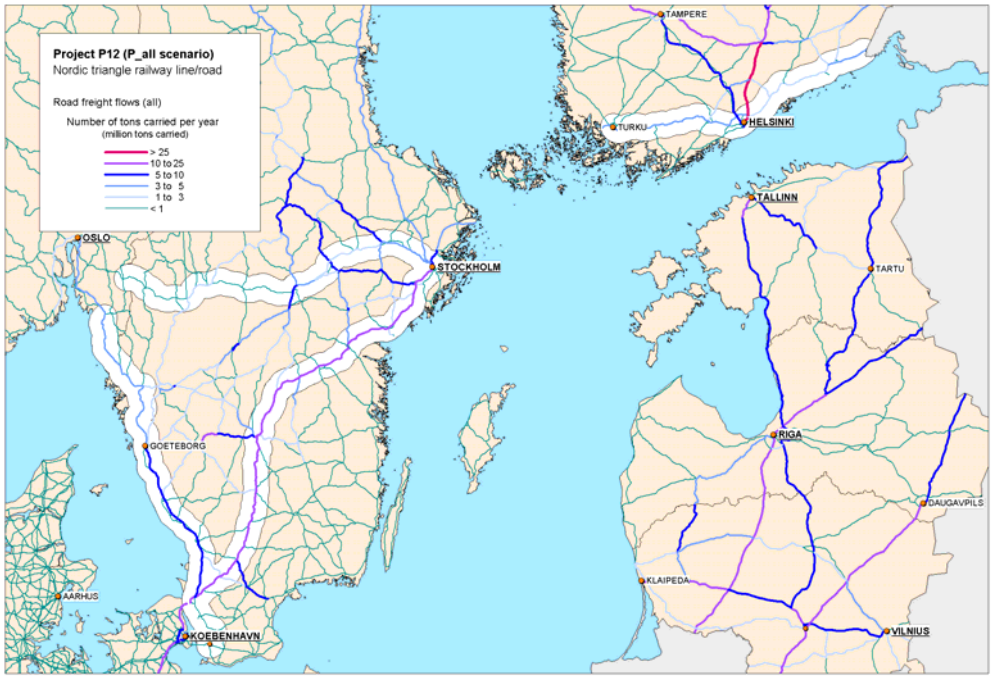
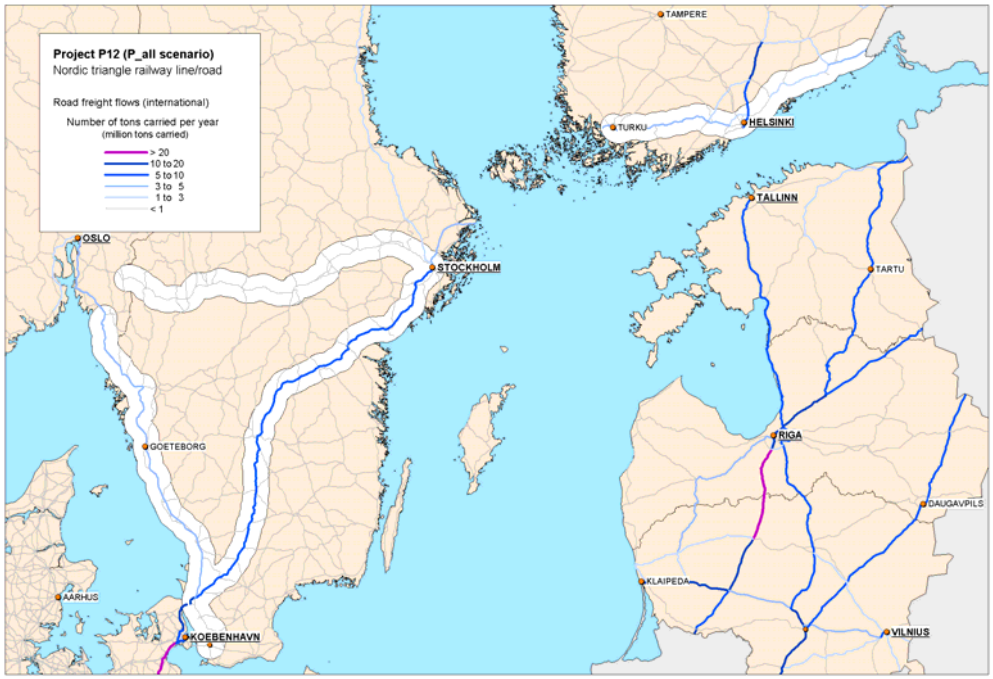


Figure 6.36 *Road freight flows P12, international*



6.9.3 Estimated aggregated impacts of the priority project

In the following table, the impact variables for the all projects scenario are presented for all sub-sections of the priority project. Between brackets, the values of the individual project scenarios are given. The methodology of the impact variables is described in D6, Chapter 3.6.

Table 6.14 *Impact variables P12: Nordic triangle railway line/road*

Objective	Indicator	P12.1	P12.2	P12.3	P12.4	P12 Total
ECONOMIC IMPACTS IN THE TRANSPORT SECTOR						
IMPROVEMENT OF ROAD LEVEL SERVICE	(1) Changes in time costs caused by road congestion, mln. € / year	-42.7 (-228.2)	-0.2 (-0.7)	-0.2 (0.9)	-0.2 (1.1)	-43.2 (-227)
REDUCTION OF TRAVEL TIME	(2a) Changes in monetary value of the reduction of passenger travel time, mln. € / year	-227.6 (-213.8)	-33.0 (-31)	-51.3 (-48.5)	-48.7 (-46.1)	-360.6 (-339.3)
	(2b) Changes in passenger travel time, mln hour / year	-15.8 (-15.7)	-2.2 (-2.2)	-2.5 (-2.5)	-2.5 (-2.5)	-23.1 (-22.9)
	(3) Changes in monetary value of the reduction of freight travel time, mln. € / year	-110.8 (-105)	-48.6 (-17.5)	-40.5 (-39.7)	-23.0 (-22.5)	-222.9 (-184.8)
ENVIRONMENTAL SUSTAINABILITY						
GLOBAL WARMING	(4a) Change (in monetary value) of the transport contribution to global warming, mln. € / year	-1.357 (5.904)	-3.242 (0.28)	-1.733 (-12.902)	-2.708 (-5.571)	-9.040 (-12.289)
	(4b) Change of the transport contribution to global warming, 1000 kg CO2 / year	-57763 (251226)	-137977 (11918)	-73755 (-549026)	-115242 (-237053)	-384737 (-522935)
ATMOSPHERIC POLLUTION	(5a) Change (in monetary value) of the NOX transport emission, mln. € / year	-1.921 (-0.734)	1.175 (-0.334)	0.846 (0.651)	0.042 (0.217)	0.142 (-0.2)
	(5b) Change of the NOX transport emission, 1000 kg NOx / year	-336 (-212)	636 (-35)	437 (426)	20 (170)	757 (349)
	(6a) Change (in monetary value) of particulates' emissions of transport, mln. € / year	0.032 (0)	0.281 (0)	0.049 (0)	0.009 (0)	0.371 (0.1)
	(6b) Change of particulates' emissions of transport, 1000 kg particulates / year	3 (0)	43 (3)	26 (18)	4 (8)	76 (30)
TRANSPORT SAFETY	(7) Variation on monetary value of accidents, mln. € / year	-64.2 (-72.5)	-25.4 (-42.3)	-13.8 (-57.9)	-11.5 (-31.9)	-115.0 (-204.5)
INVESTMENT COST						
INVESTMENT COST	(8) Total project costs, mln. €	10723	774	260	331	12088
GENERAL TRANSPORT RELEVANCE						
TOTAL TRAFFIC VOLUME ON THE PROJECT	(10) Total passenger traffic on the project section, mln. passengers / year	13.7 (13.6)	10.8 (10.7)	0.8 (0.8)	2.8 (2.8)	- -
	(11a) Maximum freight traffic on the project section, mln. ton / year	18.6 (17.8)	5.5 (5.4)	37.0 (36.9)	19.9 (20)	37.0 (36.9)
	(11b) Average freight traffic on the project section, mln. ton / year	5.6 (5.4)	4.0 (3.4)	16.4 (16.3)	19.9 (20)	- -
	(11c) Total freight traffic on the project section, mln. ton km /year	6747 (6590)	791 (665)	4881 (4872)	1416 (1420)	13835 (13546)
INTERMODALITY	(12) Quantitative appraisal of the project's contribution for an intermodal transport system, mln. ton	0.8 (0.8)	0.0 (0)	9.6 (10.3)	3.9 (4.6)	14.3 (15.7)
CREATION OF EUROPEAN VALUE ADDED						
DEVELOPMENT OF INTERNATIONAL PASSENGER TRAFFIC	(13) Share of international passenger traffic on total traffic on the project, %	12.2 (11.5)	13.7 (13.5)	25.4 (24.2)	11.9 (11.2)	- -
	(14) Volume of international passenger traffic on the project, mln. passengers / year	1.7 (1.6)	1.5 (1.4)	0.2 (0.2)	0.3 (0.3)	- -
DEVELOPMENT OF INTERNATIONAL FREIGHT TRAFFIC	(15) Share of international freight traffic on total traffic on the project, %	58.5 (57.4)	83.6 (86.1)	47.6 (47.5)	32.1 (32.3)	- -
	(16) Volume of international freight traffic on the project, mln. tons / year	3.3 (3.1)	3.4 (2.9)	7.8 (7.8)	6.4 (6.5)	- -
INTEROPERABILITY	(17) Reduction of passengers waiting time at borders for international traffic	N/a	N/a	N/a	N/a	-
	(18) Reduction of freight waiting time at borders for international traffic	N/a	N/a	N/a	N/a	-
	(19) Length of networks becoming interoperable because of the project	N/a	N/a	N/a	N/a	-

Objective	Indicator	P12.1	P12.2	P12.3	P12.4	P12 Total
IMPROVEMENT OF ACCESSIBILITY						
PASSENGER ACCESSIBILITY	(20) Variation of the STAC centrality index for passenger transport, %	0.07 (0.07)	0.00 (0)	0.00 (0)	0.00 (0)	- -
FREIGHT ACCESSIBILITY	(21) Variation of the STAC centrality index for freight transport, %	0.03 (0.04)	0.00 (0)	0.00 (0)	0.00 (0)	- -
PERIPHERAL ACCESSIBILITY	(22) Variation of the STAC centrality index for passenger transport in regions identified as peripheral, %	1.07 (0.65)	0.01 (0)	0.01 (0)	0.01 (0)	- -
	(23) Variation of the STAC centrality index for freight transport in regions identified as peripheral, %	2.10 (1.87)	0.05 (0)	0.02 (0)	0.03 (0.06)	- -
ENVIRONMENTAL SUSTAINABILITY						
MODAL REBALANCING	(24) Volume of road freight traffic shifted to rail, IWW or sea transport, mln. t·km / year	885 (215)	4196 (1214)	2989 (6349)	1971 (3235)	10041 (11013)
	(25) Volume of road and air passenger traffic shifted to rail, mln. passenger·km / year	-914 (-409)	158 (-293)	58 (-180)	210 (-178)	-488 (-1060)
LEVEL OF CONCERN :TRAFFIC TRANSFER	(26) Transfer of traffic from infrastructure lying in sensitive zones to the projected infrastructure, % of road traffic transferred from sensitive areas	-1.6% (0,0%)	5.0% (12,8%)	0.3% (2,6%)	7.0% (15,9%)	- -
LEVEL OF CONCERN: DISTANCE	(27) Percentage of the length of the project lying in a sensitive area, % length	0.0%	0.0%	0.0%	0.0%	-
LEVEL OF CONCERN: EMISSIONS	(28a) Changes of inhabitants' level of concern caused by emissions of NOx, % NOx	0.7% (-2,9%)	-3.0% (-2,8%)	-5.8% (-9,3%)	-4.7% (-6,8%)	- -
	(28b) Changes of inhabitants' level of concern caused by emissions of particulates, % particulates	0.1% (-3,2%)	-4.9% (-4,8%)	-8.1% (-11,6%)	-6.2% (-8,8%)	- -
LEVEL OF CONCERN: PROXIMITY	(29) Synthetic appreciation of the proximity of the project from specially protected areas (SPAs) or densely populated areas. Proximity of the project from SPA, km	0.0%	0.0%	3.0%	0.0%	-
MATURITY AND COHERENCE OF THE PROJECT						
DEVELOPMENT OF THE PROJECT	(30) Appraisal of the project planning status	1	3	3	5	-
INSTITUTIONAL SOUNDNESS	(31) Qualitative appraisal of the project's compliance with national plans	3	3	3	3	-
COHERENCE OF THE PROJECT	(32) Qualitative appraisal of the project's coherence with main international traffic corridors	1 / 3	3	2	2	-

Comments on the main results

Sub-section P12.1 is multi-modal. When interpreting the results, one has to be aware that the values refer to all modes concerned by the infrastructure measure. Therefore, especially the values referring to transport volumes on a sub-section tend to be higher for multi-modal sub-sections than for uni-modal ones.

Impact on passenger volumes and modal shift

- The passenger transport volumes vary on average between 0.8 million passenger per year on sub-section P12.3 (Railway line (Helsinki -) Lahti – Vainikkala and other railway projects in Finland) and 13.7 million on P12.1 (Road and railway projects in Sweden). According to the model outcomes for passenger transport the road infrastructure investments dominate the effects of the priority project P12, so that an increase in passenger road transport performance is expected by 488 million pkm per year.
- P12.1 reveals a comparatively strong decrease in potential passenger travelling times, which is caused mainly by the large-scale dimension of the sub-section and by the multi-modal infrastructure investments.

Impact on freight volumes and modal shift

- Average interregional freight transport volumes of the rail sub-sections are higher than the interregional freight transport on the road sub-sections.
- The priority project will result in an increase of 14.3 mln ton in the transported rail freight tonnage at the expense of (primarily) road freight transport;
- This group of subsections therefore realises a significant shift volume, despite the fact that they are implemented in a non-central part of Europe.
- Total transport shift to rail is 10.04 bln. ton-km.

Impact on infrastructure network use

The detailed analysis carried out by the consortium has revealed the following impact on infrastructure use:

- The main changes in interregional rail freight traffic flows are observed in Finland, and this is caused mainly by the rerouting of the traffic to the Northern part of the country.
- For rail passenger transport an increase in transport volume is expected especially between Malmo and Göteborg, Mjölby and Stockholm and along Turko – Helsinki – Lahti – Imatra, whereas a decrease is forecasted on the links between Turko and Lahti via Toijaja and between Hässleholm and Mjölby.
- Road passenger transport is forecasted to increase between Helsingborg and Jönköping, Örebro – Stockholm via Västeras and between Turku and Mikkeli via Helsinki, whereas decreases are expected between Helsingborg and Stockholm on the route via Halmstad, Jönköping and Norköpping.

Impact on accessibility

- Sub-section P12.1 highlights a relative strong improvement of centrality values of relatively poor and peripheral regions because of positive effects for peripheral regions Stockholm, Sydsverige, Småland med öarna, Västsverige as well as Denmark.

Impact on environmental sustainability

- The reduction in emissions results in a decrease (up to9%) of human health risks along the corridor.
- In some sub-sections road traffic will be transferred away from sensitive areas, and in other sub-sections there will be a transfer of road traffic to sensitive areas. The changes vary between 5% transferred away from these areas to an increase of 3% in the different sub-sections.
- No sub-sections are located within potentially sensitive areas.

Impact on emissions

The overall impact on emission is quantified from the impact at the network level and the differences between the all project run and the reference 2 scenario are as follows:

- CO2: net decrease with 385 thousand tonnes
- NOx: increase with 757 tonnes
- Particulates: marginal net increase of 76 tonnes

Development of the project

- P12.1: Road and railway projects in Sweden (including Malmo and Stockolm railways tunnels). Some of the design studies have already been completed. Some are going on. Works will start before 2004 and new subprojects will start continuously. Some financial agreements have already proposed, and others are ongoing. It is difficult to determine how many projects already have completed their own studies, for how many the studies are still on going. Therefore, the general indication of +1 has been taken into account.
- P12.2: Vaalimaa - Helsinki-Turku motorway. It includes 2 sections with different level of development. Interventions on the (Turku) – Muurla – Lohja – Lohjanharju – (Helsinki) have already started and the score is +5, while Helsinki–Vaalimaa sub-section has the design studies achieved and approved by the relevant authorities and no decisions on funding have been taken. The score is +3. The final score of the sub-section, taking into account the costs of the sections, is +3.
- P12.3: Railway line (Helsinki)-Lahti-Vainikkala and other railways projects in Finland. Overall design studies have been completed and more detailed studies are carried out in coordination with the implementation plan. The score is +3.
- P12.4 Railway line Kerava – Lahti. The works are ongoing; consequently, the score is +5.

6.10 P13 UK/IRELAND/BENELUX ROAD LINK

6.10.1 Description of the priority project

Priority Project	Priority Project name	Sub-sections		Sections	Sub-section start date	Sub-section end date
P13	UK/Ireland/Benelux road link	P13.1	UK/Ireland/Benelux road link (UK sections)	P13 UK/IRL/Benelux road link (UK part)	1996	2010
				P13 UK/IRL/Benelux road link (Irish part)	1996	2010

These sub-sections involve the upgrading of various UK road sections between Liverpool and Hull. The aim is to improve capacity and thereby reduce the journey times and reliability for passengers and freight between two of the majr ports in the UK. Indirectly it is believed that improving these hinterland connections also contributes to the development of the ports.

Table 6.15 *Project fiche P13*

Project	Description			
P13 UK/ Ireland/ Benelux road link	The project is to improve and modernise road links. This will reduce journey times between Ireland, the United Kingdom and the heart of mainland Europe, which will contribute to a better accessibility of all regions of the Community, while also improving network reliability and safety conditions			
Sections of the Project	Objectives	Description	Start date	End date
P13. 1 UK/ Ireland/ Benelux road link (UK part)	The objective is to reduce journey times between Ireland, the United Kingdom and the heart of mainland Europe, which will contribute to a better accessibility of all regions of the Community and improve network reliability and safety.	The main scope of the project (in the UK) is to upgrade existing roads to motorway, expressway, dual carriageway, and high-quality single carriageway depending on traffic densities. In England, construction of the A14 road linking the A1 and M6 has been undertaken and more sections are under investigation. In Wales, work on A40 from St. Clears to Haverfordwest is planned. In Northern Ireland, three sections totalling 24 km are planned together with improvements of several junctions.	1996	2010

6.10.2 Impact on the level of traffic flows

The impact at the level of traffic flows is identified at infrastructure level as follows:

- Road passenger flows P13, total interregional,
- Road passenger flows P13, international,
- Road freight flows P13, total interregional.
- Road freight flows P13, international.

The impact at the level of traffic flows is illustrated by the figures hereunder.

Figure 6.37 *Road passenger flows P13, total interregional*

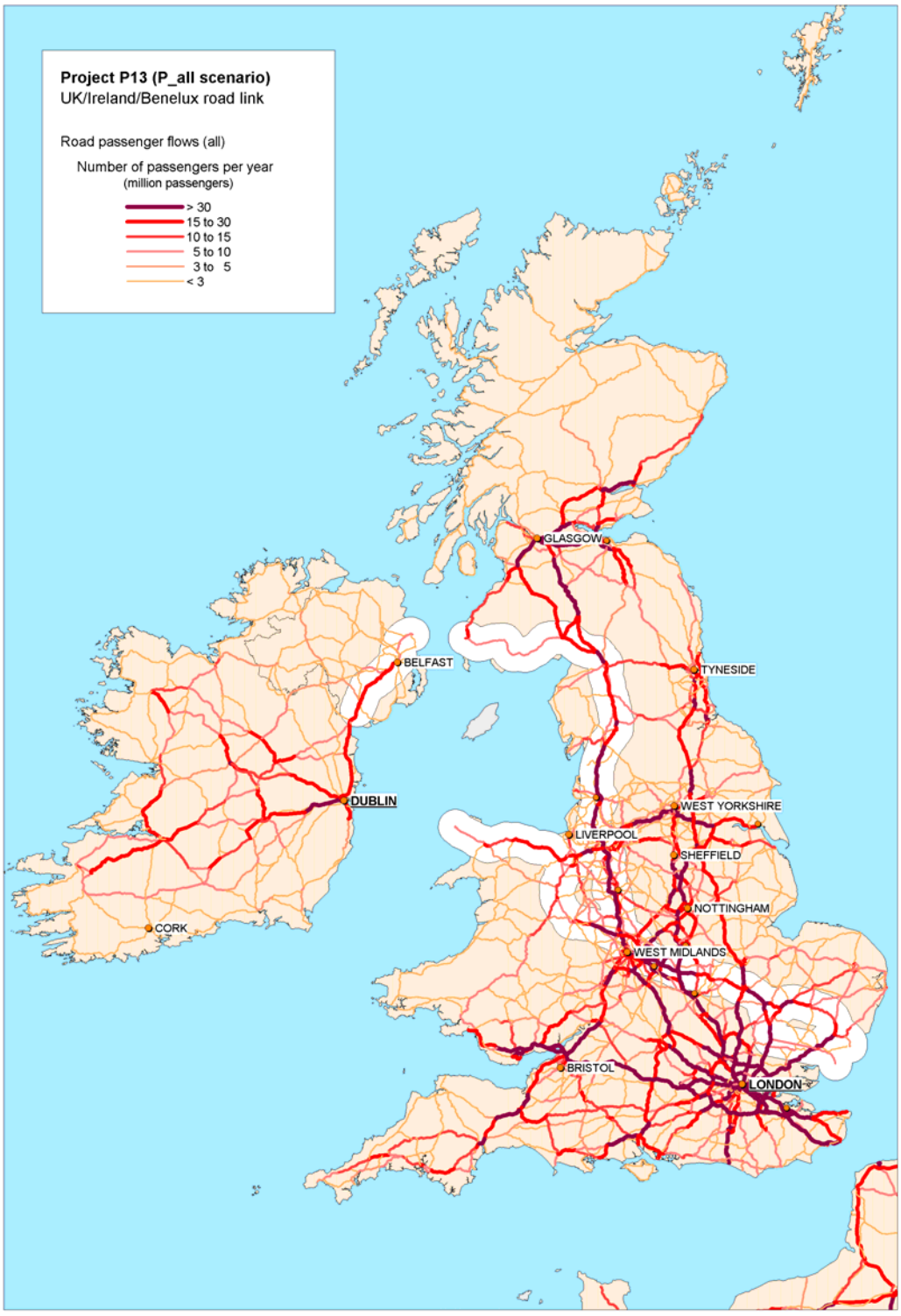


Figure 6.38 *Road passenger flows P13, international*

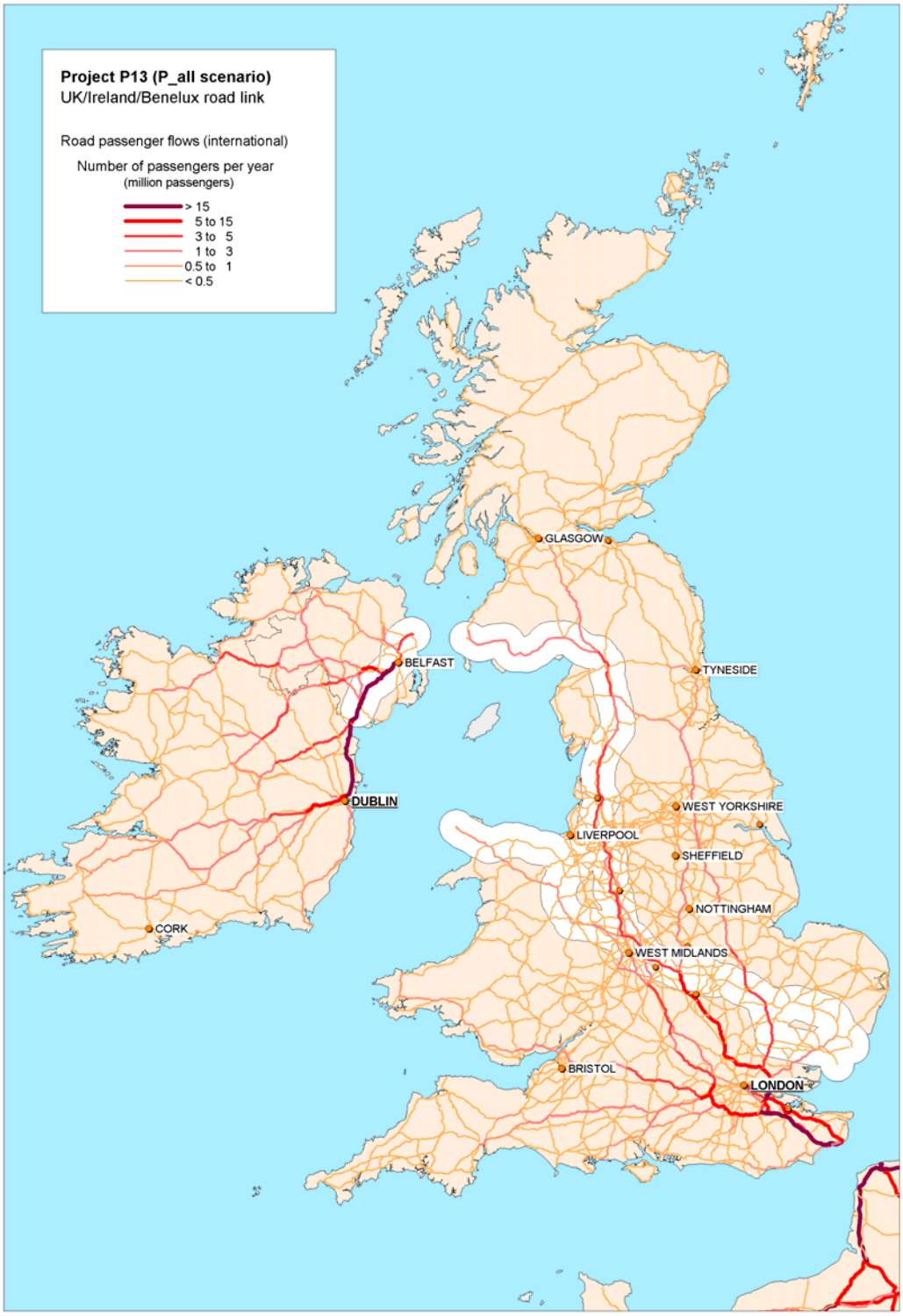


Figure 6.39 *Road freight flows P13, total interregional*

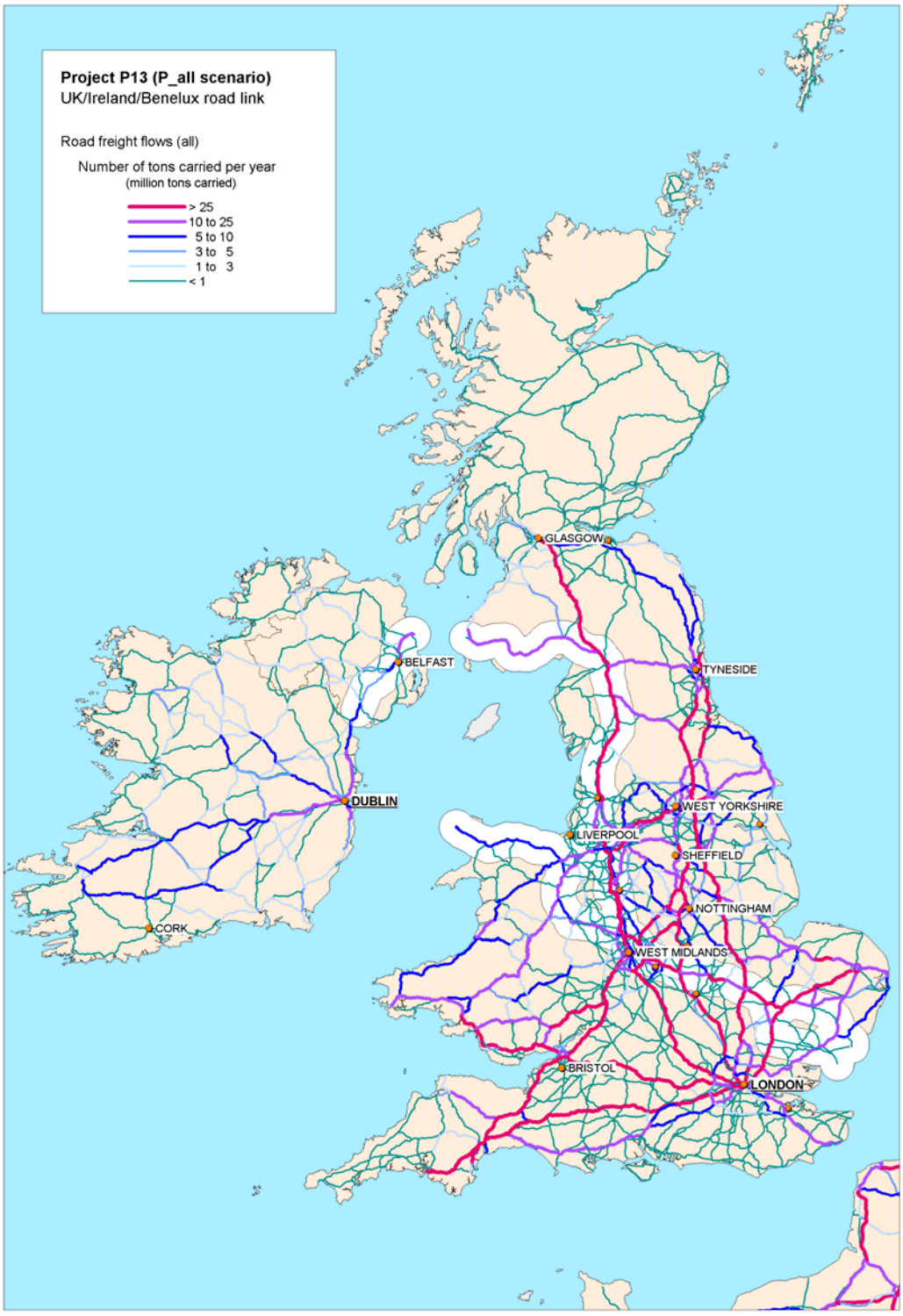
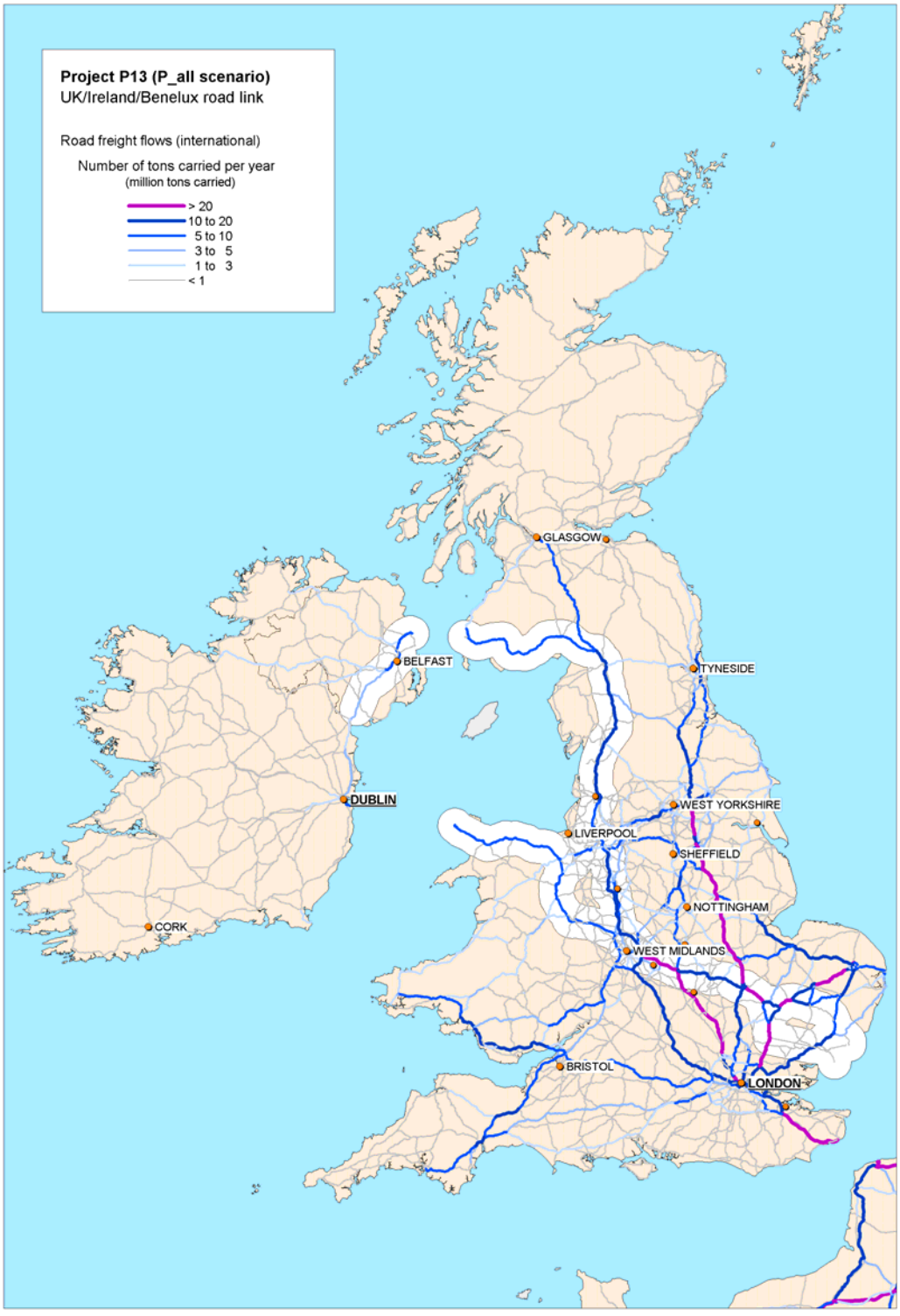


Figure 6.40 *Road freight flows P13, international*



6.10.3 Estimated aggregated impacts of the priority project

In the following table, the impact variables for the all projects scenario are presented for all sub-sections of the priority project. Between brackets, the values of the individual project scenarios are given. The methodology of the impact variables is described in D6, Chapter 3.6.

Table 6.16 *Impact variables P13: UK/Ireland/Benelux road link*

Objective	Indicator	P13.1	P13 Total
ECONOMIC IMPACTS IN THE TRANSPORT SECTOR			
IMPROVEMENT OF ROAD LEVEL SERVICE	(1) Changes in time costs caused by road congestion, mln. € / year	-12.9 (58.5)	-12.9 (58.5)
REDUCTION OF TRAVEL TIME	(2a) Changes in monetary value of the reduction of passenger travel time, mln. € / year	-32.7 (-30)	-32.7 (-30)
	(2b) Changes in passenger travel time, mln hour / year	-2.5 (-2.4)	-2.5 (-2.4)
	(3) Changes in monetary value of the reduction of freight travel time, mln. € / year	-36.1 (-36.4)	-36.1 (-36.4)
ENVIRONMENTAL SUSTAINABILITY			
GLOBAL WARMING	(4a) Change (in monetary value) of the transport contribution to global warming, mln. € / year	4.225 (11.175)	4.225 (11.175)
	(4b) Change of the transport contribution to global warming, 1000 kg CO2 / year	179786 (475527)	179786 (475527)
ATMOSPHERIC POLLUTION	(5a) Change (in monetary value) of the NOX transport emission, mln. € / year	-1.544 (0.45)	-1.544 (0.45)
	(5b) Change of the NOX transport emission, 1000 kg NOx / year	-253 (129)	-253 (129)
	(6a) Change (in monetary value) of particulates' emissions of transport, mln. € / year	0.047 (0.043)	0.047 (0.043)
	(6b) Change of particulates' emissions of transport, 1000 kg particulates / year	5 (3)	5 (3)
TRANSPORT SAFETY	(7) Variation on monetary value of accidents, mln. € / year	-88.0 (-161.2)	-88.0 (-161.2)
INVESTMENT COST			
INVESTMENT COST	(8) Total project costs, mln. €	1349	1349
GENERAL TRANSPORT RELEVANCE			
TOTAL TRAFFIC VOLUME ON THE PROJECT	(10) Total passenger traffic on the project section, mln. passengers / year	11.3 (10.9)	- -
	(11a) Maximum freight traffic on the project section, mln. ton / year	37.5 (37.9)	37.5 (37.9)
	(11b) Average freight traffic on the project section, mln. ton / year	10.5 (11.5)	- -
	(11c) Total freight traffic on the project section, mln. ton km /year	3865 (4221)	3865 (4221)
INTERMODALITY	(12) Quantitative appraisal of the project's contribution for an intermodal transport system, mln. ton	0.0 (0)	0.0 (0)
CREATION OF EUROPEAN VALUE ADDED			
DEVELOPMENT OF INTERNATIONAL PASSENGER TRAFFIC	(13) Share of international passenger traffic on total traffic on the project, %	22.9 (22.8)	22.9 (22.8)
	(14) Volume of international passenger traffic on the project, mln. passengers / year	2.6 (2.5)	- -
DEVELOPMENT OF INTERNATIONAL FREIGHT TRAFFIC	(15) Share of international freight traffic on total traffic on the project, %	65.9 (65.1)	65.9 (65.1)
	(16) Volume of international freight traffic on the project, mln. tons / year	6.9 (7.5)	- -
INTEROPERABILITY	(17) Reduction of passengers waiting time at borders for international traffic	N/a	N/a
	(18) Reduction of freight waiting time at borders for international traffic	N/a	N/a
	(19) Length of networks becoming interoperable because of the project	N/a	N/a

Objective	Indicator	P13.1	P13 Total
IMPROVEMENT OF ACCESSIBILITY			
PASSENGER ACCESSIBILITY	(20) Variation of the STAC centrality index for passenger transport, %	0.00 (0)	0.00 (0)
FREIGHT ACCESSIBILITY	(21) Variation of the STAC centrality index for freight transport, %	0.01 (0)	0.01 (0)
PERIPHERAL ACCESSIBILITY	(22) Variation of the STAC centrality index for passenger transport in regions identified as peripheral, %	0.00 (0.02)	0.00 (0.02)
	(23) Variation of the STAC centrality index for freight transport in regions identified as peripheral, %	0.30 (0.44)	0.30 (0.44)
ENVIRONMENTAL SUSTAINABILITY			
MODAL REBALANCING	(24) Volume of road freight traffic shifted to rail, IWW or sea transport, mln. t·km / year	164 (-1377)	164 (-1377)
	(25) Volume of road and air passenger traffic shifted to rail, mln. passenger·km / year	-131 (-481)	-131 (-481)
LEVEL OF CONCERN :TRAFFIC TRANSFER	(26) Transfer of traffic from infrastructure lying in sensitive zones to the projected infrastructure, % of road traffic transferred from sensitive areas	0.2% (1,2%)	- -
LEVEL OF CONCERN: DISTANCE	(27) Percentage of the length of the project lying in a sensitive area, % length	15.0%	-
LEVEL OF CONCERN: EMISSIONS	(28a) Changes of inhabitants' level of concern caused by emissions of NOx, % NOx	2.5% (1,9%)	- -
	(28b) Changes of inhabitants' level of concern caused by emissions of particulates, % particulates	2.1% (1,5%)	- -
LEVEL OF CONCERN: PROXIMITY	(29) Synthetic appreciation of the proximity of the project from specially protected areas (SPAs) or densely populated areas. Proximity of the project from SPA, km	16.0%	-
MATURITY AND COHERENCE OF THE PROJECT			
DEVELOPMENT OF THE PROJECT	(30) Appraisal of the project planning status	5	5
INSTITUTIONAL SOUNDNESS	(31) Qualitative appraisal of the project's compliance with national plans	3	3
COHERENCE OF THE PROJECT	(32) Qualitative appraisal of the project's coherence with main international traffic corridors	2	2

Comments on the main results

Impact on passenger volumes and modal shift

- The passenger transport volumes are on the priority project average 11.3 mln passengers per year.
- The priority project will result in an increase of road passenger transport performance of 131 mln pkm, which is caused both by modal shift from rail to road and, for some relations, by an increase in trip lengths.

Impact on freight volumes and modal shift

- The UK/Ireland/Benelux road link as such is insignificant in cargo shifting to other modes. This is practically 0.
- Total transport shift from road to rail is 164 mln. ton-km.

Impact on infrastructure network use

The detailed analysis carried out by the consortium has revealed the following impacts on infrastructure use:

- The main changes observed on the traffic flows are a small decrease of rail traffic and a stronger rerouting effect for road passengers. For passenger transport the most significant expected changes are an increase in road transport volume on the links between Carlile and Stranraer, as well as between Belfast and Dublin.
- Overall, changes are however very small.

Impact on transport safety

There is a positive effect for sub-sections that comprise road projects and are not located in the peripheral areas of Europe. These effects can also be observed for sub-section P13.1. The improvement of the road infrastructure will result in safer roads and therefore a decrease in the number of accidents.

Impact on environmental sustainability

- The increase of CO2 and PM-10 emissions results in an increase of 2% - 3% of human health risks along the corridor.
- The transfer of road traffic away from and to sensitive areas is negligible.
- In the priority project, about 15% is located within potentially sensitive areas.

Impact on emissions

The overall impact on emission is quantified from the impact at the network level and the differences between the all project run and the reference 2 scenario are as follows:

- CO2: net increase with 180 thousand tonnes due to the shift to road,
- NOx: net decrease with 253 tonnes,
- Particulates: marginal net increase 5 tonnes.

Development of the project

- P13.1: it is divided in 2 parts, UK and Irish parts. Interventions are ongoing on both sides; hence the score is +5.

6.11 P16 FREIGHT RAILWAY LINE SINES-MADRID-PARIS

6.11.1 Description of the priority project

Priority Project	Priority Project name	Sub-sections		Sections	Sub-section start date	Sub-section end date
P16	Freight railway line Sines-Madrid-Paris	P16.1	New high-capacity rail link across the Pyrenees	P16 E – F High capacity rail link crossing the Pyrenées	2013	2020
		P16.2	Railway line Sines-Badajoz	P16 P Sines- Badajoz	2005	2010

The first sub-section aims to establish a rail link crossing the Pyrenees in order to provide an alternative to the road flows of goods, in the first instance. The second is a proposed section that establishes a connection of the Portuguese rail network to the new-high capacity railway line crossing the Pyrenees.

The principal objective of this railway lines (new sections) is to increase speed and improve the capacity of Iberian rail freight network and by means of this to absorb a significant part of the traffic crossing the Pyrenees. It is expected that a substantial modal shift will be realised by construction of these projects.

Table 6.17 *Project fiche P16*

Project	Description			
P16 Freight railway line Sines – Madrid – Paris	Improving the Iberian peninsula's rail infrastructures will make an important contribution to strengthen its connections with the rest of Europe and its position as a western European gateway.			
Sections of the Project	Objectives	Description	Start date	End date
P16. 1 New high capacity rail link across the Pyrenees	A high capacity line linking the French and Spanish rail networks will significantly increase rail's share of international freight between the Iberian peninsula and the rest of Europe. The project will create an indispensable bridge between the Iberian rail freight network and that of the rest of Europe capable to absorb the impressive growth in the transpyrenean traffic (currently increasing at a 10% rate per year). Road connections between Spain and France are close to saturation and even if some existing road axes are going to be improved, a rail link dedicated to freight will be needed in the medium term. The objective is to capture in future 30% of freight traffic on rail	This project consists of the construction of a new high capacity rail link across the Pyrenees on a route that is still to be defined amongst several options under consideration. This link, dedicated mainly to freight, should include European gauge lines and would require the construction of a long distance tunnel, (expected length between 33 and 47 km) approximately 50% in Spanish territory. The expected capacity is 20 tonn/ year. Up to now some preliminary studies concerning the tracks have been carried out but others with main details are expected. Design and interoperability standards will agree with EU and UN/ECE	Not defined yet	2020

	(compared with a share of 3% today).	standards.		
P16. 2 Railway Sines – Badajoz	The objective of the section is to contribute to improve the Iberian peninsula's rail connection to strengthen its connection with the rest of Europe and its position as a Western European gateway. This line is key to the development of the Port of Sines and will foster traffic from Lisbon and Setubal to central Spain. Its construction with new standards of speed and polyvalent sleepers will make possible the future fully interoperability between Portuguese and Spanish freight networks with the rest of the trans- European rail network.	This project includes the new construction of 200 km of rail track. The line will be one track with active siding, half distance between Evora and Elvas. A platform for future expansion in double track is planned. The works will be developed in order to reach the standards defined in the EU and UN/ECE forms. The use of polyvalent sleepers allows the future migration to the standard gauge.	2005	2010

6.11.2 Impact on the level of traffic flows

The impact at the level of traffic flows is identified at infrastructure level as follows:

- Rail passenger flows P16, total interregional,
- Rail passenger flows P16, international,
- Rail freight flows P16, total interregional.
- Rail freight flows P16, international.

The impact at the level of traffic flows is illustrated by the figures hereunder.

Figure 6.41 *Rail passenger flows P16, total interregional*

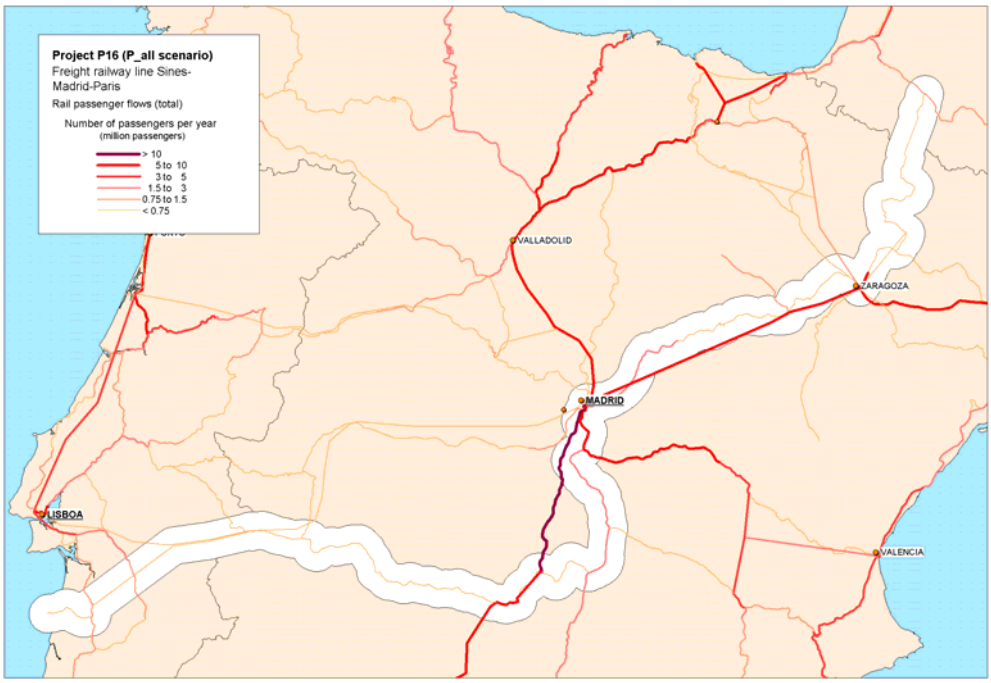


Figure 6.42 *Rail passenger flows P16, international*

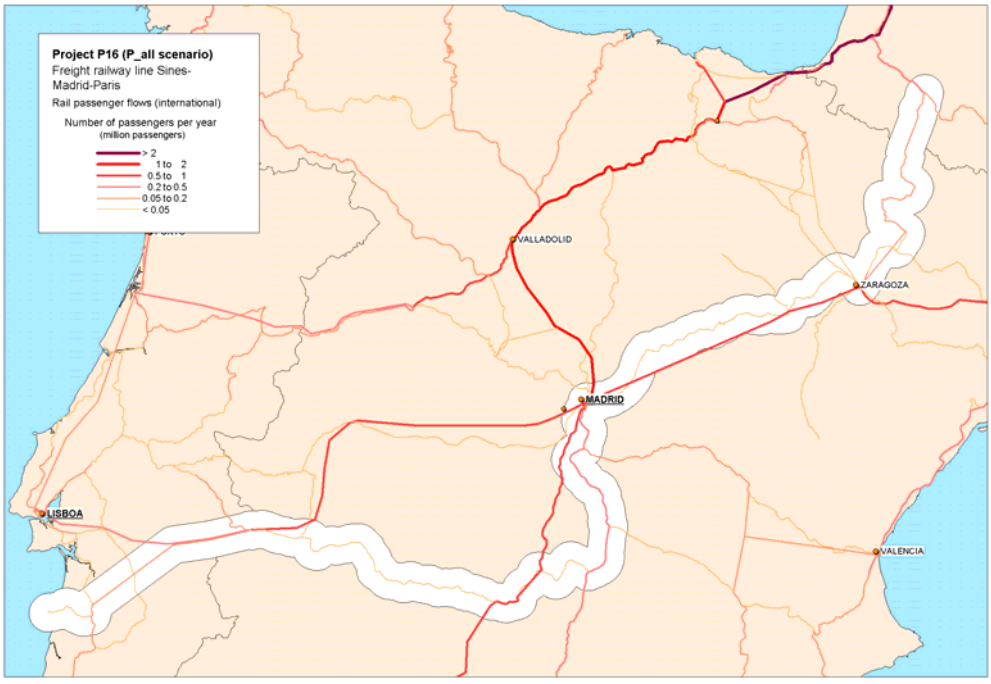


Figure 6.43 *Rail freight flows P16, total interregional*

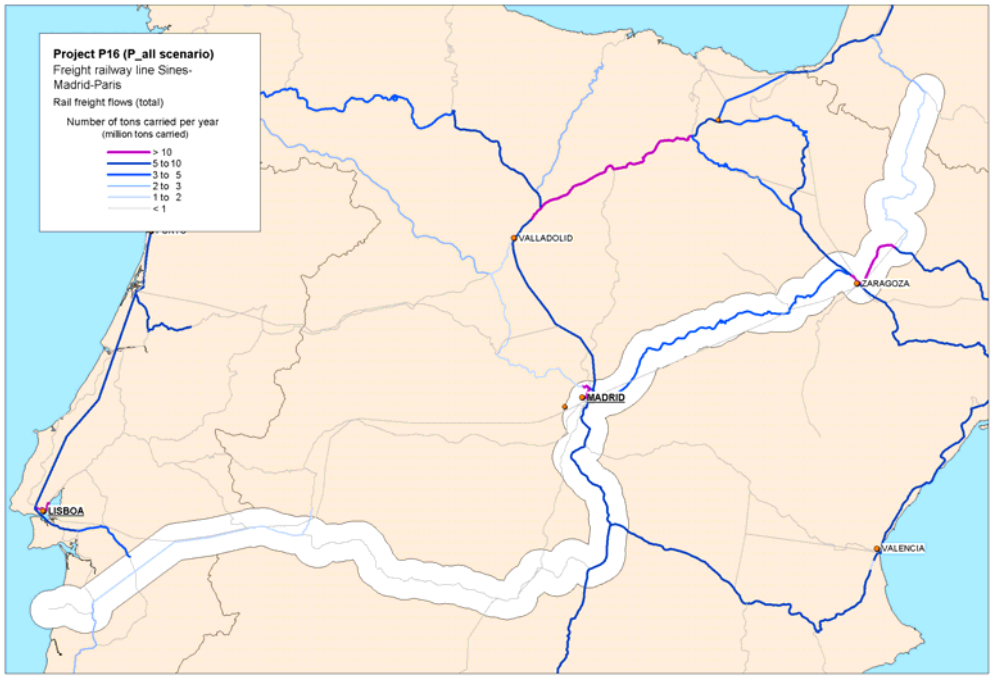
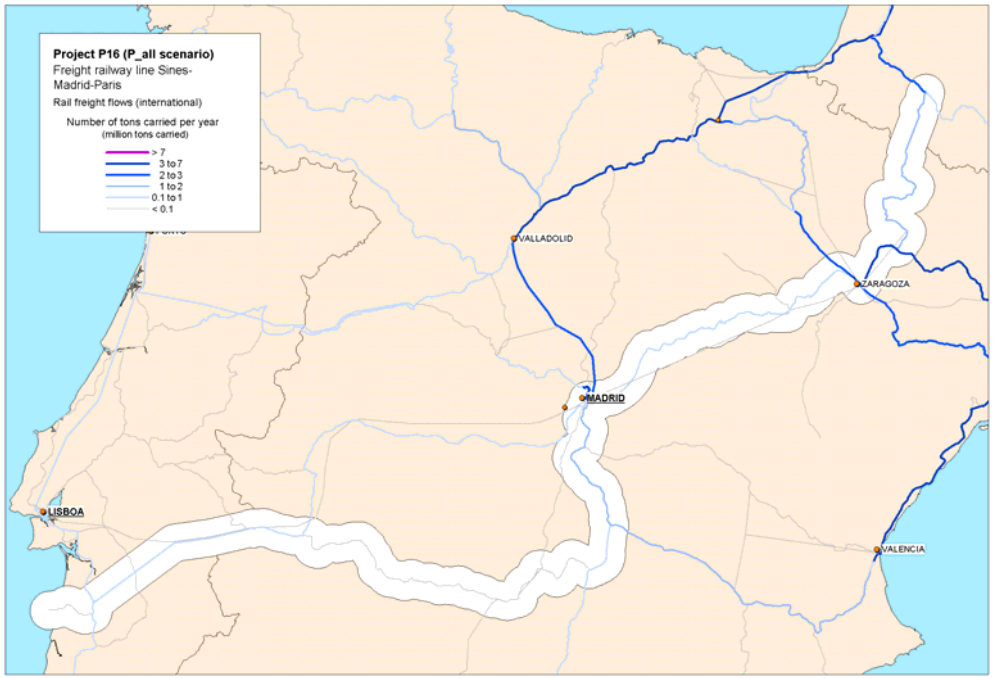


Figure 6.44 *Rail freight flows P16, international*



6.11.3 Estimated aggregated impacts of the priority project

In the following table, the impact variables for the all projects scenario are presented for all sub-sections of the priority project. Between brackets, the values of the individual project scenarios are given. The methodology of the impact variables is described in D6, Chapter 3.6.

Table 6.18 *Impact variables P16: Freight railway line Sines-Madrid-Paris*

Objective	Indicator	P16.1	P16.2	P16 Total
ECONOMIC IMPACTS IN THE TRANSPORT SECTOR				
IMPROVEMENT OF ROAD LEVEL SERVICE	(1) Changes in time costs caused by road congestion, mln. € / year	-0.2 (-3.9)	-0.1 (-0.2)	-0.4 (-4.1)
REDUCTION OF TRAVEL TIME	(2a) Changes in monetary value of the reduction of passenger travel time, mln. € / year	0.1 (-8)	-0.1 (-0.8)	0.0 (-8.8)
	(2b) Changes in passenger travel time, mln hour / year	0.0 (-0.9)	0.0 (-0.1)	0.0 (-1)
	(3) Changes in monetary value of the reduction of freight travel time, mln. € / year	-3.4 (-15.9)	-0.2 (-0.3)	-3.5 (-16.2)
ENVIRONMENTAL SUSTAINABILITY				
GLOBAL WARMING	(4a) Change (in monetary value) of the transport contribution to global warming, mln. € / year	-1.099 (-1.43)	-0.544 (-0.801)	-1.643 (-2.231)
	(4b) Change of the transport contribution to global warming, 1000 kg CO2 / year	-46773 (-60838)	-23165 (-34073)	-69938 (-94911)
ATMOSPHERIC POLLUTION	(5a) Change (in monetary value) of the NOX transport emission, mln. € / year	-0.569 (-0.818)	-0.242 (-0.132)	-0.811 (-0.95)
	(5b) Change of the NOX transport emission, 1000 kg NOx / year	-62 (-130)	-32 (-22)	-94 (-152)
	(6a) Change (in monetary value) of particulates' emissions of transport, mln. € / year	-0.031 (0.027)	0.011 (0.018)	-0.020 (0.045)
	(6b) Change of particulates' emissions of transport, 1000 kg particulates / year	-2 (3)	2 (2)	0 (4)
TRANSPORT SAFETY	(7) Variation on monetary value of accidents, mln. € / year	-1.1 (-2.4)	-3.3 (-3.4)	-4.4 (-5.7)
INVESTMENT COST				
INVESTMENT COST	(8) Total project costs, mln. €	5000	700	5700
GENERAL TRANSPORT RELEVANCE				
TOTAL TRAFFIC VOLUME ON THE PROJECT	(10) Total passenger traffic on the project section, mln. passengers / year	0.1 (1.1)	0.1 (0.2)	- -
	(11a) Maximum freight traffic on the project section, mln. ton / year	1.8 (2.9)	2.0 (1.7)	2.0 (2.9)
	(11b) Average freight traffic on the project section, mln. ton / year	1.8 (2.9)	1.1 (1.2)	- -
	(11c) Total freight traffic on the project section, mln. ton km /year	64 (101)	242 (268)	306 (369)
INTERMODALITY	(12) Quantitative appraisal of the project's contribution for an intermodal transport system, mln. ton	0.1 (0.2)	0.8 (0.8)	0.9 (1)
CREATION OF EUROPEAN VALUE ADDED				
DEVELOPMENT OF INTERNATIONAL PASSENGER TRAFFIC	(13) Share of international passenger traffic on total traffic on the project, %	100.0 (100)	85.5 (89.4)	- -
	(14) Volume of international passenger traffic on the project, mln. passengers / year	0.1 (1.1)	0.1 (0.2)	- -
DEVELOPMENT OF INTERNATIONAL FREIGHT TRAFFIC	(15) Share of international freight traffic on total traffic on the project, %	100.0 (100)	18.3 (26.7)	- -
	(16) Volume of international freight traffic on the project, mln. tons / year	1.8 (2.9)	0.2 (0.3)	- -
INTEROPERABILITY	(17) Reduction of passengers waiting time at borders for international traffic	N/a	N/a	-
	(18) Reduction of freight waiting time at borders for international traffic	N/a	N/a	-
	(19) Length of networks becoming interoperable because of the project	N/a	N/a	-

Objective	Indicator	P16.1	P16.2	P16 Total
IMPROVEMENT OF ACCESSIBILITY				
PASSENGER ACCESSIBILITY	(20) Variation of the STAC centrality index for passenger transport, %	0.00 (0.09)	0.02 (0)	- -
FREIGHT ACCESSIBILITY	(21) Variation of the STAC centrality index for freight transport, %	0.00 (0)	0.00 (0)	- -
PERIPHERAL ACCESSIBILITY	(22) Variation of the STAC centrality index for passenger transport in regions identified as peripheral, %	-0.01 (0.19)	0.03 (0.05)	- -
	(23) Variation of the STAC centrality index for freight transport in regions identified as peripheral, %	0.00 (0)	0.01 (0)	- -
ENVIRONMENTAL SUSTAINABILITY				
MODAL REBALANCING	(24) Volume of road freight traffic shifted to rail, IWW or sea transport, mln. t·km / year	491 (495)	500 (534)	991 (1029)
	(25) Volume of road and air passenger traffic shifted to rail, mln. passenger·km / year	24 (184)	112 (11)	136 (195)
LEVEL OF CONCERN :TRAFFIC TRANSFER	(26) Transfer of traffic from infrastructure lying in sensitive zones to the projected infrastructure, % of road traffic transferred from sensitive areas	-2.9% (-0,5%)	-0.8% (-0,1%)	- -
LEVEL OF CONCERN: DISTANCE	(27) Percentage of the length of the project lying in a sensitive area, % length	10.0%	0.0%	-
LEVEL OF CONCERN: EMISSIONS	(28a) Changes of inhabitants' level of concern caused by emissions of NOx, % NOx	-2.4% (-0,5%)	-1.9% (-2,3%)	- -
	(28b) Changes of inhabitants' level of concern caused by emissions of particulates, % particulates	-2.1% (-0,5%)	-2.2% (-2,4%)	- -
LEVEL OF CONCERN: PROXIMITY	(29) Synthetic appreciation of the proximity of the project from specially protected areas (SPAs) or densely populated areas. Proximity of the project from SPA, km	4.0%	0.0%	-
MATURITY AND COHERENCE OF THE PROJECT				
DEVELOPMENT OF THE PROJECT	(30) Appraisal of the project planning status	1	0	-
INSTITUTIONAL SOUNDNESS	(31) Qualitative appraisal of the project's compliance with national plans	4	2	-
COHERENCE OF THE PROJECT	(32) Qualitative appraisal of the project's coherence with main international traffic corridors	0	0	-

Comments on the main results

Impact on passenger volumes and modal shift

For the modelling approach the freight rail links were not closed for passenger trains, hence slight impacts on passenger transport are expected:

- The forecasted passenger transport volumes amount to 0.1 mln passengers per year;
- The passenger road transport performance is expected to decrease with 136 mln pkm per year.

Impact on freight volumes and modal shift

- Transport volumes in this priority project vary between 1.1 mln and 1.8 mln ton on sub-sections. Almost all transport is international freight transport;
- The priority project will result in an increase of 0.9 mln ton in the transported rail freight volume at the expense of (primarily) road freight transport;
- Total transport shift to rail is 991 mln. ton-km.

Impact on infrastructure network use

The detailed analysis carried out by the consortium has revealed the following impact on infrastructure use:

- The main changes observed on the traffic flows are an increase of the rail freight across the Pyrenees, but here the shift towards rail is not such high as expected. However, here we see a combined effect of modal shift and rerouting. A possible bottleneck here might consist of the difficulties of interoperability with the European freight dedicated network which is build at different design standard.

Impact on environmental sustainability

- The reduction in emissions results in a decrease (between 2% and 3%) of human health risks along the corridor.
- In the corridor road traffic will be transferred to sensitive areas. However, in all sub-sections the changes are small (less than 3%).
- In the Pyrenees sub-sections 10% is located within potentially sensitive areas.

Impact on emissions

The overall impact on emission is quantified from the impact at the network level and the differences between the all project run and the reference 2 scenario are as follows:

- CO2: net decrease with 70 thousand tonnes,
- NOx: net decrease with 94 tonnes,
- Particulates: not significant change.

Development of the project

- P16.1: New high-capacity rail link across the Pyrenees. The score of this sub-section is +1, design studies are ongoing, and no decisions on funding have been taken.
- P16.2: Railway line Sines - Badajoz. No decisions either on the funding or on the design studies have been taken yet. Therefore the score assigned to this sub-section is 0.

6.12 P17 RAILWAY LINE (PARIS)-STRASBOURG-STUTTGART-WIEN-BRATISLAVA

6.12.1 Description of the priority project

Priority Project	Priority Project name	Sub-sections		Sections	Sub-section start date	Sub-section end date
P17	Railway line (Paris-) Strasbourg-Stuttgart-Wien-Bratislava	P17.1	Baudrecourt-Strasbourg-Stuttgart with the Kehl bridge as cross-border section	P17 (ex P04) Baudrecourt - Strasbourg	2010	2015
				P17 F/D Strasbourg - Appenweier	2010	2015
		P17.2	Stuttgart-Ulm	P17 D Stuttgart–Ulm	2004	2012
		P17.3	München-Salzburg , cross-border section	P17 D Munchen – Muhldorf – Salzburg	2002	2015
				P17 A Munchen – Muhldorf – Salzburg	2005	2015
		P17.4	Salzburg-Wien	P17 A Salzburg - Wien	1990	2012
		P17.5	Wien-Bratislava, cross-border section.	P17 A Wien - Bratislava	2004	2010

The priority projects consist in construction of new sections as well as upgrading of existing sections of the railway connections in this West-Centre corridor in the middle of the European continent. The new railway line is a mixed passengers/ freight line.

The principal objectives are to increase speed (high-speed railway services) and capacity in order to improve the access of new Member states to the EU-economic centres and achieve a significant modal shift both in passengers as in freight transport.

Table 6.19 *Project fiche P17*

Project	Description			
P17 Railway line (Paris) – Strasbourg – Stuttgart – Wien – Bratislava	This project comprises the construction of new and upgraded high-speed lines all the way from Paris to Wien and upgrade of existing lines between Wien until Bratislava. It includes, in particular, the construction of a second track on the Kehl bridge over the Rhine to interconnect the French and German networks. It includes upgrade of existing lines, which will be used for freight. The project will provide a continuous rail axis for both passengers and freight from Paris to Bratislava. The development of this axis will contribute to a successful EU enlargement by connecting new Member States and by providing alternative to roads for inter – Member States traffic. The project will improve access to and from the many conurbations along its route.			
Sections of the Project	Objectives	Description	Start date	End date
P17.1 Baudrecourt – Strasbourg – Stuttgart with the Kehl bridge as	One of the objectives of the section of this project is savings in journey time. In	The project of this section includes 106 km of new line between Baudrecourt (Moselle) and Vendenheim (Bas Rhin) and 16 km of links on the	2004[6]	2010[7]

[6] According to the "A European Initiative for growth investing in networks and knowledge for growth and jobs – Final report to the European Council" document.
[7] According to the "A European Initiative for growth investing in networks and knowledge for growth and jobs – Final report to the European Council" document.

cross border section	particular in passengers' traffic, the reduction between Paris and Strasbourg will be from 3 h 50 to 1 h 50. The project will increase the passengers and freight traffic. It will reduce the freight capacity in the regional sector on the existing facilities. Besides the project will eliminate bottleneck especially in the connection France – Germany (Kehl bridge) with the improvement along the section Strasbourg – Stuttgart – München. The project will also increase the overall capacity of the corridor (250 trains/ day).	existing facilities. The expected capacity will be around 200 trains/ day. The overall capacity of the Paris – Strasbourg will be 500 trains/ day. The interoperability and design standards will be in accordance with EU and UN/ECE standards and there will be the ERTMS level 2 and the GSM – R. It is included the construction of a bridge on the Rhine to connect France and Germany. The other part of the section, between Kehl and Appenweier, will be an upgrading of the double track for speed up to 200 km/ h for a length of 17 km and the upgrading of the existing bridge over the Rhine for the second track. The design and the interoperability standards will be in accordance with the EU and UN/ECE standards.		
P17.2 Stuttgart – Ulm	The aim of the project is to contribute to have a better accessibility to and from the many conurbations along its route. Its development contributes as well to have a successful EU enlargement by connecting new Member States and by providing alternative to roads for inter – Member States traffic.	The project of this section involves the construction of a double track high-speed line between Stuttgart and Neu Ulm for a total length of 91 km. The design and interoperability standards according to the EU and UN/ECE standards will be TSI, ECE: E 43.	2004	2012
P17.3 Munchen – Salzburg, crossborder section	The project will contribute to the improvement of the accessibility to and from the many conurbations along its route. Its development contributes as well to have a successful EU enlargement by connecting new Member States.	The project of this section includes the upgrading of the line Munchen – Markt Schwaben to 4 tracks, the upgrading of the line Markt Schwaben – Muhldorf – Freilassing to 2 tracks, electrification and upgrading for higher speed. The expected capacity will be 182 trains per day and directionon the 4 tracks and 106 trains per day and directionon the 2 tracks.	2002[8]	2015[9]
P17.4 Salzburg – Wien	The objective of this section is mainly to face the high international traffic and its high potential for future increase. In particular in the section between Wien and Wels the volume and the percentage of international traffic are very high. The section constitutes a bottleneck both on road and rail; therefore the	The project of this section includes some parts of the section to be built. In particular, the part between the Border D/A – Salzburg and Wels for a length of 108 km and the part between Wels and Wien with a length of 214 km. The expected capacity on this side is 260 existing trains/ day plus 200 additional and there will be 2 tracks additional to the existing 2 tracks between Linz and Wien and between Wien and Wels. Design and interoperability standards will be in accordance with EU and UN/ ECE standards: HS	1990	After 2010

[8] According to the "A European Initiative for growth investing in networks and knowledge for growth and jobs – Final report to the European Council" document.
[9] According to the "A European Initiative for growth investing in networks and knowledge for growth and jobs – Final report to the European Council" document.

	interventions on this section are a key project in Austrian rail network.	– TSI and AGC, AGCT for the existing, the upgrading and the new lines.		
P17.5 Wien – Bratislava, cross-border section	The objective of this section is mainly to contribute to face the high international traffic and its high potential for future increase. Besides, the time at the border will be reduced of several minutes.	Concerning the project of this section, some parts of the section have to be upgraded. In particular the section between the D/A border Passau and Wels (83 km), the section between (Wien) Parndorf – border A/SK (Bratislava) with a length of 21 km and the section between Wien – Marchegg – border A/SK (Bratislava) with a length of 53 km.	2004[10]	2010[11]

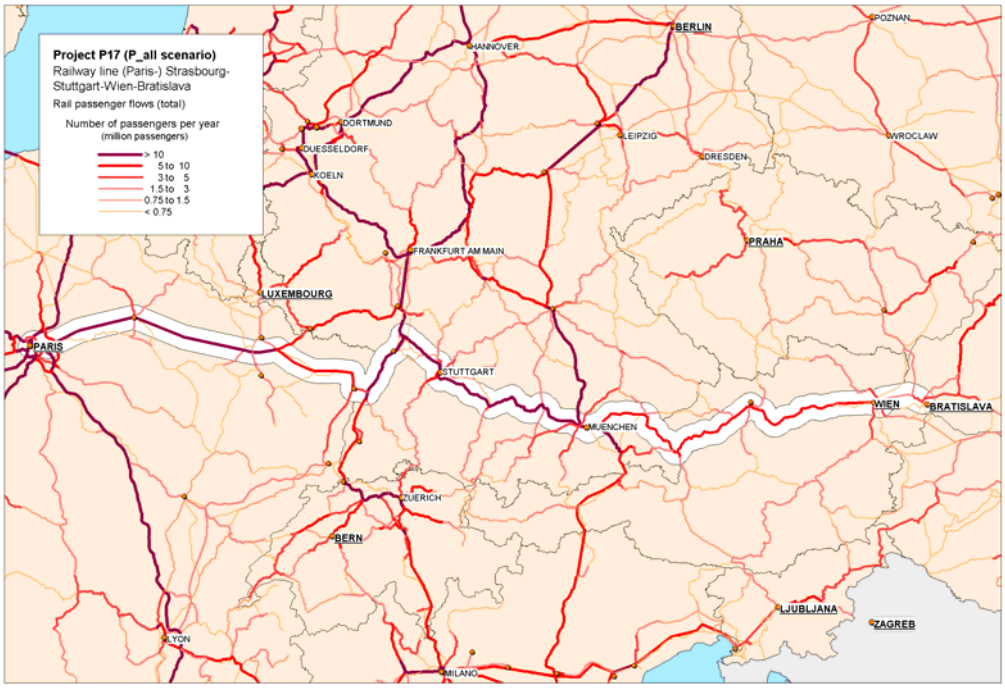
6.12.2 Impact on the level of the traffic flows

The impact at the level of traffic flows is identified at infrastructure level as follows:

- Rail passenger flows P17, total interregional,
- Rail passenger flows P17, international,
- Rail freight flows P17, total interregional,
- Rail freight flows P17, international.

The impact at the level of traffic flows is illustrated by the figures hereunder.

Figure 6.45 *Rail passenger flows P17, total interregional*



[10] According to the "A European Initiative for growth investing in networks and knowledge for growth and jobs – Final report to the European Council" document.
[11] According to the "A European Initiative for growth investing in networks and knowledge for growth and jobs – Final report to the European Council" document.

Figure 6.46 *Rail passenger flows P17, international*

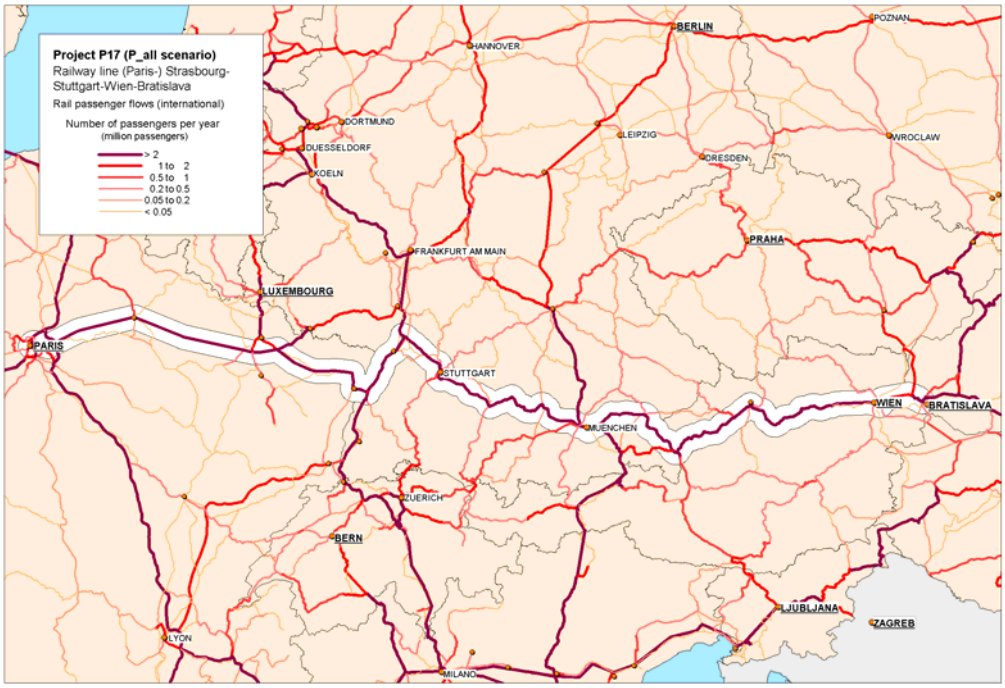


Figure 6.47 *Rail freight flows P17, total interregional*

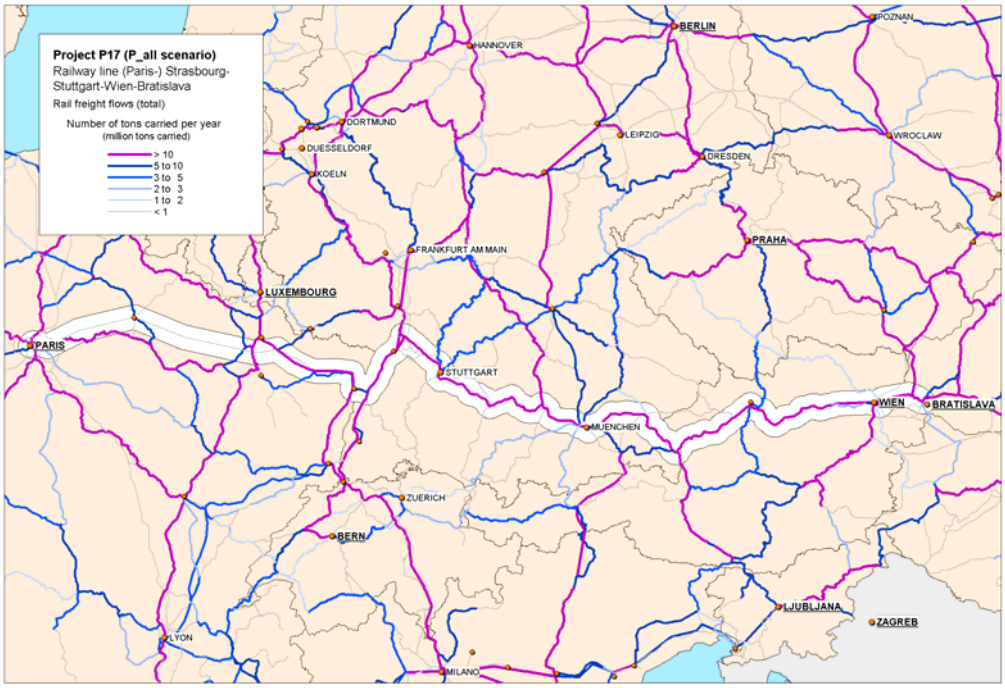
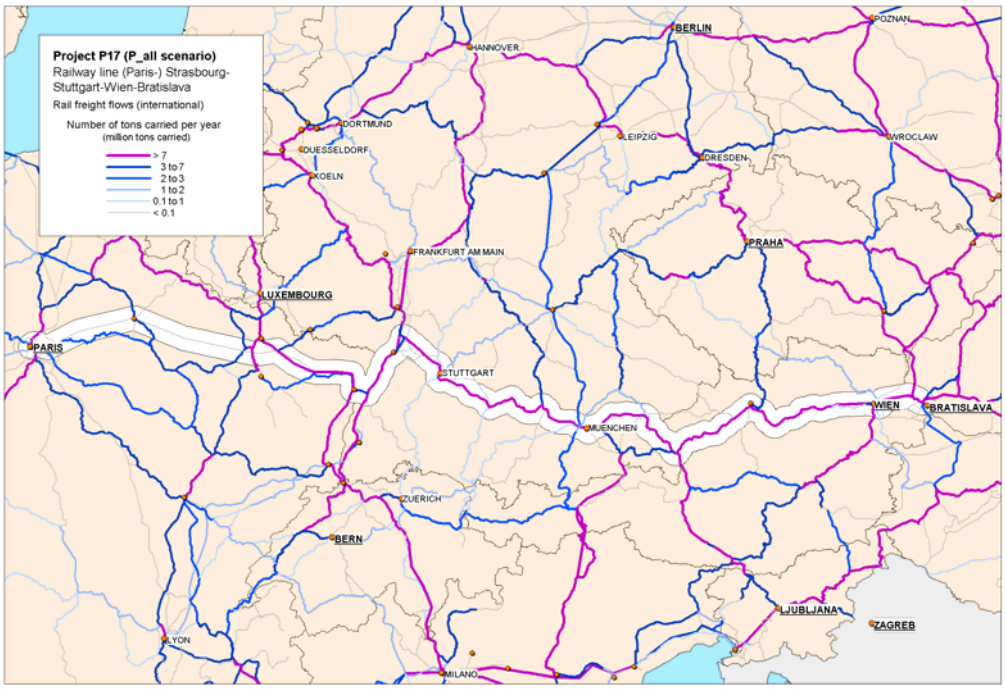


Figure 6.48 *Rail freight flows P17, international*



6.12.3 Estimated aggregated impacts of the priority project

In the following table, the impact variables for the all projects scenario are presented for all sub-sections of the priority project. Between brackets, the values of the individual project scenarios are given. The methodology of the impact variables is described in D6, Chapter 3.6.

Table 6.20 *Impact variables P17: Railway line (Paris-) Strasbourg-Stuttgart-Wien-Bratislava*

Objective	Indicator	P17.1	P17.2	P17.3	P17.4	P17.5	P17 Total
ECONOMIC IMPACTS IN THE TRANSPORT SECTOR							
IMPROVEMENT OF ROAD LEVEL SERVICE	(1) Changes in time costs caused by road congestion, mln. € / year	-6.7 (-33.6)	-1.6 (-9)	-4.5 (-5.9)	-1.8 (-9.2)	-2.4 (-6.2)	-16.9 (-64)
REDUCTION OF TRAVEL TIME	(2a) Changes in monetary value of the reduction of passenger travel time, mln. € / year	-67.5 (-69.4)	-91.5 (-66)	-77.4 (-97.4)	-228.7 (-214.1)	-11.6 (-13.8)	-476.7 (-460.7)
	(2b) Changes in passenger travel time, mln hour / year	-4.4 (-4.8)	-5.9 (-4.6)	-5.4 (-6.9)	-10.4 (-10.6)	-0.9 (-1.3)	-27.0 (-28.2)
	(3) Changes in monetary value of the reduction of freight travel time, mln. € / year	-17.1 (-13.3)	0.0 (0)	-8.2 (-13.6)	-25.9 (-29)	-11.0 (-15.6)	-62.3 (-71.5)
ENVIRONMENTAL SUSTAINABILITY							
GLOBAL WARMING	(4a) Change (in monetary value) of the transport contribution to global warming, mln. € / year	-10.448 (-9.685)	-1.079 (-3.543)	-6.078 (-4.517)	-1.366 (-6.142)	1.101 (-4.859)	-17.870 (-28.746)
	(4b) Change of the transport contribution to global warming, 1000 kg CO2 / year	-444602 (-412135)	-45934 (-150771)	-258654 (-192227)	-58115 (-261350)	46838 (-206776)	-760467 (-1223259)
ATMOSPHERIC POLLUTION	(5a) Change (in monetary value) of the NOX transport emission, mln. € / year	-3.215 (-1.051)	-0.184 (-0.498)	-3.439 (-0.692)	-0.745 (-0.692)	0.210 (-0.415)	-7.373 (-3.348)
	(5b) Change of the NOX transport emission, 1000 kg NOx / year	-416 (-151)	-11 (-84)	-497 (-113)	-70 (-132)	143 (-98)	-851 (-578)
	(6a) Change (in monetary value) of particulates' emissions of transport, mln. € / year	0.058 (0.05)	0.068 (0.017)	0.084 (0.028)	0.011 (0.045)	0.117 (0.041)	0.338 (0.181)
	(6b) Change of particulates' emissions of transport, 1000 kg particulates / year	4 (3)	4 (1)	5 (2)	2 (4)	11 (3)	26 (13)
TRANSPORT SAFETY	(7) Variation on monetary value of accidents, mln. € / year	-24.5 (-33.8)	-5.5 (-18.9)	-20.0 (-20.7)	-8.8 (-33.2)	-8.2 (-23.1)	-67.0 (-129.7)
INVESTMENT COST							
INVESTMENT COST	(8) Total project costs, mln. €	1450	1266	898	6000	134	9748
GENERAL TRANSPORT RELEVANCE							
TOTAL TRAFFIC VOLUME ON THE PROJECT	(10) Total passenger traffic on the project section, mln. passengers / year	8.5 (8.3)	14.3 (12.5)	7.7 (8.1)	7.2 (7.1)	2.4 (2.6)	- -
	(11a) Maximum freight traffic on the project section, mln. ton / year	30.1 (28.8)	17.1 (16)	27.6 (30.1)	27.2 (30.4)	28.3 (32.2)	30.1 (32.2)
	(11b) Average freight traffic on the project section, mln. ton / year	18.2 (18.2)	17.1 (16)	20.4 (24.4)	21.9 (24.4)	25.5 (31.4)	- -
	(11c) Total freight traffic on the project section, mln. ton km /year	3557 (3541)	1523 (1425)	3005 (3589)	5930 (6622)	1656 (2041)	15669 (17218)
INTERMODALITY	(12) Quantitative appraisal of the project's contribution for an intermodal transport system, mln. ton	4.8 (8.9)	0.7 (2.1)	0.8 (3)	2.0 (5)	0.8 (3.5)	9.1 (22.5)

Objective	Indicator	P17.1	P17.2	P17.3	P17.4	P17.5	P17 Total
CREATION OF EUROPEAN VALUE ADDED							
DEVELOPMENT OF INTERNATIONAL PASSENGER TRAFFIC	(13) Share of international passenger traffic on total traffic on the project, %	36.8 (38.2)	21.4 (21.9)	56.9 (59.6)	34.7 (33.7)	90.1 (91.2)	- -
	(14) Volume of international passenger traffic on the project, mln. passengers / year	3.1 (3.2)	3.1 (2.7)	4.4 (4.8)	2.5 (2.4)	2.2 (2.4)	- -
DEVELOPMENT OF INTERNATIONAL FREIGHT TRAFFIC	(15) Share of international freight traffic on total traffic on the project, %	75.7 (75.7)	66.6 (64.3)	91.3 (92.7)	69.8 (71)	99.9 (99.9)	- -
	(16) Volume of international freight traffic on the project, mln. tons / year	13.8 (13.7)	11.4 (10.3)	18.7 (22.6)	15.3 (17.4)	25.4 (31.4)	- -
INTEROPERABILITY	(17) Reduction of passengers waiting time at borders for international traffic	N/a	N/a	N/a	N/a	N/a	-
	(18) Reduction of freight waiting time at borders for international traffic	N/a	N/a	N/a	no	N/a	-
	(19) Length of networks becoming interoperable because of the project	N/a	N/a	N/a	N/a	N/a	-
IMPROVEMENT OF ACCESSIBILITY							
PASSENGER ACCESSIBILITY	(20) Variation of the STAC centrality index for passenger transport, %	0.02 (0.02)	0.01 (0)	0.01 (0)	0.04 (0)	0.00 (0)	- -
FREIGHT ACCESSIBILITY	(21) Variation of the STAC centrality index for freight transport, %	0.02 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.01 (0)	- -
PERIPHERAL ACCESSIBILITY	(22) Variation of the STAC centrality index for passenger transport in regions identified as peripheral, %	0.04 (0.02)	0.01 (0)	0.01 (0)	0.03 (0)	0.00 (0)	- -
	(23) Variation of the STAC centrality index for freight transport in regions identified as peripheral, %	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	- -
ENVIRONMENTAL SUSTAINABILITY							
MODAL REBALANCING	(24) Volume of road freight traffic shifted to rail, IWW or sea transport, mln. t·km / year	5188 (5030)	756 (1712)	3346 (2226)	968 (2958)	421 (2579)	10678 (14505)
	(25) Volume of road and air passenger traffic shifted to rail, mln. passenger·km / year	564 (384)	143 (303)	299 (299)	-87 (274)	-189 (165)	730 (1424)
LEVEL OF CONCERN :TRAFFIC TRANSFER	(26) Transfer of traffic from infrastructure lying in sensitive zones to the projected infrastructure, % of road traffic transferred from sensitive areas	-1.5% (-0,9%)	-1.2% (-0,9%)	0.4% (-1,2%)	5.3% (-2,3%)	8.8% (-2,5%)	- -
LEVEL OF CONCERN: DISTANCE	(27) Percentage of the length of the project lying in a sensitive area, % length	31.0%	0.0%	0.0%	0.0%	7.0%	-
LEVEL OF CONCERN: EMISSIONS	(28a) Changes of inhabitants' level of concern caused by emissions of NOx, % NOx	-1.5% (-0,8%)	-1.3% (-0,9%)	-0.7% (-0,6%)	0.5% (-1,1%)	2.2% (-1,1%)	- -
	(28b) Changes of inhabitants' level of concern caused by emissions of particulates, % particulates	-1.5% (-0,8%)	-1.4% (-0,9%)	-0.8% (-0,6%)	0.1% (-1,1%)	1.5% (-1,1%)	- -
LEVEL OF CONCERN: PROXIMITY	(29) Synthetic appreciation of the proximity of the project from specially protected areas (SPAs) or densely populated areas. Proximity of the project from SPA, km	4.0%	0.0%	0.0%	0.0%	1.0%	-
MATURITY AND COHERENCE OF THE PROJECT							
DEVELOPMENT OF THE PROJECT	(30) Appraisal of the project planning status	2	2	5	3	3	-
INSTITUTIONAL SOUNDNESS	(31) Qualitative appraisal of the project's compliance with national plans	5	5	5	5	3	-
COHERENCE OF THE PROJECT	(32) Qualitative appraisal of the project's coherence with main international traffic corridors	2	3	2	3	3	-

Comments on the main results

Impact on passenger volumes and modal shift

- Passenger transport volumes vary on average between 14.3 mln. passengers per year in case of P17.2 (Stuttgart – Ulm) and 2.4 mln. in case of 17.5 (Wien – Bratislava)
- The priority project is expected to result in decrease of road passenger transport performance with 730 mln pkm per year.
- The values for changes in (potential) passenger transport costs reflect two dimensions: the demand on the sub-sections and the dimension of the infrastructure project in terms of length of transport infrastructure subject to improvements and type of infrastructure measures (e.g. upgrade versus new construction). These dimensions have to be taken into account for the interpretation of the results: large sub-sections with a high level of expected demand, like P17.4 highlights with strong performances due to relatively high demand levels and the large-scale dimension of the infrastructure investments.
- In spite of very high passenger volumes on sub-section P17.2 the potential passenger travel time savings are at a medium level only: this is caused by the size of this sub-section, which is relatively small.

Impact on freight volumes and modal shift

- Freight transport volumes across certain sub-sections of the priority project vary between 17.1 mln and 25.5 mln ton of which more than 65-99% consists of international freight transport;
- This group of sub-sections will achieve a modal shift to rail transport of 9.1 mln tonnes per year in freight.
- Total transport shift to rail is 10.7 bln. ton-km.

Impact on infrastructure network use

The detailed analysis carried out by the consortium has revealed the following impact on infrastructure use:

- The main changes observed on the traffic flows are an increase of the rail freight along the whole priority project, in particular in Southern Germany where the growth of rail freight traffic flows amounts to more than 10 million tonnes, as a result of both modal shift and rerouting.
- Rail passenger transport flows are also expected to increase substantially along the whole priority project. Further increases in passenger transport volumes are expected on several feeding lines, like Köln – Frankfurt – Mannheim, Basel – Strasbourg, Bologna – Verona – Brenner – Rosenheim and Warszawa – Czetochowa – Ostrava – Wien.

Impact on environmental sustainability

- The reduction in emissions of especially NOx in all sub-sections, except Wien- Bratislava, results in a marginal decrease (between 1% and 2%) of human health risks along these sub-sections.
- In some sub-sections (the most Eastern sections) road traffic will be transferred away from sensitive areas and in other sub-sections there will be a transfer of traffic to sensitive areas. The transfer in the sub-sections varies between transfer of up till 9% away from the sensitive areas to increased road traffic of 2%.
- In the most Western sub-sections 31% of the project is located within potentially sensitive areas, whereas the interaction of the other sub-sections with sensitive area is very limited.

Impact on emissions

The overall impact on emission is quantified from the impact at the network level and the differences between the all project run and the reference 2 scenario are as follows:

- CO_2: net decrease with 760 thousand tonnes generated mainly by the shift from road to rail,
- NO_x: net decrease with almost one thousand tonnes,
- Particulates: no significant changes.

Development of the project

- P17.1: Baudrecourt-Strasbourg-Stuttgart with the Kehl bridge as cross-border section. This sub-section includes 2 sections Baudrecourt – Strasbourg and Strasbourg – Appenweier. +3 is the score assigned to the Baudrecourt – Strasbourg and +2 to the Strasbourg – Appenweier due the completion of the design studies and the incompletion of the financial plans. Calculating an average score, with the costs taken as weights, the overall score carried out is +2.
- P17.2: Stuttgart-Ulm. The score assigned is +2, due to the fact that even if the works are scheduled to start in 2004, financial plans have not been provided yet.
- P17.3: München-Salzburg, cross-border section. Works already started, the score assigned is +5.
- P17.4: Salzburg- Wien. The design studies have been carried out. Start of works is expected to be in 2004. Hypothesis of financial contributions have been done, therefore the score is +3.
- P17.5: Wien-Bratislava, cross-border section. It has the same level of development as the Salzburg – Wien sub-section. The score is +3.

6.13 P18 RHINE/MEUSE-MAIN-DANUBE INLAND WATERWAY ROUTE

6.13.1 Description of the priority project

Priority Project	Priority Project name	Sub-sections		Sections	Sub-section start date	Sub-section end date
P18	Rhine/Meuse-Main-Danube inland waterway route	P18.1	Rhine-Meuse with the lock of Lanaye as cross-border section	P18 B Lock of Lanaye	2006	2010
				P18 NL Rhine - Meuse	2005	2019
		P18.2	Vilshofen-Straubing	P18 D Vilshofen – Straubing	2008	2013
		P18.3	Wien-Bratislava cross-border section	P18 A Wien - Bratislava	2006	2015
		P18.4	Palkovicovo-Mohàcs	P18 HU Palkovicovo–Mohàcs	2007	2014
		P18.5	Bottlenecks in Romania and Bulgaria.	P18 RO Romania	2002	2011
				P18 BG Bulgaria	2004	2011
		P18.6	Inland waterway Seine - Scheldt	Inland waterway Seine - Scheldt	n.a.	2020

These infrastructure improvements involve up-grading of the Seine-Meuse-Scheldt waterway network in Western Europe and sub-sections aimed at the improvement of the Danube network in central-eastern Europe. Connecting these two waterway areas is the main waterway along which inland water transport takes place, namely the river Rhine.

Generally most projects aim to increase the draught (eliminating bottlenecks) of the waterways in order to increase the capacity allowing larger vessels to operate on these networks. This will reduce transport cost per ton and waiting times and consequentially improve the competitiveness of inland water transport. This in turn is expected to result in a significant modal shift to inland waterways.

Table 6.21 *Project fiche P18*

Project	Description			
P18 Rhine/Meuse – Main Danube inland waterway route	The project will improve the competitiveness of the waterway in relation to other means of transport on this multimodal route crossing Europe from east to west, in order to encourage the transfer of freight transport from road to inland waterway. Removing bottlenecks on the Rhine-Main-Danube corridor will improve its navigability, favouring the transfer of freight traffic on an increasingly congested route from road to waterways. The mentioned corridor is a major freight route connecting the North Sea (port of Rotterdam) to the Black Sea (in particular the port of Constanta). It will integrate the networks of a number of candidate countries into the European Union. It will also be instrumental in the economic and social cohesion of the acceding countries by creating jobs.			
Sections of the Project	Objectives	Description	Start date	End date
P18.1 Rhine – Meuse with the lock of Lanaye as cross border section	An objective is to increase the importance in the waterway traffic between Netherlands, Belgium and Germany. Currently the Meuse route is a bottleneck.	The Meuseroute project is situated between Nijmegen and Maastricht/ Belgian border. It connects to the lock of Lanaye, Belgium, where also an enlargement of the lock complex to class Vb is foreseen. The works on the Meuse route in Netherlands consist in an upgrading of the inland	2005	2019

	Another fundamental objective is to promote the modal shift. Thanks to this intervention up to 50% of the growth in road traffic can be transferred to Meuse route, being up to 8,300 trucks every 24 h.	Waterway between Nijmegen and Maastricht/ Belgian border from class Va to class Vb, and increasing of draught from 3.0 meters to 3.5 meters. Making the waterway available for container vessels stacked 4 containers high between Nijmegen and Born Container terminal. Heightening of the bridges over the Weurt lock (Nijmegen) by 2.5 meters has to be done, in order to increase the availability of the locks during high waters at the River Waal. All lock complexes are to be upgraded towards a length of 210 meters, width 16 meters and draught 3.5 meters at least, in order to accommodate class Vb vessels, thus the following works have to be done: the building of a new lock at Heumen (Maas-Waal-canal) in order to make two-way traffic from River Maas to the canal possible, the rebuilding of the old locks at Sambeek and Belfeld, in order to increase draught and width of the locks, building a new class Vb lock at Heel, enlarging locks at Maasbracht and Born from class Va lock to class Vb lock, building a new lock near Maastricht, being the entrance to the Juliana canal. The width of the Juliana canal must be enlarged with about 25 meters over a stretch of about 10 kilometres. Smaller adjustments to the River Maas must be made at Neer, Steijl and Venlo to improve navigability. The Maas route is at the moment a class Va waterway with depth, heights and width restrictions. Thanks to the upgrading it will become navigable for class Vb vessels instead of class Va. A further growth of goods, up to 50 % is therefore possible on this waterway. Up to 50 % of the growth of truck traffic, expected on the A2 motorway, can be transferred to the Meuseroute waterway after upgrading, thus creating less congestion on the motorway. Regarding the lock of Lanaye, a new lock will be built and the end of the works is expected to be in 2010. The new construction will improve the interconnection between the Wallon Region and the Rhine – Main – Danube through the Netherlands.		
P18.2 Vishofen – Straubing	The objective of this section is to eliminate the “strategic bottleneck” and to improve the shipping conditions. The promotion of the waterway transport has to be considered and the interventions on this section will contribute to shift in 2015 114,000 tonnes from road to waterborne transport.	This section is a part of the transnational axis between Rotterdam and the Black Sea. The length of the section to be upgraded is about 70 km. According to forecast a freight volume of 114000 t will be shifted to waterway transport in 2015. In total, a cargo volume of approximately 11 Mt is predicted by 2015. The percentage of border crossing transport in 2015 is predicted at 97,3%.	2008	2013
P18.3 Wien – Bratislava cross border section	In context with the intention to shift transport from road to more ecological inland waterways, the upgrade of the Danube river will be in accordance with European	The project consists in an upgrade of the section between Wien and Bratislava for a length of 47 km to eliminate bottlenecks in the Danube inland waterway. The existing facilities have an unsatisfying waterway depth (draught < 2m). It has to be increased to 2.7 m in order to reach the LNRL	2006	2015

	transport policy. No new construction of infrastructure will be necessary; the project leads to an improvement of the environmental balance and transport safety. Furthermore the growing together of an economic area of European importance will be accelerated.	Level (Low Navigation and Regulation Level = water level that corresponds to the flow available for 94% of the duration of the navigable season). The width of the navigable section has to be 100 m - 120 m. The tonnes-kilometres/ year to be shifted from road to waterborne transport are about 1.25 billions tonnes-kilometres/ year on the Austrian section.		
P18.4 Palkovico – Mohacs	This section will contribute to shift transport from road to waterways. (After completion of the works approximately a quantity of 100 000 tons will be shifted to waterborne transport exclusively from the volume of Hungarian exports and imports simultaneously additional growth will be initiated by the shift of an even greater volume coming from the volume of the transit passing through Hungary).	The length of this section is 358 km. Bottlenecks on the Danube waterway along those km have to be eliminated, by the upgrading of some parts of the section. From the Slovak - Hungarian section (Palkovicovo - 1,811.0 km) to 1,708.2 km is required an upgrading for draught to 2.70 m (lowest recorded draught at dry seasons is 1.70 m) and an upgrading for height under bridges to 9.10 m (current height under bridge is 7.75 m). The section from 1,708.0 km to Budapest at 1,652.0 km - lowest recorded draught is 1.70 m and has to be upgraded as well as between the km 1632-1433 where lowest recorded draught 2.00 metres. No new sections have to be built. Basically there are no tunnels and bridges involved by these works. The improvements are aimed at ensuring a proper fairway for inland waterways transport.	2007	2014
P18.5 Bottlenecks in Romania & Bulgaria	The interventions included in the project of this section will improve the navigation safety on the Danube. The conditions for permanent navigation will be ensured even when the river levels are low. The time for transit crossing of Bulgarian – Romanian section of the river will significantly decrease as well as the operational costs. The development of cartographic and information systems will establish a Bathymetric map and it will be used by all the countries as a tool for communication and for joint social and economic cohesion projects development.	This project includes some interventions on the Romanian and Bulgarian territory aim to improve the inland waterways navigability. The Romanian sector of the Danube frames within km 1075, at the entrance into the country, and the point where Sulina Arm issues into the Black Sea. On the sector between km 1075 and km 863, the river has a dammed flow regimen, due to the construction of the Hydrotechnical and Navigation Systems Portile de Fier (Iron Gates) I and II. Downstream km 863, the river has a natural flow regimen. On the river sector between km 863 and km 175, due to the variable flow regimen, to the drift and accumulation of alluviums, and to the existence of a great number of secondary arms, in certain areas, during the low water periods, there occur navigation bottlenecks, due to the low depths of 1-1.5 m, much lower than the recommended minimal depths, of 2.5 m. Such phenomena occur in periods of 60 to 150 days/ year. Downstream km 175, there is Danube's river-sea sector. On the sector between km 63 and km 0, Sulina Channel, the bank protections executed during the period 1954-1965 could not cope with the traffic volume (especially sea vessels traffic) and with the size of the ships that navigate in that area. Hence, a massive erosion and destruction of banks has occurred, and the effect of this phenomenon is the frequent flooding of the neighbouring localities, and the negative impact on Danube's Delta. In the main ports of Danube's Romanian sector, it is also necessary to create a system for disposal of residues,	1982	2011

		wastewater and waste from ships, so as to prevent water pollution by ships. In order to eliminate the navigation hindrances, the following works are necessary. In the sector between km 845.5 and km 375, there are necessary hydrotechnical works for assuring natural dredging of alluviums and, consequently, depths over 2.5 m during the low water periods. In the sector between km 375 and km 175, there are necessary works for closing secondary arms and for calibrating the riverbed, with a view to increase the water volume on the main channel of the Danube during the low water periods and, consequently, to assure the minimal navigation depths. In the sector between km 175 and km 63, there are necessary works for riverbed calibration, fairway stabilisation and cutting-off of Danube's riverbed in Tulcea area. In the sector km 63 – km 0 – Sulina Channel, there are necessary works for banks' protection, water and alluvium streams' control, and reduction of water discharges. The bank protection works are necessary on a length of approx. 100 km. Works' execution started in 1984. Until 2003, the works have been completed on 32 km. Besides the above-mentioned works, in order to improve the river transport on Danube's Romanian sector, the following works are also necessary: The repair and improvement of the port infrastructure in the Romanian ports; The works' completion at the Danube – Black Sea Canal (slopes and electrical installations); The system for disposal of waste and wastewater. Concerning the Bulgarian sector, the project envisages fairway improvements of the sections from rkm 530 to rkm 520 and rkm 576 to rkm 560 of the Danube river to ensure international navigation safety. The following conditions for navigation have to be guaranteed: Depth of 2.50 m under "0" conditional water level for the relevant river sections, which will ensure minimum 3.50 m draw depth at low water navigation level and width of the navigation route 180 m. Currently no facilities exist. The project completion will improve the navigation safety on the Danube. The conditions for permanent navigation will be ensured even when the river levels are low. The time for transit crossing of Bulgarian-Romanian section of the river will significantly decrease. The transport costs will decrease with 0.030 EURO for t/ km.		
P18.6 Inland waterway Seine – Scheldt	The improvement of the Seine - Scheldt river link will connect the Parisian Region and Seine basin with the entire Benelux inland waterway network. This link forms part of a vital transport route in a highly - developed economic and industrial region, connecting in particular the ports of Le Havre,	The project is formed by a Belgian and a French part. The works will improve the navigability of the Seine Scheldt river link. In Belgium the distance covered is 80 km while in France is 105 km. Currently, the navigability on the French part of the section is at the lower end of international standards, with access restricted to vessels of no more than 400 to 750 tonnes on some stretches. The project comprises the construction of a channel with large gauge of about hundred kilometres, which will allow		2020

	Rouen, Dunkirk, Antwerp and Rotterdam.	the conveying of loadings, which can reach 4,400 tonnes. The route selected departs from valleys and from the inhabited areas, thus limiting the impact of the project on the natural inheritance. Belgium also plans to improve navigability on the Scheldt north to give access to vessels up to 4,400 tonnes. The works will therefore ensure continuity between the inland waterways basins of the North of France and Benelux. The project will assist transit traffic and alleviate land - based transport congestion and it will have a beneficial effect on the adjacent regions, where transport platforms could be developed. Numerous jobs could be created, about 8,000 units over 5 years.		

6.13.2 Impact on the level of traffic flows

The impact at the level of traffic flows is identified at infrastructure level as follows:

- Inland waterways freight flows P18 total interregional,
- Inland waterways freight flows P18 international.

The impact at the level of traffic flows is illustrated by the figures hereunder.

Figure 6.49 *Inland waterways freight flows P18, total interregional*

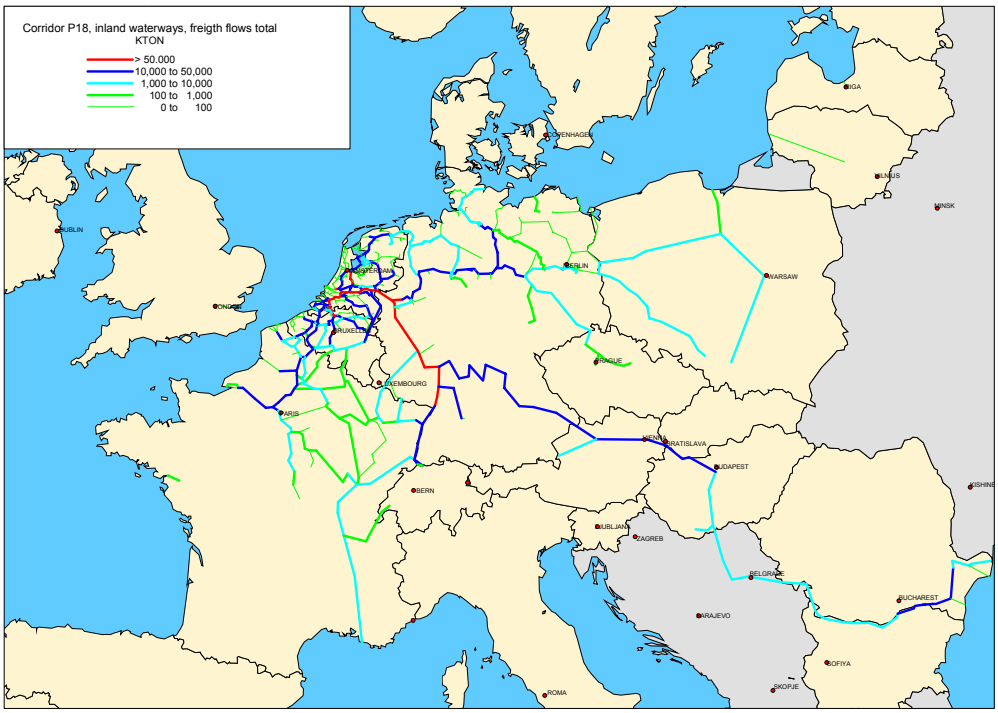
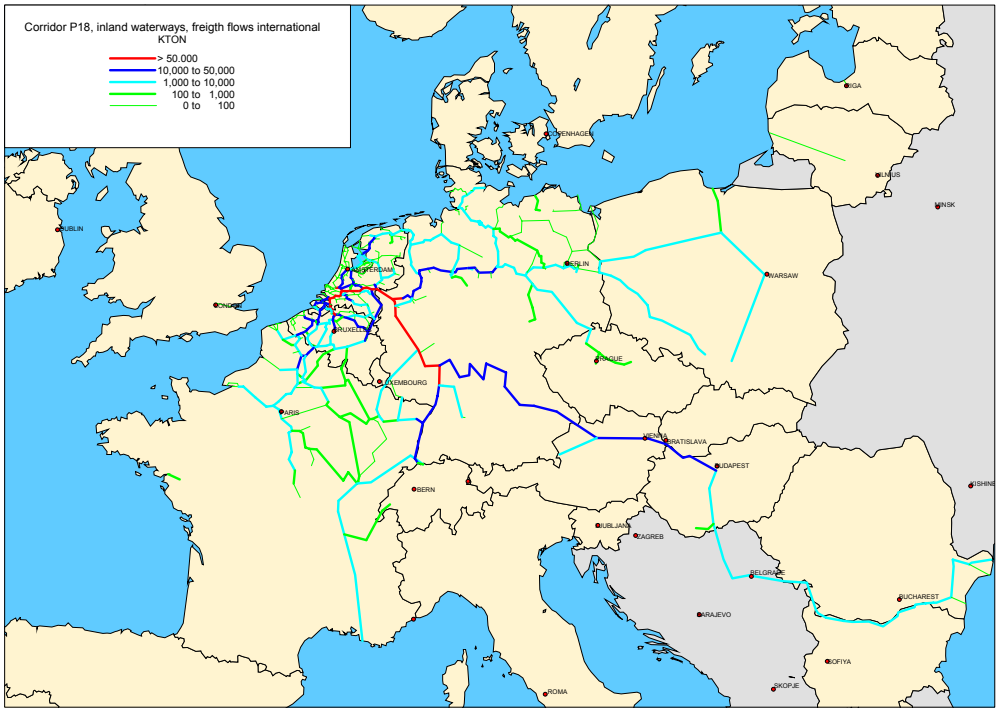


Figure 6.50 *Inland waterways freight flows P18, international*



6.13.3 Estimated aggregated impacts of the priority project

In the following table, the impact variables for the all projects scenario are presented for all sub-sections of the priority project. Between brackets, the values of the individual project scenarios are given. The methodology of the impact variables is described in D6, Chapter 3.6.

Table 6.22 *Impact variables P18: Rhine/Meuse-Main-Danube inland waterway route*

Objective	Indicator	P18.1	P18.2	P18.3	P18.4	P18.5	P18.6	P18 Total
ECONOMIC IMPACTS IN THE TRANSPORT SECTOR								
IMPROVEMENT OF ROAD LEVEL SERVICE	(1) Changes in time costs caused by road congestion, mln. € / year	-0.2 (-0.9)	-1.2 (-2.3)	-0.8 (-2.2)	-0.8 (-2.1)	-0.2 (-0.1)	-10.0 (-33.8)	-13.2 (-41.5)
REDUCTION OF TRAVEL TIME	(2a) Changes in monetary value of the reduction of passenger travel time, mln. € / year	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)
	(2b) Changes in passenger travel time, mln hour / year	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)
	(3) Changes in monetary value of the reduction of freight travel time, mln. € / year	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)
ENVIRONMENTAL SUSTAINABILITY								
GLOBAL WARMING	(4a) Change (in monetary value) of the transport contribution to global warming, mln. € / year	0.129 (-0.494)	0.791 (-0.739)	0.541 (-0.991)	0.187 (-1.125)	-0.569 (-1.151)	-0.247 (-4.237)	0.831 (-8.738)
	(4b) Change of the transport contribution to global warming, 1000 kg CO2 / year	5503 (-21055)	33647 (-31437)	23000 (-42203)	7942 (-47868)	-24201 (-48966)	-10512 (-180281)	35379 (-371809)
ATMOSPHERIC POLLUTION	(5a) Change (in monetary value) of the NOX transport emission, mln. € / year	0.362 (0.04)	1.171 (0.254)	0.684 (-0.108)	0.636 (-0.215)	1.053 (0.793)	2.002 (-3.626)	5.908 (-2.862)
	(5b) Change of the NOX transport emission, 1000 kg NOx / year	69 (14)	227 (86)	137 (15)	142 (-12)	208 (3)	505 (-112)	1289 (-6)
	(6a) Change (in monetary value) of particulates' emissions of transport, mln. € / year	0.115 (0.058)	0.371 (0.266)	0.213 (0.139)	0.190 (0.093)	0.310 (0.27)	0.941 (0.233)	2.140 (1.059)
	(6b) Change of particulates' emissions of transport, 1000 kg particulates / year	6 (4)	20 (14)	12 (7)	12 (5)	19 (8)	52 (18)	121 (56)
TRANSPORT SAFETY	(7) Variation on monetary value of accidents, mln. € / year	-0.5 (-2.1)	-0.9 (-2.7)	-0.5 (-2.3)	-1.7 (-2.5)	-1.5 (-1.7)	-2.8 (-6.6)	-8.0 (-17.9)
INVESTMENT COST								
INVESTMENT COST	(8) Total project costs, mln. €	498	128	180	250	777	2710	4543
GENERAL TRANSPORT RELEVANCE								
TOTAL TRAFFIC VOLUME ON THE PROJECT	(10) Total passenger traffic on the project section, mln. passengers / year	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	- -
	(11a) Maximum freight traffic on the project section, mln. ton / year	28.5 (30.6)	16.0 (16.4)	15.0 (15.3)	12.1 (12.4)	14.4 (14.5)	18.7 (17.8)	28.5 (30.6)
	(11b) Average freight traffic on the project section, mln. ton / year	28.5 (30.6)	16.0 (16.4)	15.0 (15.3)	12.1 (12.4)	10.3 (10.4)	18.7 (17.8)	- -
	(11c) Total freight traffic on the project section, mln. ton km /year	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)
INTERMODALITY	(12) Quantitative appraisal of the project's contribution for an intermodal transport system, mln. ton	1.4 (1.5)	1.7 (1.9)	0.6 (0.6)	0.7 (0.8)	3.2 (3.3)	10.9 (9.8)	18.5 (18)

Objective	Indicator	P18.1	P18.2	P18.3	P18.4	P18.5	P18.6	P18 Total
CREATION OF EUROPEAN VALUE ADDED								
DEVELOPMENT OF INTERNATIONAL PASSENGER TRAFFIC	(13) Share of international passenger traffic on total traffic on the project, %	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)	- -
	(14) Volume of international passenger traffic on the project, mln. passengers / year	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)	- -
DEVELOPMENT OF INTERNATIONAL FREIGHT TRAFFIC	(15) Share of international freight traffic on total traffic on the project, %	78.3 (79.8)	99.6 (99.7)	91.3 (90.9)	99.0 (98.8)	84.7 (85.3)	72.9 (71.2)	- -
	(16) Volume of international freight traffic on the project, mln. tons / year	22.3 (24.4)	15.9 (16.3)	13.7 (13.9)	12.0 (12.2)	8.7 (8.9)	13.7 (12.7)	- -
INTEROPERABILITY	(17) Reduction of passengers waiting time at borders for international traffic	N/a	N/a	N/a	N/a	N/a	N/a	-
	(18) Reduction of freight waiting time at borders for international traffic	yes	N/a	No	0.6	Yes	0.3	-
	(19) Length of networks becoming interoperable because of the project	N/a	N/a	N/a	N/a	N/a	N/a	-
IMPROVEMENT OF ACCESSIBILITY								
PASSENGER ACCESSIBILITY	(20) Variation of the STAC centrality index for passenger transport, %	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)	- -
FREIGHT ACCESSIBILITY	(21) Variation of the STAC centrality index for freight transport, %	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)	- -
PERIPHERAL ACCESSIBILITY	(22) Variation of the STAC centrality index for passenger transport in regions identified as peripheral, %	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)	- -
	(23) Variation of the STAC centrality index for freight transport in regions identified as peripheral, %	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)	- -
ENVIRONMENTAL SUSTAINABILITY								
MODAL REBALANCING	(24) Volume of road freight traffic shifted to rail, IWW or sea transport, mln. t·km / year	266 (248)	1131 (328)	430 (229)	556 (241)	813 (737)	2803 (2003)	5999 (3786)
	(25) Volume of road and air passenger traffic shifted to rail, mln. passenger·km / year	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)
LEVEL OF CONCERN :TRAFFIC TRANSFER	(26) Transfer of traffic from infrastructure lying in sensitive zones to the projected infrastructure, % of road traffic transferred from sensitive areas	-5.0% (-14,3%)	4.0% (-2,5%)	-7.2% (-2,3%)	-6.7% (-1,4%)	-0.6% (-2,4%)	-2.2% (-2,5%)	- -
LEVEL OF CONCERN: DISTANCE	(27) Percentage of the length of the project lying in a sensitive area, % length	N/a	N/a	N/a	N/a	N/a	N/a	-
LEVEL OF CONCERN: EMISSIONS	(28a) Changes of inhabitants' level of concern caused by emissions of NOx, % NOx	-2.0% (-3,9%)	-2.1% (-1,2%)	-2.7% (-2,2%)	-3.1% (-1,4%)	-2.8% (-2,9%)	-1.4% (-3,4%)	- -
	(28b) Changes of inhabitants' level of concern caused by emissions of particulates, % particulates	-1.8% (-3,8%)	-2.2% (-1,2%)	-2.9% (-2,3%)	-3.6% (-1,6%)	-3.3% (-3,4%)	-1.1% (-3,3%)	- -
LEVEL OF CONCERN: PROXIMITY	(29) Synthetic appreciation of the proximity of the project from specially protected areas (SPAs) or densely populated areas. Proximity of the project from SPA, km	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-
MATURITY AND COHERENCE OF THE PROJECT								
DEVELOPMENT OF THE PROJECT	(30) Appraisal of the project planning status	1	2	1	1	4	1	-
INSTITUTIONAL SOUNDNESS	(31) Qualitative appraisal of the project's compliance with national plans	3	5	4	5	1	3	-
COHERENCE OF THE PROJECT	(32) Qualitative appraisal of the project's coherence with main international traffic corridors	N/a	N/a	N/a	N/a	N/a	N/a	-

Comments on the main results

Impact on freight volumes and modal shift

- Interregional freight transport volumes in this priority project vary between 10.3 mln (P18.5) and 28.5 mln ton (P18.1). The share of international transport in total freight transport varies between 70%-95%.
- The combination of all these inland waterways sub-sections is expected to result in a large shift in freight transport of all grouped projects considered. The total shift in freight volumes is 18.5 mln tonnes per year to inland waterways, primarily at the expense of road freight transport but also, to a smaller extent, at the expense of rail freight transport.

Impact on infrastructure network use

The detailed analysis carried out by the consortium has revealed the following impacts on infrastructure use:

- The main changes on the traffic flows are the decrease of both road and rail traffic flows along the priority project. It is interesting to observe that also the traffic on the Rhine increase because this river connects the Danube and the Seine/Meuse operating areas.

Impact on environmental sustainability

- The reduction in emissions results in a decrease (between 0% and 3%) of human health risks along the corridor.
- In some sub-sections traffic will be transferred to sensitive areas, although the precise effect is difficult to predict for such a type of sub-section.
- No information on priority project interaction with sensitive areas has been available.

Impact on emissions

The overall impact on emission is quantified from the impact at the network level and the differences between the all project run and the reference 2 scenario are as follows:

- CO_2: net increase with 35 thousand tonnes,
- NO_x: net increase with 1.3 thousand tonnes,
- Particulates: net increase of 121 tonnes.

The growth in emissions is explained firstly by the fact that the reduction of road emissions generated by the inland waterways priority projects (a modal shift of 18.5 mln tonnes is identified) is shared between the inland waterways and rail for the common segments of the market (this is the case of all projects scenario), while the emissions generated by inland waterways are totally accounted for this transport mode. In the project only scenario (results between brackets) this is not the case, and P18 shows considerable reductions of CO_2 emissions.

Secondly, the technological progress in case of freight road transport is far more advanced than in case of inland waterways, where the ships' engines have a high rate of emissions. This can be explained by the long life span of ships, leading to a slower impact of technological improvements, compared to road transport.

Development of the project

- P18.1: Rhine-Meuse with the lock of Lanaye as cross-border section. It involves 2 sections: Lock of Lanaye and Rhine – Meuse. For the Lock of Lanaye, the start of design studies was in 2003 and the start of works is expected to be in 2006. Financial plan is provided. The intervention is scheduled in the National Plan. In this case the design studies are on going while the financial plan is available. The +1 score is considered even if elements on funding are provided. For the Rhine – Meuse section design studies are achieved. Therefore the score is +2. The score for the entire sub-section is considered to be +1.
- P18.2: Vilshofen-Straubing. The score assigned is +2. Design studies for this sub-section are achieved.
- P18.3: Wien-Bratislava cross-border section. The score assigned is +1. No design studies have been carried out.
- P18.4: Palkovicovo-Mohàcs. No design studies have been carried out. The score assigned is +1.
- P18.5: Bottlenecks in Romania and Bulgaria. It includes 2 sections, one in Romania, and the other one in Bulgaria. On the Romanian side works are ongoing and the score is +5, while on the other side the feasibility studies have still to be carried out. Considering the costs of both sides, the score for the entire sub-section is +4.
- P18.6: Inland Waterway Seine – Scheldt. The score assigned is +1. Actually, either design studies or financial plans have been carried out.

6.15 P19 HIGH-SPEED RAIL INTEROPERABILITY ON THE IBERIAN PENINSULA

6.15.1 Description of the priority project

Priority Project	Priority Project name	Sub-sections		Sections	Sub-section start date	Sub-section end date
P19	High-speed rail interoperability on the Iberian peninsula	P19.1	Madrid-Andalucia	P19 E Madrid-Andalucia	2001	2010
		P19.2	North-east	P19 E Nordeste	2001	2010
		P19.3	Madrid-Levante and Mediterranean	P19 E Madrid-Levante y Mediterráneo	2001	2010
		P19.4	North/North-west corridor, except Vigo-Porto	P19 E Corredor Norte-Noroeste	2001	2010
		P19.5	Extremadura	P19 E Extremadura	2001	2010
		P19.6	Vigo-Porto	P19 E Corredor Norte-Noroeste	2001	2010

This priority project involves construction of new high-speed lines as well as adaptation of existing lines, using new technology, to enable dual gauge, thereby making the lines interoperable with the Trans-European network.

The project is a technological project that aims to increase the level of rail network interoperability in the Iberian Peninsula and improve access to the rest of Europe and stimulate modal shift from road and air transport to rail transport.

Table 6.23 *Project fiche P19*

Project	Description			
P19 High-speed rail interoperability on the Iberian peninsula	New and adapted (dual gauge) high railway lines[12] aiming at the integration of Spain and Portugal into a fully interoperable trans-European rail network			
Sections of the Project	Objectives	Description	Start date	End date
P19.1 Madrid – Andalucía	Improvement of the interoperability of the Iberian rail network with the rest of Europe, through the elimination of the difference of gauges (by new lines or lines adapted using new techniques such as polyvalent sleepers, third tracks or axle-gauge changeover station). Elimination of bottlenecks in the rail network.	New standard gauge lines and adaptation of existing line at dual gauge in the regions of Madrid and Andalucía.		
P19.2 North-East		New standard gauge lines and adaptation of existing line at dual gauge in the North-East regions		
P19.3 Madrid – Levante and Mediterranean		New standard gauge lines and adaptation of exiisting line at dual gauge in the corridor Madrid, Levante and Mediterranean		
P19.4 North/North – west corridor, except Vigo – Porto		New standard gauge lines and adaptation of existing line at dual gauge in the North – North-West corridor (Vigo – Porto non included)		

[12] For the STAC modelling purposes, standard gauge lines included in projects P03, P08 or P16 have been considered within those projects only (thus they are not considered again in the P019 interoperability projects).

P19.5 Extremadura	Promoting of modal shift from road to rail for medium and long distance traffic.	New standard gauge lines in the Extremadura region		
P19.6 Vigo – Porto		New standard gauge rail link between Vigo and Porto		

6.15.2 Impact on the level of traffic flows

The impact at the level of traffic flows is identified at infrastructure level as follows:

- Rail passenger flows P19, total interregional,
- Rail passenger flows P19, international.

The impact at the level of traffic flows is illustrated by the figures hereunder.

Figure 6.51 *Rail passenger flows P19, total interregional*

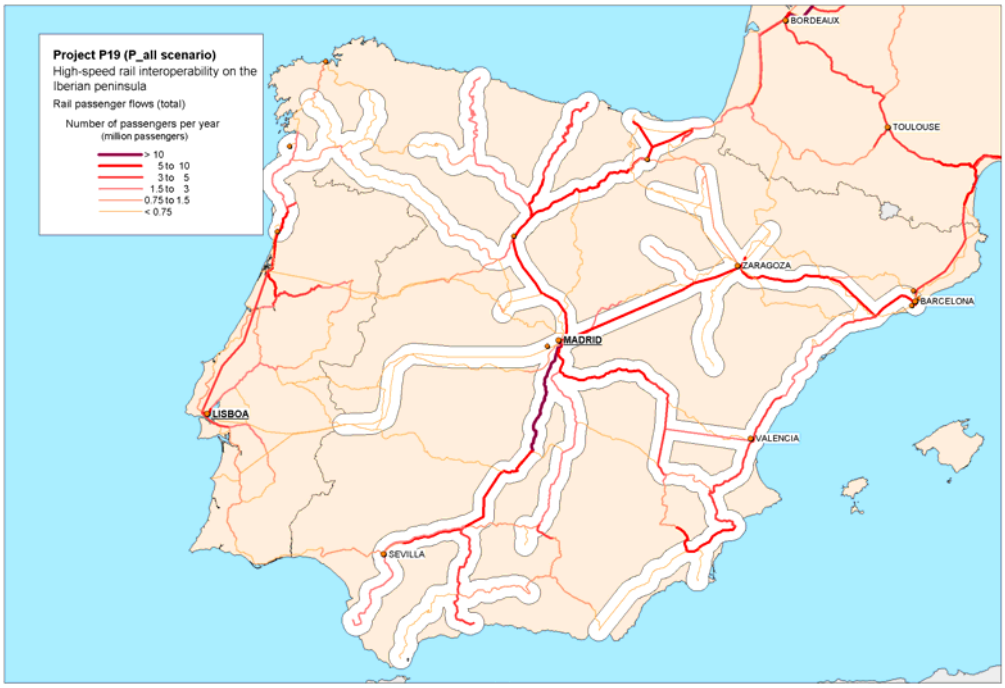


Figure 6.52 *Rail passenger flows P19, international*

6.15.3 Estimated aggregated impacts of the priority project

In the following table, the impact variables for the all projects scenario are presented for all sub-sections of the priority project. Between brackets, the values of the individual project scenarios are given. The methodology of the impact variables is described in D6, Chapter 3.6. The sub-sections P19.5 and P19.6 are completely dealt within the framework of other sub-sections (P03.1 and P08.1).

Table 6.24 *Impact variables P19: High-speed rail interoperability on the Iberian Peninsula*

Objective	Indicator	P19.1	P19.2	P19.3	P19.4	P19.5	P19.6	P19 Total
ECONOMIC IMPACTS IN THE TRANSPORT SECTOR								
IMPROVEMENT OF ROAD LEVEL SERVICE	(1) Changes in time costs caused by road congestion, mln. € / year	-1.1 (-1.1)	-0.4 (-0.3)	-2.4 (-1.6)	-0.2 (-0.1)	N/a (N/a)	N/a (N/a)	-4.1 (-3.1)
REDUCTION OF TRAVEL TIME	(2a) Changes in monetary value of the reduction of passenger travel time, mln. € / year	-93.0 (-83.4)	-188.6 (-152.4)	-174.1 (-162.7)	-11.3 (-13.7)	N/a (N/a)	N/a (0.0)	-467.0 (-412.1)
	(2b) Changes in passenger travel time, mln hour / year	-9.3 (-8.9)	-14.7 (-12.1)	-15.2 (-14.9)	-1.3 (-1.7)	N/a (N/a)	N/a (0.0)	-40.5 (-37.5)
	(3) Changes in monetary value of the reduction of freight travel time, mln. € / year	-9.6 (-9.6)	-70.5 (-72.2)	-27.9 (-29.7)	-8.4 (-11.4)	N/a (N/a)	N/a (0.0)	-116.3 (-122.9)
ENVIRONMENTAL SUSTAINABILITY								
GLOBAL WARMING	(4a) Change (in monetary value) of the transport contribution to global warming, mln. € / year	-2.231 (-0.529)	-0.839 (-0.128)	-2.826 (-0.187)	-0.575 (-0.005)	N/a (N/a)	N/a (N/a)	-6.471 (-0.849)
	(4b) Change of the transport contribution to global warming, 1000 kg CO2 / year	-94956 (-22507)	-35706 (-5439)	-120239 (-7951)	-24476 (-220)	N/a (N/a)	N/a (N/a)	-275377 (-36117)
ATMOSPHERIC POLLUTION	(5a) Change (in monetary value) of the NOX transport emission, mln. € / year	-1.162 (-1.483)	-0.276 (-0.239)	-1.542 (-1.185)	-0.404 (-0.103)	N/a (N/a)	N/a (N/a)	-3.384 (-3.01)
	(5b) Change of the NOX transport emission, 1000 kg NOx / year	-177 (-241)	-33 (-37)	-200 (-193)	-56 (-17)	N/a (N/a)	N/a (N/a)	-466 (-488)
	(6a) Change (in monetary value) of particulates' emissions of transport, mln. € / year	0.039 (0.035)	0.024 (0.016)	0.025 (0.034)	-0.004 (0.006)	N/a (N/a)	N/a (N/a)	0.084 (0.091)
	(6b) Change of particulates' emissions of transport, 1000 kg particulates / year	4 (3)	3 (2)	4 (3)	0 (1)	N/a (N/a)	N/a (N/a)	11 (9)
TRANSPORT SAFETY	(7) Variation on monetary value of accidents, mln. € / year	-14.5 (-17.9)	-5.6 (-5.6)	-13.2 (-10.1)	-6.0 (-1.8)	N/a (N/a)	N/a (N/a)	-39.2 (-35.4)
INVESTMENT COST								
INVESTMENT COST	(8) Total project costs, mln. €	4074	1439	9359	8736	t.b.d	1338	24946
GENERAL TRANSPORT RELEVANCE								
TOTAL TRAFFIC VOLUME ON THE PROJECT	(10) Total passenger traffic on the project section, mln. passengers / year	2.1 (2)	2.4 (1.7)	2.3 (2.4)	0.7 (0.6)	N/a (N/a)	N/a (0.0)	- -
	(11a) Maximum freight traffic on the project section, mln. ton / year	9.3 (9.5)	7.2 (7.1)	9.2 (9.2)	6.7 (6.9)	N/a (N/a)	N/a (0.0)	9.3 (9.5)
	(11b) Average freight traffic on the project section, mln. ton / year	2.7 (2.7)	2.3 (2.2)	1.3 (1.3)	2.1 (2.1)	N/a (N/a)	N/a (0.0)	- -
	(11c) Total freight traffic on the project section, mln. ton km /year	2581 (2507)	1737 (1704)	2137 (2080)	1434 (1466)	N/a (N/a)	N/a (0.0)	7890 (7757)
INTERMODALITY	(12) Quantitative appraisal of the project's contribution for an intermodal transport system, mln. ton	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	N/a (N/a)	N/a (0.0)	0.0 (0)
CREATION OF EUROPEAN VALUE ADDED								
DEVELOPMENT OF INTERNATIONAL PASSENGER TRAFFIC	(13) Share of international passenger traffic on total traffic on the project, %	5.2 (3.4)	4.2 (4.2)	3.3 (4.1)	15.0 (24.7)	N/a (N/a)	N/a (N/a)	- -
	(14) Volume of international passenger traffic on the project, mln. passengers / year	0.1 (0.1)	0.1 (0.1)	0.1 (0.1)	0.1 (0.2)	N/a (N/a)	N/a (0.0)	- -
DEVELOPMENT OF INTERNATIONAL FREIGHT TRAFFIC	(15) Share of international freight traffic on total traffic on the project, %	16.2 (16.5)	21.1 (22.9)	33.2 (32.7)	9.8 (12.5)	N/a (N/a)	N/a (N/a)	- -
	(16) Volume of international freight traffic on the project, mln. tons / year	0.4 (0.4)	0.5 (0.5)	0.4 (0.4)	0.2 (0.3)	N/a (N/a)	N/a (0.0)	- -
INTEROPERABILITY	(17) Reduction of passengers waiting time at borders for international traffic	N/a	N/a	N/a	N/a	N/a	N/a	-
	(18) Reduction of freight waiting time at borders for international traffic	N/a	N/a	N/a	N/a	N/a	N/a	-
	(19) Length of networks becoming interoperable because of the project	N/a	N/a	N/a	N/a	N/a	N/a	-
IMPROVEMENT OF ACCESSIBILITY								
PASSENGER ACCESSIBILITY	(20) Variation of the STAC centrality index for passenger transport, %	0.57 (0.19)	0.27 (0.02)	0.30 (0)	0.43 (0.12)	N/a (N/a)	N/a (N/a)	0.57 (0.19)
FREIGHT ACCESSIBILITY	(21) Variation of the STAC centrality index for freight transport, %	0.05 (0.04)	0.00 (0)	0.02 (0)	0.02 (0)	N/a (N/a)	N/a (N/a)	0.05 (0.04)
PERIPHERAL ACCESSIBILITY	(22) Variation of the STAC centrality index for passenger transport in regions identified as peripheral, %	0.82 (0.3)	0.57 (0.05)	1.16 (0.23)	0.63 (0.21)	N/a (N/a)	N/a (N/a)	0.82 (0.3)
	(23) Variation of the STAC centrality index for freight transport in regions identified as peripheral, %	0.05 (0.06)	0.01 (0)	0.03 (0)	0.03 (0)	N/a (N/a)	N/a (N/a)	0.05 (0.06)

Objective	Indicator	P19.1	P19.2	P19.3	P19.4	P19.5	P19.6	P19 Total
ENVIRONMENTAL SUSTAINABILITY								
MODAL REBALANCING	(24) Volume of road freight traffic shifted to rail, IWW or sea transport, mln. t·km / year	0 (0)	0 (0)	0 (0)	0 (0)	N/a (N/a)	N/a (N/a)	0 (0)
	(25) Volume of road and air passenger traffic shifted to rail, mln. passenger·km / year	851 (1018)	335 (363)	725 (591)	233 (109)	N/a (N/a)	N/a (N/a)	2144 (2082)
LEVEL OF CONCERN :TRAFFIC TRANSFER	(26) Transfer of traffic from infrastructure lying in sensitive zones to the projected infrastructure, % of road traffic transferred from sensitive areas	-1.5% (-0,1%)	-1.0% (0,0%)	-1.4% (0,1%)	-0.3% (-0,1%)	N/a (N/a)	N/a (N/a)	- -
LEVEL OF CONCERN: DISTANCE	(27) Percentage of the length of the project lying in a sensitive area, % length	1.0%	0.0%	0.0%	2.0%	N/a	N/a	-
LEVEL OF CONCERN: EMISSIONS	(28a) Changes of inhabitants' level of concern caused by emissions of NOx, % NOx	-1.2% (-0,3%)	-1.7% (-0,2%)	-0.6% (-0,1%)	-2.2% (-0,1%)	N/a (N/a)	N/a (N/a)	- -
	(28b) Changes of inhabitants' level of concern caused by emissions of particulates, % particulates	-1.2% (-0,3%)	-1.6% (-0,2%)	-0.5% (-0,1%)	-2.3% (-0,1%)	N/a (N/a)	N/a (N/a)	- -
LEVEL OF CONCERN: PROXIMITY	(29) Synthetic appreciation of the proximity of the project from specially protected areas (SPAs) or densely populated areas. Proximity of the project from SPA, km	18.0%	0.0%	0.0%	5.0%	13.0%	0.0%	-
MATURITY AND COHERENCE OF THE PROJECT								
DEVELOPMENT OF THE PROJECT	(30) Appraisal of the project planning status	3	3	3	5	N/a	3	-
INSTITUTIONAL SOUNDNESS	(31) Qualitative appraisal of the project's compliance with national plans	3	3	3	3	2	3	-
COHERENCE OF THE PROJECT	(32) Qualitative appraisal of the project's coherence with main international traffic corridors	1	1	1	1	1	N/a	-

Comments on the main results

Impact on passenger volumes and modal shift

- The average passenger transport volumes are expected to vary between 2.4 mln. passengers per year in case of P19.2 (North-East) and 0.7 in case of P19.4 (North/ North-West corridor, except Vigo-Porto).
- The priority project is forecasted to result in a decrease of road passenger transport performance by 2.1 bln pkm per year.
- The share of international volumes on a sub-section inform about the sub-section's relevance for international transport flows. For the interpretation of the performance values, the scope and the definition of the sub-sections have to be considered: A relatively short border-crossing sub-section is more likely to represent a high value than a large sub-section with a border-crossing link. Some sub-sections with a low share of international traffic volumes.Most of the sub-sections in P19 suggest the conclusion that their significance is mainly at national level, for passenger.

Impact on freight volumes and modal shift

- The average interregional freight traffic flows on this priority project are between insignificant as in case of P19.6 and 2.7 mln ton per year as in case of P19.1.
- There are not modal shift effects for freight transport, as the improvements consider passenger transport only.

Impact on infrastructure network use

The detailed analysis carried out by the consortium has revealed the following impacts on infrastructure use:

- There is observed a relatively high increase of passenger traffic flows in the range of 2 – 5 million passengers / year to the East of Madrid and Andalusia to the Mediterranean area.

Impact on environmental sustainability

- The reduction in emissions results in a marginal decrease (up till 2%) of human health risks along the corridor.
- In some sub-sections traffic will be transferred away from sensitive areas and in other sub-sections there will be a transfer of traffic to sensitive areas. However, in all sub-sections the changes are marginal (less than 2%).
- The priority project is only marginally interacting with potentially sensitive areas.

Impact on emissions

The overall impact on emission is quantified from the impact at the network level and the differences between the all project scenario and the reference 2 scenario are as follows:

- CO_2: net decrease with 275 thousand tonnes,
- NO_x: net decrease with 466 tonnes,
- Particulates: slight increase, not significant.

Development of the project

- P19.1 Madrid-Andalucia. Interventions on this sub-section are a priority objective in the Spanish Transport Plan 2000 - 2007. The implementation is expected to be within 2010. The start of design studies was in 1999 for some tracks of the network as well as the start of works for some of them was in 2001. Therefore the score assigned is +3.
- P19.2: North-east. The score assigned is +3, for the same reasons of the previous case.
- P19.3: Madrid-Levante and Mediterranean. The score assigned is +3, for the same reasons of the previous case.
- P19.4: North/North-west corridor, except Vigo-Porto. Due to the fact that some works on this corridor already started, the score assigned is +5.
- P19.5: Vigo – Porto: No information available to assign a score to this sub-section.
- P19.6: Extremadura: the situation is similar to that one of the first, second and third sub-section. Hence, the score assigned is +3.

6.16 P20 FEHMARN BELT RAILWAY LINE

6.16.1 Description of the priority project

Priority Project	Priority Project name	Sub-sections		Sections	Sub-section start date	Sub-section end date
P20	Fehmarn Belt railway line	P20.1	Fehmarn Belt fixed rail/road link	P20 D – DK Fehmarn Belt Strait	2007	2014
		P20.2	Railway line for access in Denmark from Öresund	P20 DK Copenhagen – Rodby	2007	2015
		P20.3	Puttgarden - Hamburg - Hannover/Bremen	P20 D Puttgarden – Hamburg	2007	2015
				P20 D Hamburg/Bremen – Hannover	2010	2015

The main sub-section is the Fehmarn Belt link (Bridge or tunnel) that crosses the Fehmarn Belt Strait. The other sub-sections involve improvements of railway sections in Germany (directly or indirectly) connected to the Fehmarn Belt link.

The principal objective is to improve connections of the Nordic countries to central Europe (just as the Öresund Bridge) which is believed to further regional economic development in the Nordic countries. The project will eliminate an existing bottleneck. Rail transport is expected to absorb a significant share of freight and passengers transport.

Table 6.25 *Project fiche P20*

Project	Description			
P20 Fehmarn Belt railway line	The Fehmarn Belt is an essential construction project, which will provide a fast, direct land - based transport link, for passenger and freight traffic, between Scandinavian countries and the hearth of the European mainland. The main objective is to ensure sufficient capacity on the whole north – south route consistent with the transport capacity of the Fehmarn Belt fixed link.			
Sections of the Project	Objectives	Description	Start date	End date
P20.1 Fehrman Belt fixed rail/ road link	It will attract passenger and freight traffic estimated at 3.3 million vehicles and 30,400 – 35,100 trains a year, helping to relieve congestion on the Great Belt route across Denmark. Currently, less than 20% of goods transported between Scandinavia and the European mainland are carried via the Fehmarn Belt (by ferry) between Denmark and Germany. When the fixed link has been built, the proportion of goods being transported via	This project consists in a tunnel with a length of 19 km from Rødby on the Danish island Lolland to Puttgarden on the German island Fehmarn. Currently Rødby and Puttgarden are connected by ferry service running twice an hour with a crossing time of approximately 45 minutes (excluding waiting time). The design will be based on the latest EU-standards, including new directives regarding interoperability of the railway, as one purpose is to create a new fast border crossing railway connection between Scandinavia and the continent. The construction period is estimated to be 6-8 years depending on the technical solution. The solutions have been investigated,	2007	2014

	Fehmarn Belt route is expected to increase to 33-37% or approximately 15 to 17 million tonnes of freight per year, thereof 8 to 11 million tonnes of rail freight per year. The project is expected also to stimulate economic development in the Baltic Sea region of Denmark and Germany.	the decision on the technical solution has still to be taken. Rail and road capacities will depend also on the technical solution.		
P20.2 Railway line for access in Denmark from Oresund	The completion of the project also necessitates improvements to domestic links in Denmark between the Oresund and the Fehmarn Belt. The main objectives will be to ensure sufficient capacity on the whole North-South route consistent with the transport capacity of the Fehmarn Belt fixed link.	The entire distance from Copenhagen to Fehmarn Belt fixed link is 185 km. The first activity is to do some studies to identify the optimal layout of the railway line between Copenhagen and Fehmarn Belt. This distance can be divided in following sections: Copenhagen – Ringsted (64 km); Ringsted – Vordingborg (55 km); Vordingborg – Nyköbing (29 km); Nyköbing – Fehmarn Belt, Rödby Faerge (37 km). The purpose of the studies is to recommend upgrading or building of new lines in the sections. The increase of capacity should reflect the capacity on the Fehmarn Belt fixed link. It is expected the connection will be used of the majority of the freight traffic from Scandinavia to the continent of Europe, furthermore some passenger traffic is expected. Interventions on the sections can be summarised as the following: Section 1: from 2-4 tracks to 2-4 tracks; Section 2: 2 tracks (no change); Section 3: from 1 track to 2 tracks (except the Storströmsbridge); Section 4: from 1 track to 2 tracks. The design will be based on the latest EU-standards, including new directives regarding interoperability of the railway, as one purpose is to create a new fast border crossing railway connection between Scandinavia and the continent.	2008	2014
P20.3 Puttgarden – Hamburg – Hannover/ Bremen	The completion of the project also necessitates improvements to domestic links in Germany between Puttgarden and Hamburg and also in direction of Hannover and Bremen. The main objectives will be to ensure sufficient capacity on the whole North/ South route consistent with the transport capacity of the Fehmarn Belt fixed link.	The project can be divided in 2 sub-sections: Puttgarden – Hamburg; Hamburg/ Bremen - Hannover. Concerning the Puttgarden – Hamburg sub-section, the intervention concerns the improvement of railway connection along 130 km. Especially, the upgrading of the lines regards: Puttgarden – Bad Schwartau to 2 tracks (except Fehmarnsund bridge), Bad Oldesloe – Ahrensburg to 3 tracks, Ahrensburg – Hamburg-Wandsbek to 4 tracks, electrification on Lübeck - Puttgarden. Concerning the Hamburg/ Bremen – Hannover sub-section, an upgrading of the Visselhoevede – Langwedel has to be done as well as the	2008	2015

		construction of a high-speed line from Isernhagen (near Hannover) to Lauenbruck (line Hamburg – Bremen). Visselhoevede – Langwedel will be a 2 tracks line and the maximum speed will be 160 km/h with a capacity of 106 trains per day and direction while Isernhagen to Lauenbruck will be a 2 tracks line and the maximum speed will be 300 km/h with a capacity of 56 trains/day/direction. The total length of the section will be 244 km.		

6.16.2 Impact on the level of traffic flows

The impact at the level of traffic flows is identified at infrastructure level as follows:

- Rail passenger flows P20, total interregional,
- Rail passenger flows P20, international,
- Rail freight flows P20, total interregional,
- Rail freight flows P20, international.

The impact at the level of traffic flows is illustrated by the figures hereunder.

Figure 6.53 *Rail passenger flows P20, total interregional*

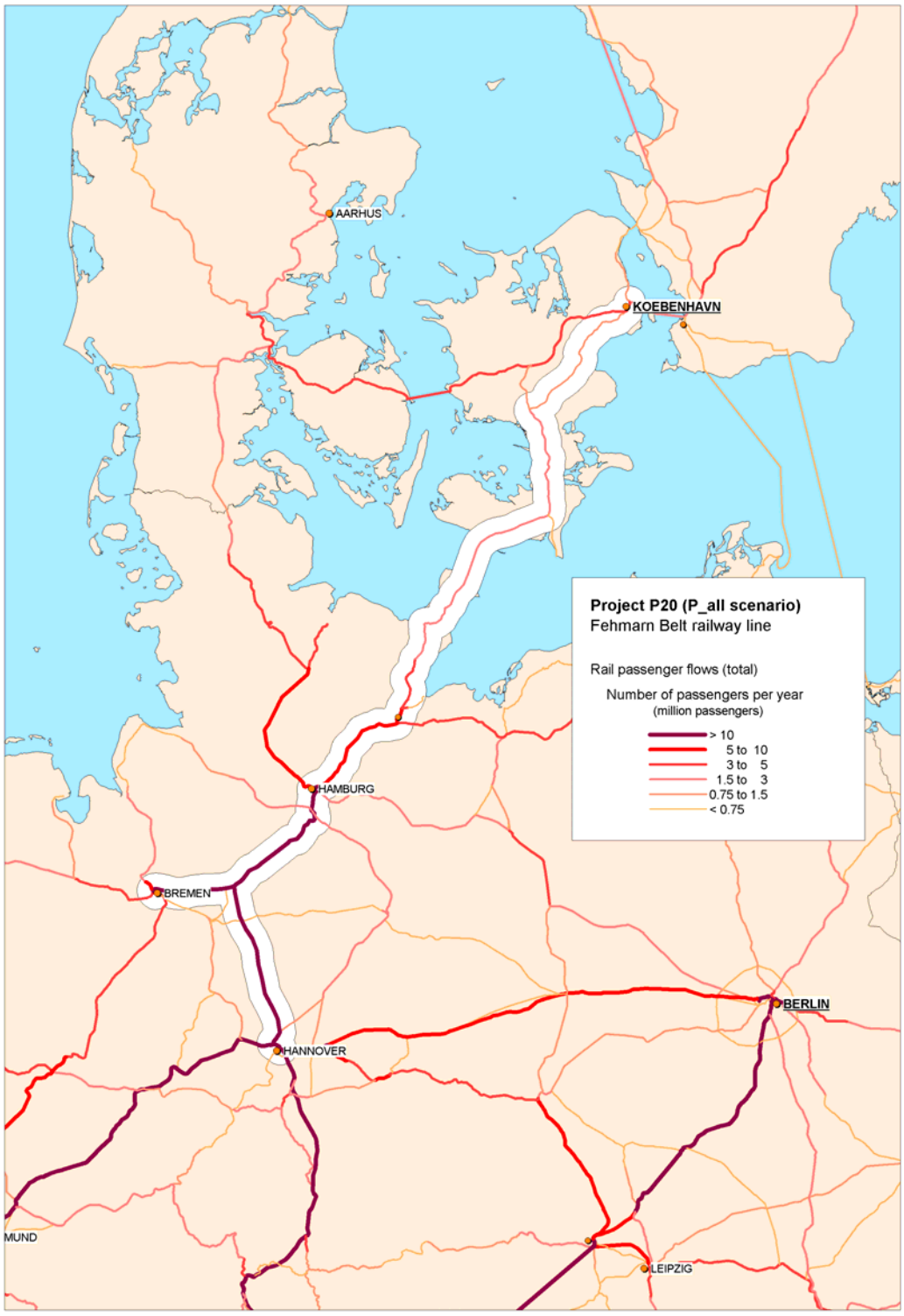


Figure 6.54 *Rail passenger flows P20, international*

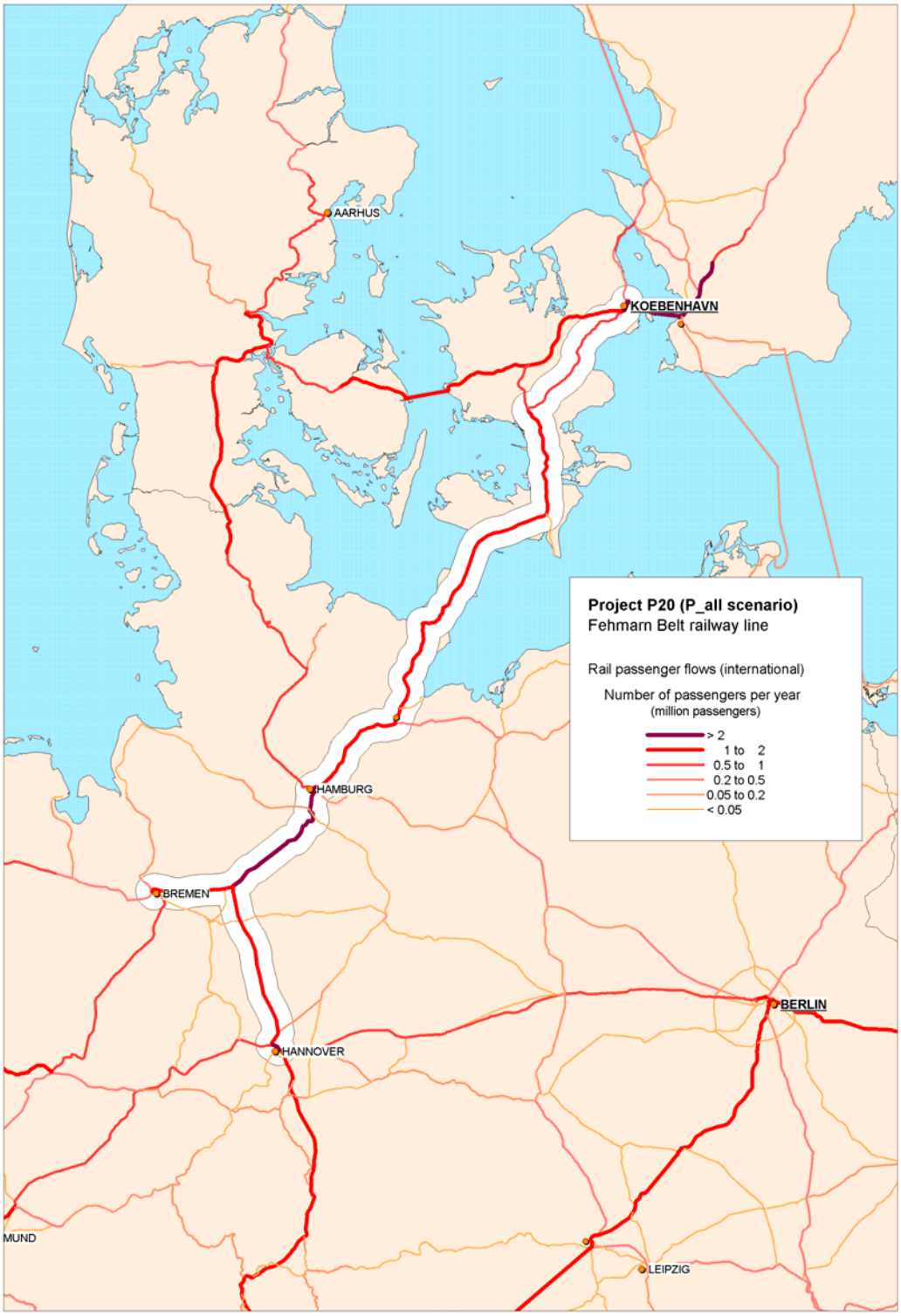


Figure 6.55 *Rail freight flows P20, total interregional*

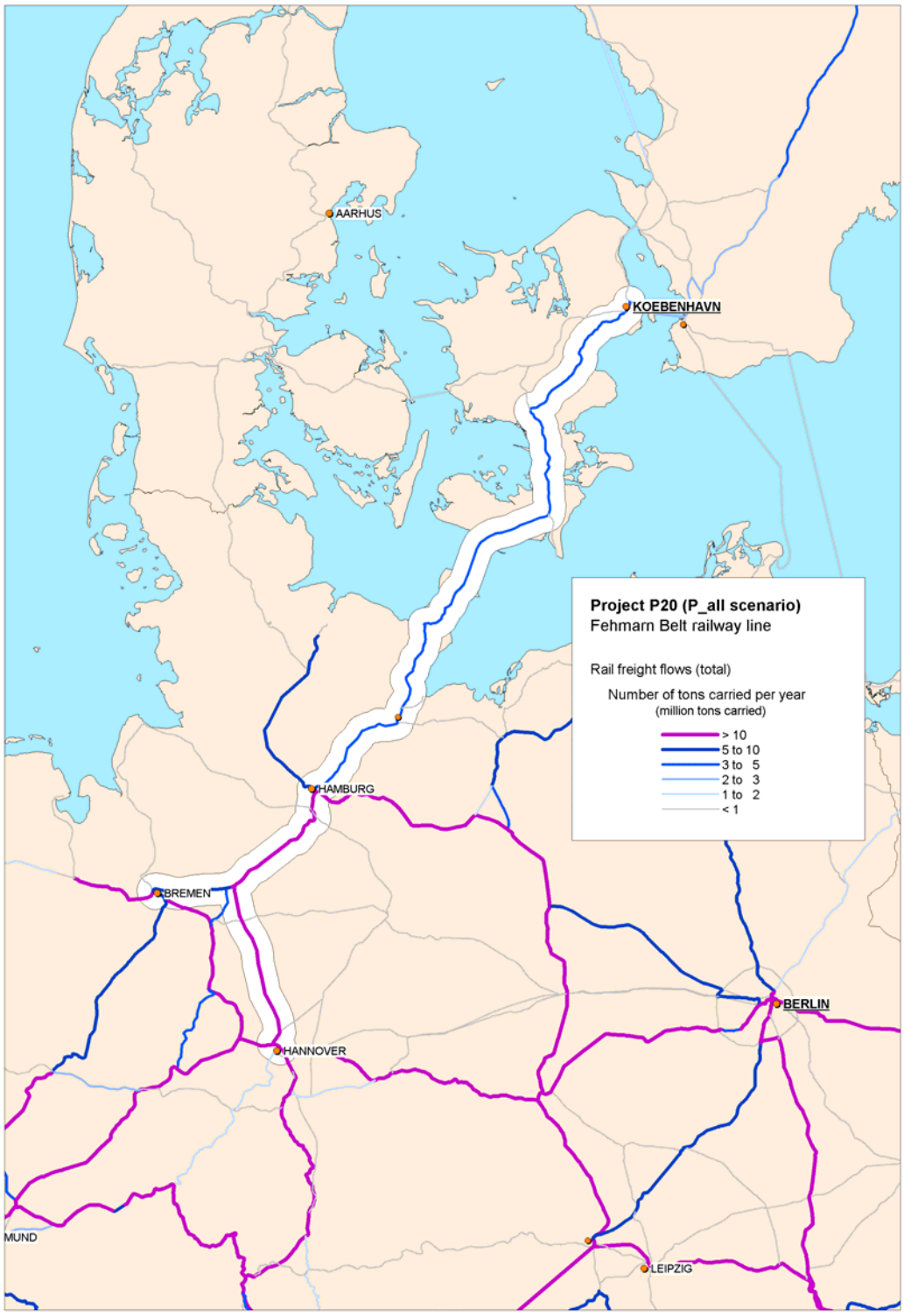
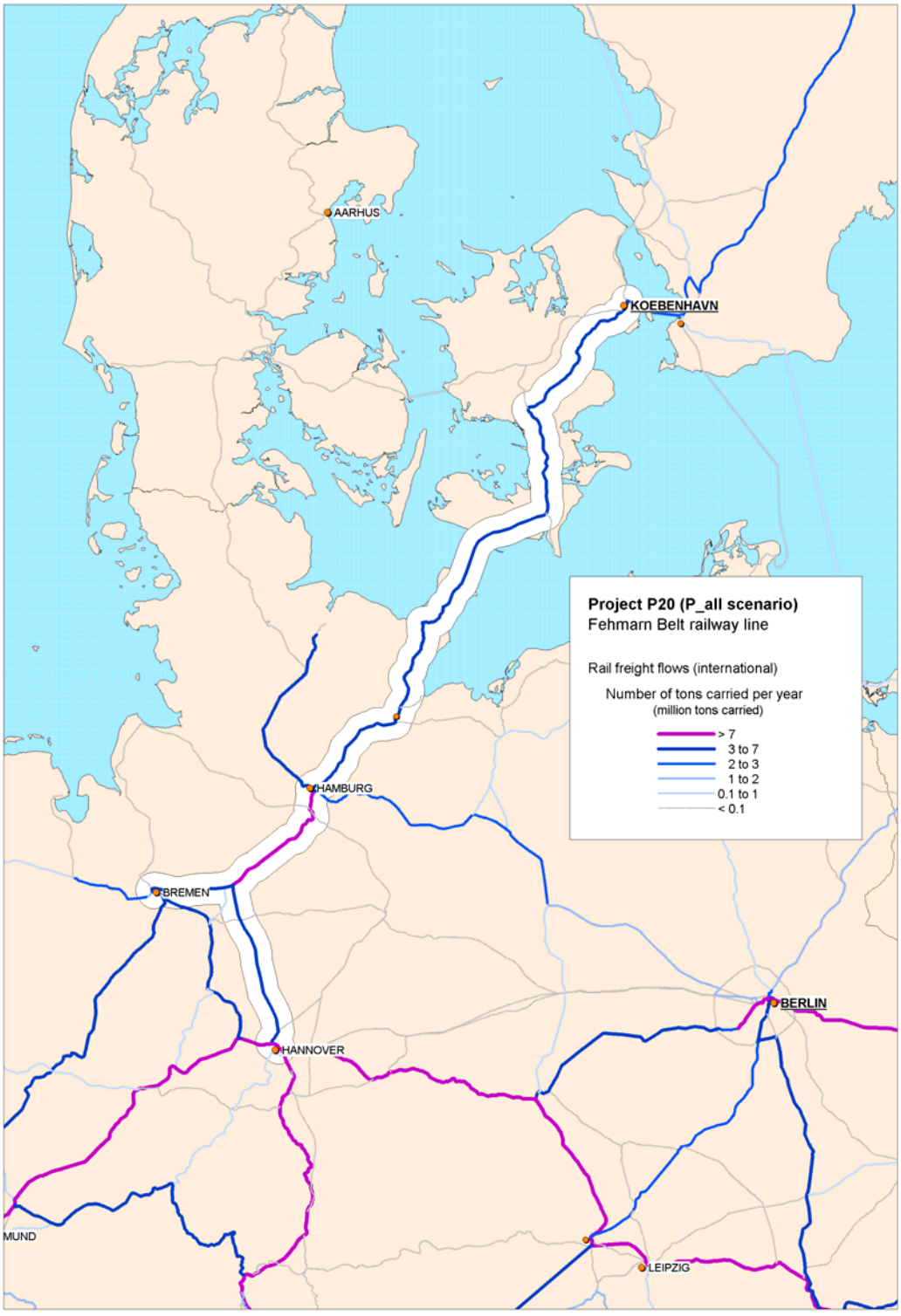


Figure 6.56 *Rail freight flows P20, international*



6.16.3 Estimated aggregated impacts of the priority project

In the following table, the impact variables for the all projects scenario are presented for all sub-sections of the priority project. Between brackets, the values of the individual project scenarios are given. The methodology of the impact variables is described in D6, Chapter 3.6.

Table 6.26 *Impact variables P20: Fehmarn Belt railway line*

Objective	Indicator	P20.1	P20.2	P20.3	P20 Total
ECONOMIC IMPACTS IN THE TRANSPORT SECTOR					
IMPROVEMENT OF ROAD LEVEL SERVICE	(1) Changes in time costs caused by road congestion, mln. € / year	-1.4 (47)	-1.1 (44.8)	-9.5 (-107.3)	-12.0 (-15.5)
REDUCTION OF TRAVEL TIME	(2a) Changes in monetary value of the reduction of passenger travel time, mln. € / year	-85.6 (-81.4)	-6.7 (-7.3)	-96.4 (-95.5)	-188.8 (-184.2)
	(2b) Changes in passenger travel time, mln hour / year	-8.9 (-8.9)	-0.4 (-0.5)	-8.2 (-8.6)	-17.6 (-18)
	(3) Changes in monetary value of the reduction of freight travel time, mln. € / year	-165.4 (-127.2)	0.0 (0)	-12.6 (-13.2)	-178.0 (-140.4)
ENVIRONMENTAL SUSTAINABILITY					
GLOBAL WARMING	(4a) Change (in monetary value) of the transport contribution to global warming, mln. € / year	-1.181 (0.237)	-0.788 (0.201)	-5.965 (-0.083)	-7.934 (0.355)
	(4b) Change of the transport contribution to global warming, 1000 kg CO2 / year	-50263 (10068)	-33516 (8571)	-253830 (-3524)	-337609 (15115)
ATMOSPHERIC POLLUTION	(5a) Change (in monetary value) of the NOX transport emission, mln. € / year	-1.681 (-2.744)	-1.310 (-2.393)	-3.538 (-2.79)	-6.529 (-7.927)
	(5b) Change of the NOX transport emission, 1000 kg NOx / year	-328 (-604)	-245 (-509)	-638 (-573)	-1211 (-1686)
	(6a) Change (in monetary value) of particulates' emissions of transport, mln. € / year	-0.004 (0.045)	0.007 (0.04)	-0.189 (0.035)	-0.186 (0.12)
	(6b) Change of particulates' emissions of transport, 1000 kg particulates / year	-1 (3)	0 (3)	-10 (2)	-12 (8)
TRANSPORT SAFETY	(7) Variation on monetary value of accidents, mln. € / year	-5.1 (40.4)	-5.0 (33.4)	-18.6 (16.7)	-28.7 (90.5)
INVESTMENT COST					
INVESTMENT COST	(8) Total project costs, mln. €	4400	400	2376	7176
GENERAL TRANSPORT RELEVANCE					
TOTAL TRAFFIC VOLUME ON THE PROJECT	(10) Total passenger traffic on the project section, mln. passengers / year	19.1 (18.9)	1.7 (1.5)	10.3 (10.2)	- -
	(11a) Maximum freight traffic on the project section, mln. ton / year	19.3 (22.1)	3.9 (3.9)	54.7 (55.2)	54.7 (55.2)
	(11b) Average freight traffic on the project section, mln. ton / year	23.4 (22.1)	3.9 (3.9)	12.8 (12.5)	- -
	(11c) Total freight traffic on the project section, mln. ton km /year	911 (861)	686 (684)	3006 (2949)	4602 (4494)
INTERMODALITY	(12) Quantitative appraisal of the project's contribution for an intermodal transport system, mln. ton	0.0 (0.1)	0.0 (0.1)	1.4 (0.9)	1.4 (1.1)
CREATION OF EUROPEAN VALUE ADDED					
DEVELOPMENT OF INTERNATIONAL PASSENGER TRAFFIC	(13) Share of international passenger traffic on total traffic on the project, %	98.2 (98.2)	89.5 (88.6)	17.9 (16.3)	- -
	(14) Volume of international passenger traffic on the project, mln. passengers / year	18.8 (18.5)	1.5 (1.4)	1.8 (1.7)	- -
DEVELOPMENT OF INTERNATIONAL FREIGHT TRAFFIC	(15) Share of international freight traffic on total traffic on the project, %	100.0 (100)	100.0 (100)	34.6 (35.5)	- -
	(16) Volume of international freight traffic on the project, mln. tons / year	23.4 (22.1)	3.9 (3.9)	4.4 (4.5)	- -
INTEROPERABILITY	(17) Reduction of passengers waiting time at borders for international traffic	N/a	N/a	N/a	-
	(18) Reduction of freight waiting time at borders for international traffic	N/a	N/a	N/a	-
	(19) Length of networks becoming interoperable because of the project	N/a	N/a	N/a	-

Objective	Indicator	P20.1	P20.2	P20.3	P20 Total
IMPROVEMENT OF ACCESSIBILITY					
PASSENGER ACCESSIBILITY	(20) Variation of the STAC centrality index for passenger transport, %	0.12 (0.16)	0.00 (0)	0.03 (0.02)	- -
FREIGHT ACCESSIBILITY	(21) Variation of the STAC centrality index for freight transport, %	0.08 (0.07)	0.00 (0)	0.00 (0)	- -
PERIPHERAL ACCESSIBILITY	(22) Variation of the STAC centrality index for passenger transport in regions identified as peripheral, %	0.77 (1.06)	0.12 (0.18)	0.44 (0.32)	- -
	(23) Variation of the STAC centrality index for freight transport in regions identified as peripheral, %	1.89 (1.68)	0.00 (0)	0.00 (0)	- -
ENVIRONMENTAL SUSTAINABILITY					
MODAL REBALANCING	(24) Volume of road freight traffic shifted to rail, IWW or sea transport, mln. t·km / year	740 (-35)	457 (-32)	2501 (13)	3698 (-55)
	(25) Volume of road and air passenger traffic shifted to rail, mln. passenger·km / year	-143 (-1548)	52 (-915)	108 (359)	17 (-2104)
LEVEL OF CONCERN :TRAFFIC TRANSFER	(26) Transfer of traffic from infrastructure lying in sensitive zones to the projected infrastructure, % of road traffic transferred from sensitive areas	1.1% (-5,8%)	-0.4% (-4,9%)	-0.2% (-1,4%)	- -
LEVEL OF CONCERN: DISTANCE	(27) Percentage of the length of the project lying in a sensitive area, % length	0.0%	0.0%	0.0%	-
LEVEL OF CONCERN: EMISSIONS	(28a) Changes of inhabitants' level of concern caused by emissions of NOx, % NOx	0.1% (0,1%)	0.2% (0,1%)	-0.5% (0,0%)	- -
	(28b) Changes of inhabitants' level of concern caused by emissions of particulates, % particulates	-0.2% (0,0%)	0.0% (0,0%)	-0.6% (0,0%)	- -
LEVEL OF CONCERN: PROXIMITY	(29) Synthetic appreciation of the proximity of the project from specially protected areas (SPAs) or densely populated areas. Proximity of the project from SPA, km	0.0%	0.0%	0.0%	-
MATURITY AND COHERENCE OF THE PROJECT					
DEVELOPMENT OF THE PROJECT	(30) Appraisal of the project planning status	1	1	1	-
INSTITUTIONAL SOUNDNESS	(31) Qualitative appraisal of the project's compliance with national plans	3	2	5	-
COHERENCE OF THE PROJECT	(32) Qualitative appraisal of the project's coherence with main international traffic corridors	2 / 3	2	2	-

Comments on the main results

Sub-section P20.1 is multi-modal. When interpreting the results, one has to be aware that the values refer to all modes concerned by the infrastructure measure. Therefore, especially the values referring to transport volumes on a sub-section tend to be higher for multi-modal sub-sections than for uni-modal ones.

Impact on passenger volumes and modal shift

- Passenger transport volumes vary between 1.7 mln. passengers per year in case of P20.2 (Railway line for access in Denmark from Öresund) and 19.1 mln. passengers per year in case of P20.1 (Puttgarden – Hamburg – Hannover/ Bremen).
- Since the core of the priority project, the Fehmarn Belt fixed link, is multi-modal the priority project is expected to result in a small increase in road passenger traffic performance by 17 mln.

Impact on freight volumes and modal shift

- Total interregional freight transport volumes vary between 3.9 (P20.2) and 23.4 mln ton (P20.1). The share on international transport in total freight transport is very high;
- Total shift towards rail of freight transport performance is 3.7 bill. ton-km.

Impact on infrastructure network use

The detailed analysis carried out by the consortium has revealed the following impacts on infrastructure use:

- The growth effects of the rail freight flows can be observed up to Lyon and München, even if the Fehmarn project seems an isolated infrastructure change.
- For passenger rail flows considerable increase is forecasted on the links belonging to the priority project and on following feeding relations: Nürnberg/ (Mannheim – Frankfurt) – Göttingen – Hannover, Dortmund – Hannover and Lübeck – Rostock – Stralsund.
- Road passenger flows are expected to increase along Hamburg – Fehmarn Belt Kopenhagen – Ljungby, whereas a decrease is forecasted for the Scanlink route Hamburg – Flensburg – Kolding – Odense – Kopenhagen and, due to route shifts, along Talinn – Riga – Vilnius.

Impact on accessibility

- Sub-section P20.1 highlights a relative strong improvement of centrality values of relatively poor and peripheral regions for its capability of improving the centrality of Denmark as well as the peripheral Swedish and Finnish regions.

Impact on transport safety

- We can observe a rise of accident costs in this priority project. Actually, the number of accidents differs only slightly in comparison with the reference case. The number of accidents slightly rises in all sub-sections of this priority project, with exception of the number of fatalities in P20.3. Despite of this, the cost of accidents is relatively high. The reason for this surprising effect lies on the huge shift of traffic flows on the road network because of the construction of the Fehmarn belt bridge. The bridge induces and attracts transport flows in countries with higher monetary factors of accidents and reduces transport flows on the road network in countries with low monetary factors. Thus the monetisation leads to a somewhat biased evaluation of sub-sections and priority projects.

Impact on environmental sustainability

- The reduction in emissions results in a marginal decrease (up till 1%) of human health risks along the corridor.
- Traffic will marginally be transferred to sensitive areas.
- The priority project is not likely to interact with potentially sensitive areas on land.

Impact on emissions

The overall impact on emission is quantified from the impact at the network level and the differences between the all project scenario and the reference 2 scenario are as follows:

- CO_2: net decrease with 338 thousand tonnes,
- NO_x: net decrease with 1211 tonnes,
- Particulates: slight decrease, no significant.

Development of the project

- P20.1: Fehmarn Belt fixed rail/road link. The design studies have not started yet. The score assigned is +1.
- P20.2: Railway line for access in Denmark from Öresund. Design studies have still to be carried out. Also in this case, the score assigned is +1.
- P20.3: Puttgarden - Hamburg - Hannover/Bremen. It includes 2 sections. Both of them are at the same level of development. The score assigned is +1.

6.17 P21 MOTORWAYS OF THE SEA

6.17.1 Description of the priority project

Priority Project	Priority Project name	Sub-sections		Sections	Sub-section start date	Sub-section end date
P21	Motorways of the sea	P21.1	Motorway of the Baltic Sea	Motorway of the Baltic Sea	n.a.	2010
		P21.2	Motorway of the sea of western Europe	Motorway of the Sea of Western Europe (IRL)	n.a.	2010
		P21.3	Motorway of the sea of south-east Europe	Motorway of the Sea of South-east Europe (+Adriatic, Chypre and Black sea ways)	n.a.	2010
		P21.4	Motorway of the sea of south-west Europe	Motorway of the Sea of the South-west Europe (MT for VTMIS)	n.a.	2010

This priority project involves the development and improvement of sea links between European ports. The exact specification of the sub-sections is as yet unknown but could differ from ice breaking (Baltic Sea), to development of new lines, port infrastructure improvements or to traffic management systems.

The principal objective it to make sea links more attractive for operators in order to let sea transport absorb a higher share of the growth in freight volumes at the expense of road freight transport. Especially the economic development of peripheral and island regions is expected to benefit from the improvement of the sea links.

Table 6.27 *Project fiche P21*

Project	Description			
P21 Motorways of the sea	The development of sea links, in order to bypass bottlenecks such as the Alps and the Pyrenees or to better connect the peripheral and island areas of the European Union, represents in some cases a genuine competitive alternative to land transport. Four maritime areas have been identified, inside which one or more regular maritime service routes will have to be established in order to connect the relevant ports for intra-Community traffic.			
Sections of the Project	Objectives	Description	Start date	End date
P21. 1 Motorways of the Baltic Sea	The development of sea links, in order to bypass bottlenecks such as the Alps and the Pyrenees or to better connect the peripheral and island areas of the European Union, represents in some cases a genuine competitive alternative to land transport.	One of the maritime lines involved is the Motorway of the Baltic Sea linking the States of the Baltic Sea to those of Central and Western Europe. The States concerned will have to develop transnational projects, which will contribute to safer and more attractive maritime routes between a restricted number of ports. The project can include packages comprising ports and logistic facilities, direct and easy - sea and land - access and start-up aids implemented through public private partnership set up through joint tendering procedures. In the Baltic Sea, the promotion of maritime traffic implies guaranteeing navigability in all season, which involves a sufficient fleets of icebreakers. The projects can be	2004	2010

		linked to traffic management systems, systems of exchange of information between the customs and port administrations and monitoring of the transport of dangerous substances. This project aims at curbing the increasing congestion of the road and railway infrastructure and at better integration of all regions of the enlarged Union. It can potentially be implemented rapidly at a low cost. It constitutes a framework to promote new forms of public - private partnerships, in order to encourage the logistical chains to reach the sufficient critical mass to ensure the viability of new regular maritime lines.		
P21. 2 Motorways of the sea of western Europe	The development of sea links, in order to bypass bottlenecks such as the Alps and the Pyrenees or to better connect the peripheral and island areas of the European Union, represents in some cases a genuine competitive alternative to land transport.	One of the maritime lines involved is the Motorway of the sea of the Western Europe leading from the Iberian Peninsula via the Atlantic Arc, to the North sea and the Irish sea. The States concerned will have to develop transnational projects, which will contribute to safer and more attractive maritime routes between a restricted number of ports. The project can include packages comprising ports and logistic facilities, direct and easy - sea and land - access and start-up aids implemented through public private partnership set up through joint tendering procedures. The projects can be linked to traffic management systems, systems of exchange of information between the customs and port administrations and monitoring of the transport of dangerous substances. This project aims at curbing the increasing congestion of the road and railway infrastructure and at better integration of all regions of the enlarged Union. It can potentially be implemented rapidly at a low cost. It constitutes a framework to promote new forms of public - private partnerships, in order to encourage the logistical chains to reach the sufficient critical mass to ensure the viability of new regular maritime lines.	2004	2010
P21. 3 Motorways of the sea of south-east Europe	The development of sea links, in order to bypass bottlenecks such as the Alps and the Pyrenees or to better connect the peripheral and island areas of the European Union, represents in some cases a genuine competitive alternative to land transport.	A maritime line involved is the Motorway of the sea of the South - East Europe area, connecting the Adriatic Sea to the Ionian Sea and the Eastern Mediterranean to include Cyprus. The States concerned will have to develop transnational projects, which will contribute to safer and more attractive maritime routes between a restricted number of ports. The project can include packages comprising ports and logistic facilities, direct and easy - sea and land - access and start-up aids implemented through public private partnership set up through joint tendering procedures. The projects can be linked to traffic management systems, systems of exchange of information between the customs and port administrations and monitoring of the transport of dangerous substances. This project aims at curbing the increasing congestion of the road and railway infrastructure and at better integration of all regions of the enlarged Union. It can potentially be implemented rapidly at a low cost. It constitutes a framework to promote new forms of public – private partnerships, in order to encourage the logistical chains to reach the sufficient critical mass to ensure the viability of new regular maritime line.	2004	2010

P21. 4 Motorways of the sea of south-west Europe	The development of sea links, in order to bypass bottlenecks such as the Alps and the Pyrenees or to better connect the peripheral and island areas of the European Union, represents in some cases a genuine competitive alternative to land transport.	One of the maritime lines involved is the Motorway of the sea of the South - West Europe (Western Mediterranean) area connecting Spain, France, Italy including Malta and linking the Motorway of the Sea of the South - East Europe (including towards the Black Sea). The States concerned will have to develop transnational projects, which will contribute to safer and more attractive maritime routes between a restricted number of ports. The project can include packages comprising ports and logistic facilities, direct and easy - sea and land - access and start-up aids implemented through public private partnership set up through joint tendering procedures. The projects can be linked to traffic management systems, systems of exchange of information between the customs and port administrations and monitoring of the transport of dangerous substances. This project aims at curbing the increasing congestion of the road and railway infrastructure and at better integration of all regions of the enlarged Union. It can potentially be implemented rapidly at a low cost. It constitutes a framework to promote new forms of public - private partnerships, in order to encourage the logistical chains to reach the sufficient critical mass to ensure the viability of new regular maritime lines.	2004	2010

6.17.2 Overview of the generalised transport costs of alternative modes on the routes of the selected sea motorways

Corridor 1: Baltic Area

As indicated the door-to-door transport chains studied in this corridor are

- Via shortsea services between Rostock and Tallinn and between Rostock and Klaipeda, serving the Hinterland of Benelux and German areas and Latvia, Lithania and Estonia.
- Via a (virtual) rail service is assumed between Hamburg and Klaipeda, serving the same hinterlands.
- Door-to-door road transport

Figure 6.57 *The shortsea services Rostock –Klaipeda – Tallin*

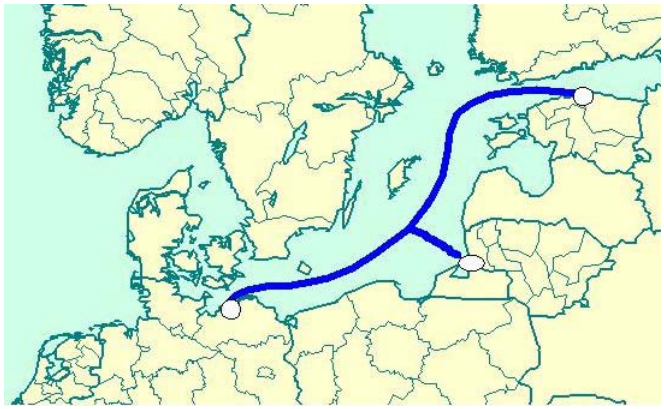
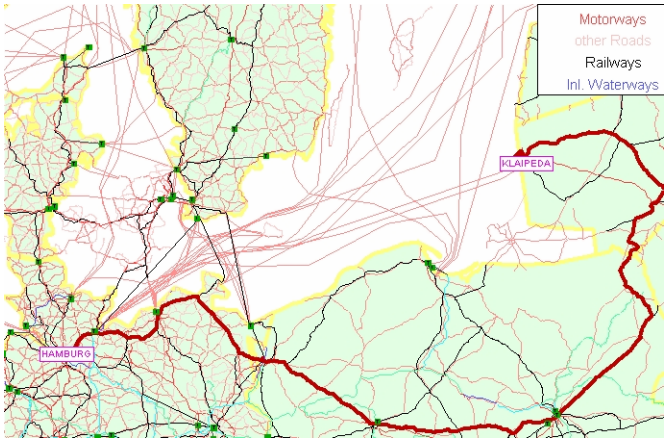


Figure 6.58 *The railway connection between Hamburg and Klaipeda*



Regarding the short sea operation, two types of transport are taken into account:

- ferry (Ro-Ro)
- container vessel (300 TEU).

Rostock – Klaipeda

The characteristics of the transport options on the relation Rostock – Klaipeda are the following:

Table 6.28 *Transport characteristics Rostock –Klaipeda*

	Road	Rail	SSS Ro-Ro Ferry	SSS Container
Door-to-door costs (one way)	€ 1117	€ 881	€ 955	€ 516
Leadtime (days)	2	2	2	2

The cost ratio between SSS (ferry) and road transport varies between 86 and 154, with an average value of 106 and a median value of 104.

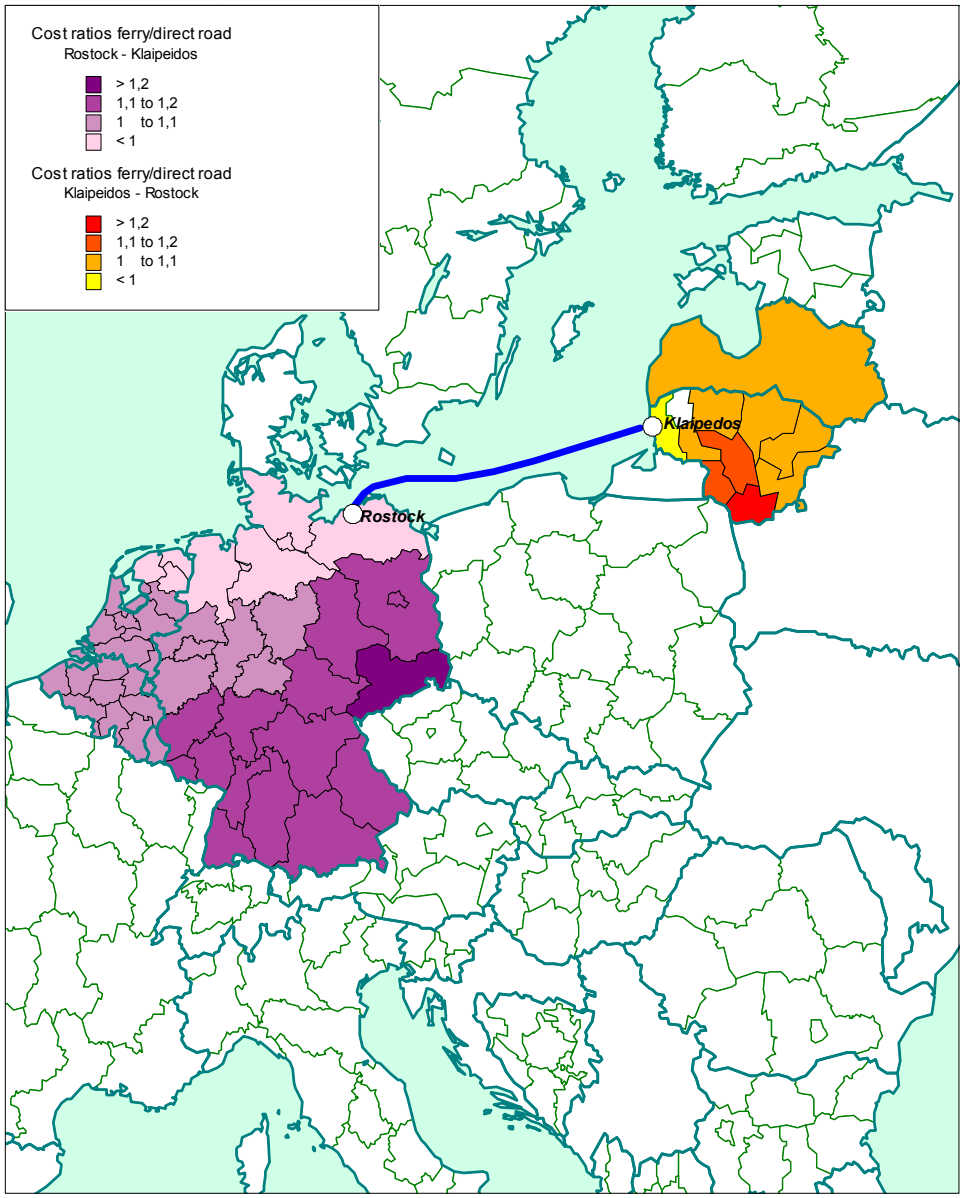
The cost ration between SSS (container) and road transport varies between 46 and 112, with an average and median value of 75. Clearly the door-to-door link using shortsea container vessels is the most competitive alternative for road transport.

The following figure presents the level of competition between the modes Short Sea and Road for ferry vessels. The figure should be interpreted as follows:

- The classes in the regions around Rostock indicate the ratio of door-to-door transport cost of Shortsea transport from the particular region to Klaipeda compared to the road transport costs.

- The classes in the regions around Klaipeda indicate the ratio of door-to-door transport cost of Shortsea transport from the particular region to Rostock compared to the road transport costs.

Figure 6.59 *Cost ratio between Shortsea (ferry) and road transport Rostock – Klaipeda*



The short sea service (container) is especially competitive for the Northern regions of Germany and Netherlands and the regions North/East of Klaipeda. Furthermore the shortsea operation with container vessels (300TEU) is competitive to rail transport for all selected regions (ratio between 59 and 95).

The shortsea operation by means of ferries is not very attractive. For only a few regions there is a cost advantage compared to road transport. Most likely the volume is therefore not sufficient to have a feasible ferry service between Rostock and Klaipeda.

Rostock – Tallinn

The characteristics of the transport options on the relation Rostock – Tallin are the following:

Table 6.29 *Transport characteristics Rostock -Tallinn*

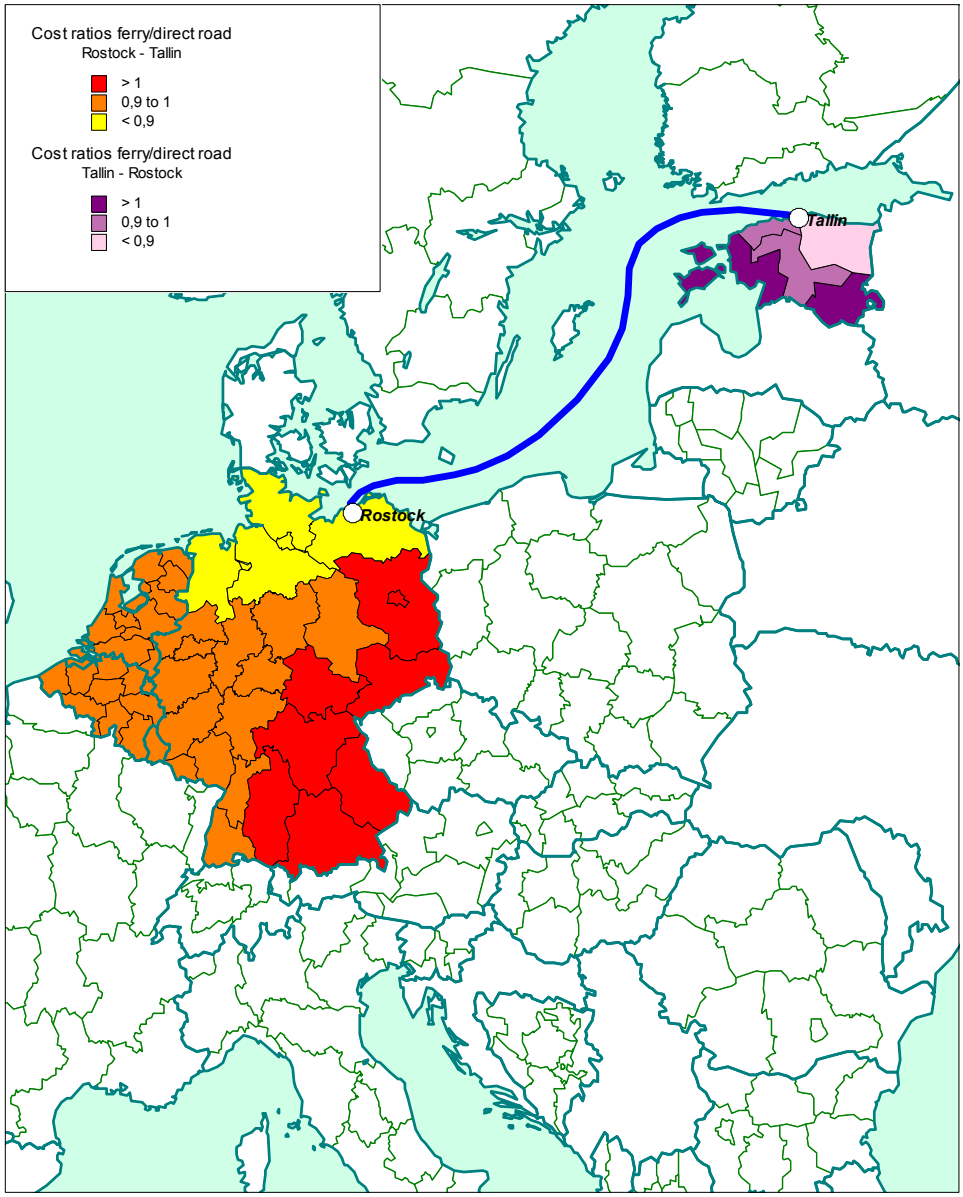
	Road	Rail	SSS Ro-Ro Ferry	SSS Container
Door-to-door costs (one way)	€ 1568	€ 1385	€ 1255	€ 552
Leadtime (days)	3	3	3	3

The cost ratio between SSS (ferry) and road transport varies between 81 and 110, with an average value of 95 and a median value of 94.

The cost ration between SSS (container) and road transport varies between 35 and 69, with an average and median value of 57. Also on this relation, the door-to-door link using shortsea container vessels is the most competitive alternative for road transport.

The following figures present the level of competition between the modes Short Sea and Road for both ferry and container vessels.

Figure 6.60 *Cost ratio between Shortsea (ferry) and road transport Rostock – Tallinn*



The short sea service (container) is especially competitive for the Northern regions of Germany and Benelux and the regions North-West in Estonia. Furthermore the shortsea operation with container vessels (300TEU) is competitive to rail transport for all selected regions (cost ratio 40-80).

The shortsea operation by means of ferries is less attractive. There is a smaller cost difference between road and short sea (ferry). Furthermore rail transport is competitive compared to ferry transport. The ratio (SSSferry/ rail) varies between 90 and 128, with an average value of 114 and median value of 113. Therefore, it seems that a feasible ferry service between Rostock and Tallinn is not possible.

Corridor 2: Atlantic Area

The door-to-door transport chains studied in this corridor are:

- Shortsea services between Antwerp and Bilbao, serving the hinterland of Benelux and German areas and Spain and Portugal.
- Rail services between Cologne and Irún and between Antwerp and Irún, serving the same hinterlands.
- Door-to-door road transport

The shortsea service Antwerp – Bilbao and railway service Cologne – Irun are illustrated below.

Figure 6.61 *Map of corridor Benelux & Germany – Iberia*

Again two types of shortsea transport are taken into account:

- ferry (Ro-Ro)
- container vessel (300 TEU)

In the transportation via Antwerp, a separation between Germany and Benelux has been made. The first results of the analysis for the Benelux are presented.

Antwerp (Benelux) – Bilbao

The characteristics of the transport options on the relation Antwerp – Bilbao are the following:

Table 6.30 *Transport characteristics Antwerp (Benelux) - Bilbao*

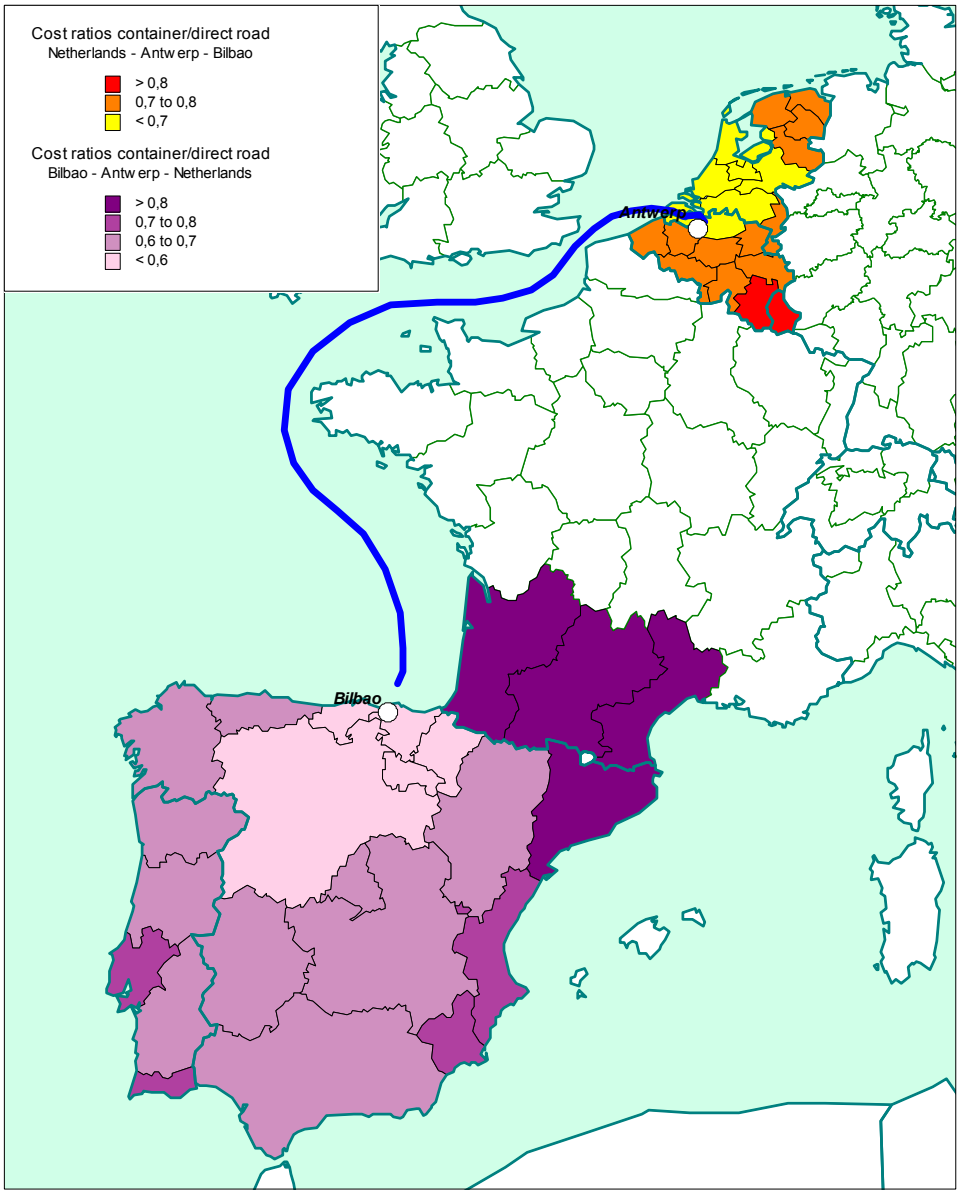
	Road	Rail	SSS Ro-Ro Ferry	SSS Container
Door-to-door costs (one way)	€ 1151	€ 813	€ 1340	€ 589
Leadtime (days)	2	2	3	3

Already for the most suitable relation (region Antwerp - region Bilbao) the short sea ferry is not competitive. It can therefore be concluded already that a short sea ferry service will not be feasible.

The cost ration between SSS (container) and road transport varies between 50 and 179 with an average value of 71 and median value of 68. However, the transport lead time of the short sea chain is extended with one day compared to road and rail.

The following figures present the level of competition between the modes Short Sea and Road for container vessels.

Figure 6.62 *Cost ratio between Shortsea (container) and road transport Antwerp (Benelux) – Bilbao*



The short sea service (container) is especially competitive for the regions in the North-West of the Benelux and in the North-West of Spain and Portugal. The area of Southern France and Cataluna and Pyrenees is the least attractive for this short sea service between Antwerp and Bilbao. Furthermore the shortsea operation with container vessels (300TEU) is competitive to rail transport for all regions (cost ratio between 72 and 92).

Germany – Bilbao

The characteristics of the transport options on the relation Ruhr area – Bilbao are the following:

Table 6.31 *Transport characteristics Antwerp (Germany) - Bilbao*

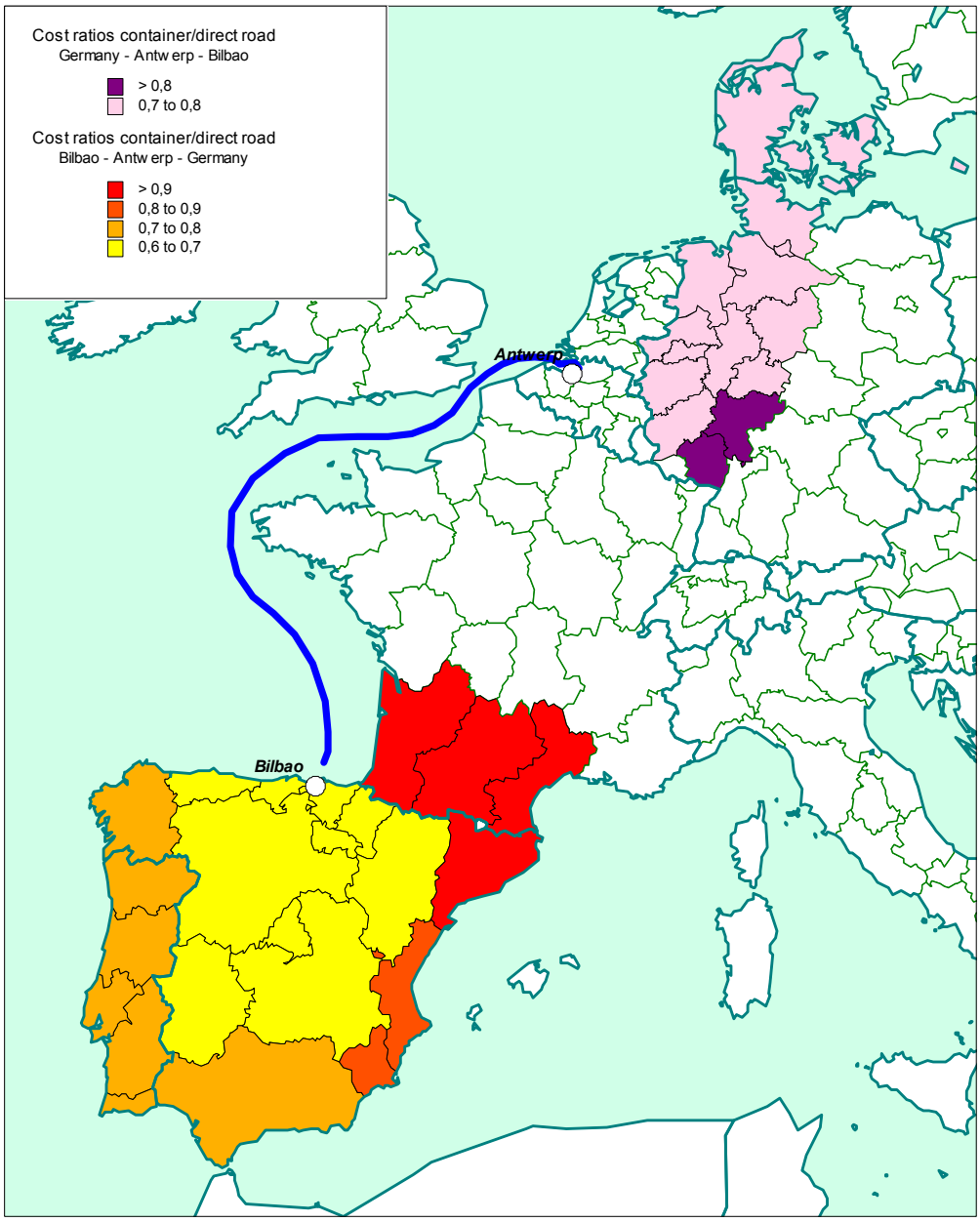
	Road	Rail	SSS Ro-Ro Ferry	SSS Container
Door-to-door costs (one way)	€ 1295	€ 908	€ 1453	€ 702
Leadtime (days)	2	3	3	4

Also in the suitable relation (Ruhr area - region Bilbao) the short sea ferry is not competitive. A short sea ferry service will therefore not be feasible.

The cost ration between SSS (container) and road transport varies between 54 and 178 with an average value of 76 and median value of 71. However, the transport lead time of the short sea chain using a container vessel is on average extended with two days compared to road transport. Shortsea (container vessel) requires an extra day compared to rail transport.

The following figures present the level of competition between the modes Short Sea and Road for container vessels.

Figure 6.63 *Cost ratio between Shortsea (container) and road transport Germany – Bilbao*



As can been seen in the figure, the short sea service (container vessel) is especially competitive for the regions in the North and West of Germany and in the North-West of Spain and Portugal. The area of Southern France and Cataluna and Pyrenees is the least attractive for this short sea service between Antwerp and Bilbao. Furthermore the shortsea operation with container vessels (300 TEU) is competitive to rail transport for all regions (cost ratio between 75 and 97 with an average and median value of 89).

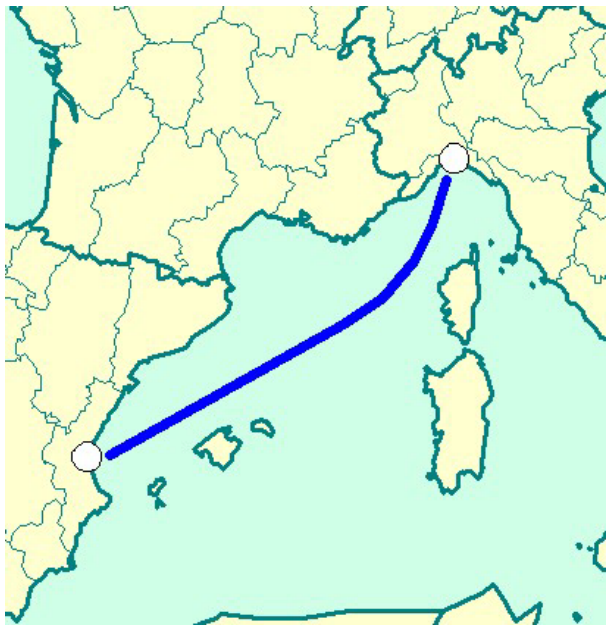
Corridor 3: Valencia – Genoa

The door-to-door transport chains studied in this corridor are:

- Shortsea services between Valencia and Genoa, serving the hinterland of Spain/Portugal and of Central Europe.
- Door-to-door road transport

Rail services are not taken into account. The short sea connection is illustrated in the following figure.

Figure 6.64 *Map of short sea connection Valencia - Genoa*



Also for this relation two types of shortsea transport are taken into account:

- ferry (Ro-Ro)
- container vessel (300 TEU)

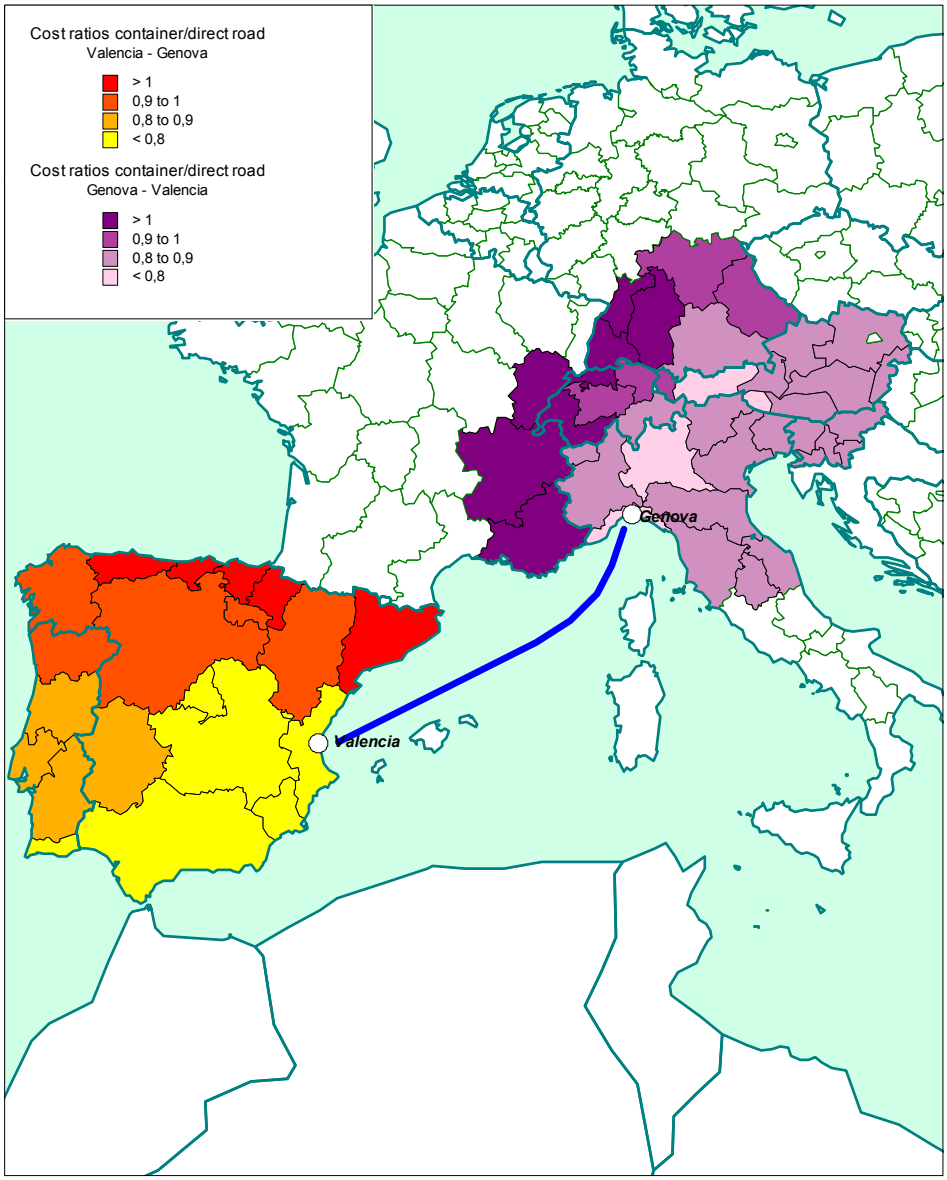
The characteristics of the transport options on the relation Valenica – Genoa are the following:

Table 6.32 *Transport characteristics Valencia - Genoa*

	Road	SSS Ro-Ro Ferry	SSS Container
Door-to-door costs (one way)	€ 1034	€ 1240	€ 545
Leadtime (days)	2	3	3

Also this relation it becomes clear that the shortsea ferry option is not feasible. The costs for transport via the ferry service are on the most favourable relation already higher than road transport. Therefore we only take into account the shortsea service using containers.
The cost ratio between SSS (container) and road transport varies between 53 and 205 with an average value of 90 and median value of 87 (calculated for 760 relations). However, the transport lead time of the short sea chain using a container vessel is on average extended with one day compared to road transport. Furthermore, it is required to use a container as loading unit.
The following figures present the level of competition between the modes Short Sea and Road for container vessels.

Figure 6.65 *Cost ratio between Shortsea (container) and road transport Valencia - Genoa*



From the figure it can be concluded that there is a good level of competition on the relations South and East of Genoa and South Spain and Portugal.

Corridor 4: Trieste – Greece

The door-to-door transport chains studied in this corridor are:

- Shortsea services between Patras and Trieste, serving the hinterland of Spain/Portugal and of Central Europe.
- Door-to-door road transport

Rail services are not taken into account in this corridor. The short sea connection is illustrated in the following figure.

Figure 6.66 *Map of short sea connection Trieste - Patras*

Also for this relation two types of shortsea transport are taken into account:

- ferry (Ro-Ro)
- container vessel (300 TEU)

The characteristics of the transport options on the relation Trieste – Patras are the following:

Table 6.33 *Transport characteristics Trieste- Patras*

	Road	SSS Ro-Ro Ferry	SSS Container
Door-to-door costs (one way)	€ 1503	€ 1492	€ 1363
Leadtime (days)	3	3	3

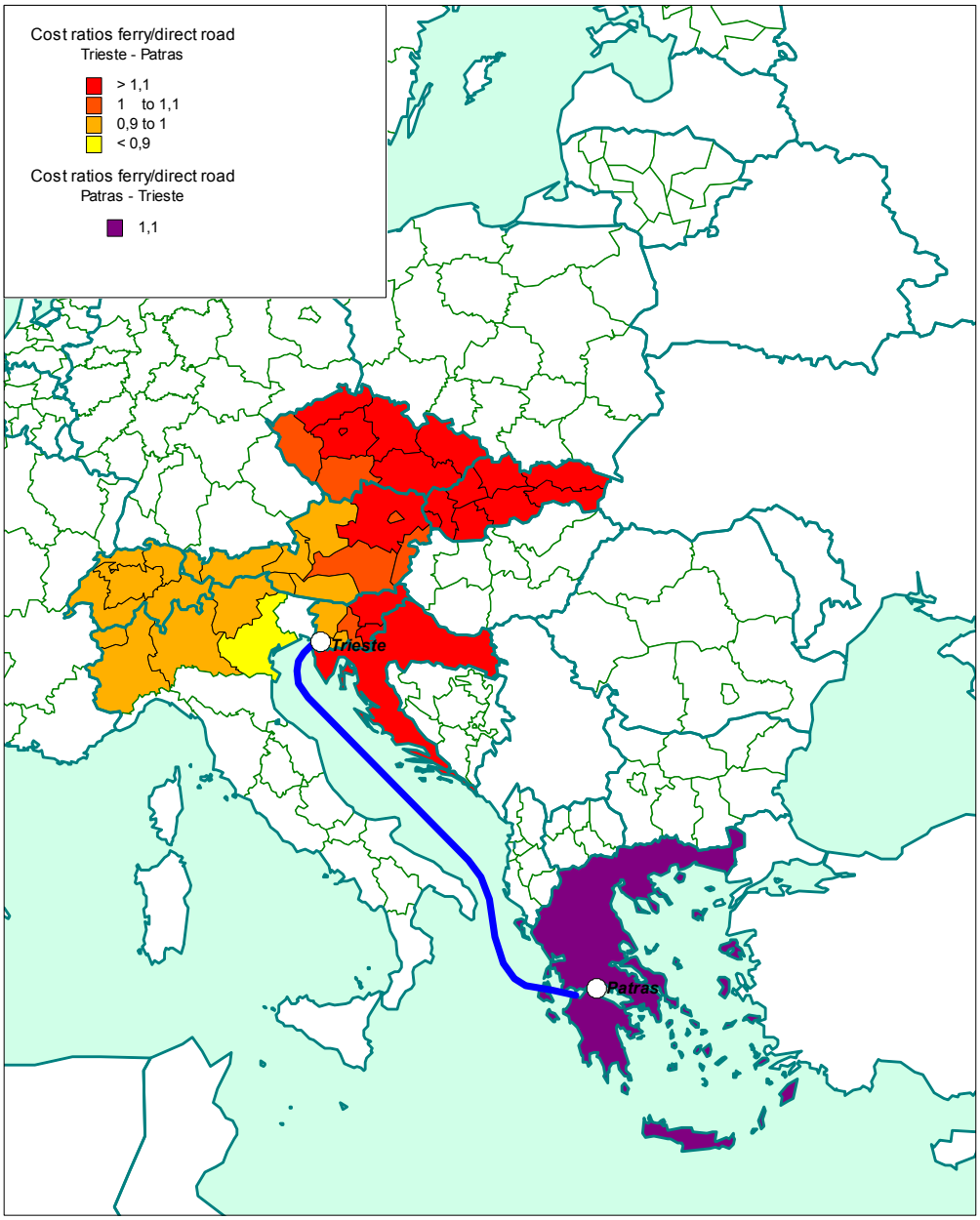
On this relation (which is most beneficial for shortsea) both the costs for shortsea using a ferry or container vessel are lower than road transport. The door-to-door leadtime of short sea transport is more or less equal to road transport.

The cost ratio between SSS (ferry) and road transport varies between 89 and 134 with an average value of 106 and median value of 105.

The cost ratio between SSS (container vessel) and road transport varies between 82 and 142. The average value is 110 and the median value is 114.

The following figures present the level of competition between the modes road and short sea for both container vessels and ferry.

Figure 6.67 *Cost ratio between Shortsea (ferry) and road transport Trieste – Patras*



From the figure it can be concluded that there is competition of short sea possible on the relations Italy and Switzerland – Greece. For Slovenia, Austria, Czech Republic and Slovakia road transport is the most favourable mode and competition of short sea is not possible.

The results of implementing sea motorways related services to attract long-distance road flows to sea transport chains on the four main routes described by the priority project P21 are estimated at the level of transport demand - modal shift from road to sea, and at the level of sea traffic flows on the four sub-sections.

It can be observed that following the current estimations the most feasible sea motorways are the Motorway of the sea of Western Europe (leading from the Iberian peninsula via the Atlantic Arc to the North Sa and Irish Sea), so that Antwerp – Bilbao in the analysis, and the Motorway of the sea of South-West Europe (Western Mediterranean), connecting Spain, France, Italy and including Malta, and linking with the motorway of the sea of South-East Europe, exemplified by the current example Genoa – Valencia.

Figure 6.68 *Difference sea flows P21 versus Reference 2*

6.17.3 Estimated aggregated impacts of the priority project

In the following table, the impact variables for the all projects scenario are presented for all sub-sections of the priority project. Between brackets, the values of the individual project scenarios are given. The methodology of the impact variables is described in D6, Chapter 3.6.

Table 6.34 *Impact variables P21: Motorways of the sea*

Objective	Indicator	P21.1	P21.2	P21.3	P21.4	P21 Total
ECONOMIC IMPACTS IN THE TRANSPORT SECTOR						
IMPROVEMENT OF ROAD LEVEL SERVICE	(1) Changes in time costs caused by road congestion, mln. € / year	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)
REDUCTION OF TRAVEL TIME	(2a) Changes in monetary value of the reduction of passenger travel time, mln. € / year	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)
	(2b) Changes in passenger travel time, mln hour / year	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)
	(3) Changes in monetary value of the reduction of freight travel time, mln. € / year	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)
ENVIRONMENTAL SUSTAINABILITY						
GLOBAL WARMING	(4a) Change (in monetary value) of the transport contribution to global warming, mln. € / year	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)
	(4b) Change of the transport contribution to global warming, 1000 kg CO2 / year	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)
ATMOSPHERIC POLLUTION	(5a) Change (in monetary value) of the NOX transport emission, mln. € / year	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)
	(5b) Change of the NOX transport emission, 1000 kg NOx / year	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)
	(6a) Change (in monetary value) of particulates' emissions of transport, mln. € / year	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)
	(6b) Change of particulates' emissions of transport, 1000 kg particulates / year	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)
TRANSPORT SAFETY	(7) Variation on monetary value of accidents, mln. € / year	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)
F INVESTMENT COST						
INVESTMENT COST	(8) Total project costs, mln. €	N/a	N/a	N/a	N/a	N/a
GENERAL TRANSPORT RELEVANCE						
TOTAL TRAFFIC VOLUME ON THE PROJECT	(10) Total passenger traffic on the project section, mln. passengers / year	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)	- -
	(11a) Maximum freight traffic on the project section, mln. ton / year	404.7 (404.7)	321.9 (321.9)	69.8 (69.8)	53.0 (53)	404.7 (404.7)
	(11b) Average freight traffic on the project section, mln. ton / year	404.7 (404.7)	321.9 (321.9)	69.8 (69.8)	53.0 (53)	- -
	(11c) Total freight traffic on the project section, mln. ton km /year	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)
INTERMODALITY	(12) Quantitative appraisal of the project's contribution for an intermodal transport system, mln. ton	1.1 (1.1)	11.1 (11.1)	0.1 (0.1)	7.3 (7.3)	19.6 (19.6)

Objective	Indicator	P21.1	P21.2	P21.3	P21.4	P21 Total
CREATION OF EUROPEAN VALUE ADDED						
DEVELOPMENT OF INTERNATIONAL PASSENGER TRAFFIC	(13) Share of international passenger traffic on total traffic on the project, %	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)
	(14) Volume of international passenger traffic on the project, mln. passengers / year	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)	- -
DEVELOPMENT OF INTERNATIONAL FREIGHT TRAFFIC	(15) Share of international freight traffic on total traffic on the project, %	100.0 (100)	100.0 (100)	100.0 (100)	100.0 (100)	- -
	(16) Volume of international freight traffic on the project, mln. tons / year	404.7 (404.7)	321.9 (321.9)	69.8 (69.8)	53.0 (53)	- -
INTEROPERABILITY	(17) Reduction of passengers waiting time at borders for international traffic	N/a	N/a	N/a	N/a	-
	(18) Reduction of freight waiting time at borders for international traffic	N/a	N/a	N/a	N/a	-
	(19) Length of networks becoming interoperable because of the project	N/a	N/a	N/a	N/a	-
IMPROVEMENT OF ACCESSIBILITY						
PASSENGER ACCESSIBILITY	(20) Variation of the STAC centrality index for passenger transport, %	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)
FREIGHT ACCESSIBILITY	(21) Variation of the STAC centrality index for freight transport, %	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)
PERIPHERAL ACCESSIBILITY	(22) Variation of the STAC centrality index for passenger transport in regions identified as peripheral, %	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)
	(23) Variation of the STAC centrality index for freight transport in regions identified as peripheral, %	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)
ENVIRONMENTAL SUSTAINABILITY						
MODAL REBALANCING	(24) Volume of road freight traffic shifted to rail, IWW or sea transport, mln. t·km / year	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)
	(25) Volume of road and air passenger traffic shifted to rail, mln. passenger·km / year	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)
LEVEL OF CONCERN :TRAFFIC TRANSFER	(26) Transfer of traffic from infrastructure lying in sensitive zones to the projected infrastructure, % of road traffic transferred from sensitive areas	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)	- -
LEVEL OF CONCERN: DISTANCE	(27) Percentage of the length of the project lying in a sensitive area, % length	N/a	N/a	N/a	N/a	-
LEVEL OF CONCERN: EMISSIONS	(28a) Changes of inhabitants' level of concern caused by emissions of NOx, % NOx	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)	- -
	(28b) Changes of inhabitants' level of concern caused by emissions of particulates, % particulates	N/a (N/a)	N/a (N/a)	N/a (N/a)	N/a (N/a)	- -
LEVEL OF CONCERN: PROXIMITY	(29) Synthetic appreciation of the proximity of the project from specially protected areas (SPAs) or densely populated areas. Proximity of the project from SPA, km	0.0%	0.0%	0.0%	0.0%	-
MATURITY AND COHERENCE OF THE PROJECT						
DEVELOPMENT OF THE PROJECT	(30) Appraisal of the project planning status	0	0	0	0	-
INSTITUTIONAL SOUNDNESS	(31) Qualitative appraisal of the project's compliance with national plans	3	3	3	3	-
COHERENCE OF THE PROJECT	(32) Qualitative appraisal of the project's coherence with main international traffic corridors	N/a	N/a	N/a	N/a	-

Comments on the main results

Impact on freight volumes and modal shift

- Total transport volumes are very high on the motorways of the sea project. They vary between 405 mln ton (P21.1) and 53 mln ton (P21.4) for the various subprojects. Furthermore the share of international freight transport is almost 100%;
- The project will result in an increase in the transported sea motorways tonnage in the priority project of 19.6 mln tonnes at the expense of (primarily) direct road freight transport;
- Also a corresponding shift of a similar size to short sea related pre- and endhaulage can be observed.

Impact on infrastructure network use

The detailed analysis carried out by the consortium has revealed the following impacts on infrastructure use:

- It is expected a decrease of the long-distance traffic flows on the road routes corresponding to the 4 sea motorways projects and an increase of the road traffic flows for the hinterland of the ports. However, the global benefit is positive as the road transport performance is decreasing.

6.18 P22 RAILWAY LINE ATHENIA-SOFIA-BUDAPEST-WIEN-PRAHA-NÜRNBERG/DRESDEN

6.18.1 Description of the priority project

Priority Project	Priority Project name	Sub-sections		Sections	Sub-section start date	Sub-section end date
P22	Railway line Athina-Sofia-Budapest-Wien-Praha-Nürnberg/Dresden	P22.1	Railway line Greek/Bulgarian border-Kulata-Sofia-Vidin/Calafat	P22 BG Kulata – Vidin/Calafat	2010	2015
		P22.2	Railway line Curtici-Brasov (towards Bucuresti and Constanta)	P22 RO Curtici - Brazov	2005	2010
		P22.3	Railway line Budapest-Wien, cross-border section	P22 A Budapest – Sopron – Wien	2004	2010
				P22 HU Budapest – Sopron – Wien	2004	2010
		P22.4	Railway line Brno-Praha-Nürnberg, with NürnbergPraha as cross-border section.	P22 CZ Brno-Praha-Czech Border	2003	2015
				P22 D CZ Border Schirnding – Marktredwitz – Nurnberg	2012	2015

The priority project consist of the upgrading of existing railway lines and partly the construction of new railway lines along a major railway axis from the Black-sea ports and the ports of Athens and Thessaloniki to Central Europe. The railway line is a mixed passenger/ freight line. The Eastern part has two branches; one in the direction of Romania and one in the direction of Greece.

The aim is to increase capacity, reduce journey times and transport costs. On a more strategic level the railway line furthers regional and port development by providing improved hinterland connections for the ports in Romania and Greece. The railway line will form one of the backbones of the rail network of Eastern Europe.

Table 6.35 *Project fiche P22*

Project	Description			
P22 Railway line Athina – Sofia – Budapest – Wien – Praha – Nürnberg/ Dresden	The project is the backbone of the railway network of Eastern Europe, connecting the ports of Athens, Thessaloniki and Constanta to the enlarged Union. The selected sections will complete an axis on which future Member States have already invested through the ISPA programme and will achieve thus a connectivity of networks on the basis of common standards (TER and ERMTS, double track, electrified, with maximum speed from 160 to 200 km/ h). This line will foster traffic and trade within a big part of Europe. It will also provide the Greek network with an important hinterland.			
Sections of the Project	Objectives	Description	Start date	End date
P22.1 Railway line Greek/ Bulgarian border – Kulata – Sofia – Vidin/ Calafat	This project is part of Pan-European Transport Corridors and it provides the land railway connection of Greece with the EU Member States of Central and Western Europe. From year 2007, the railway line will connect 4 Member States: Greece, Bulgaria, Romania and Hungary. Besides, the construction of the Danube Bridge at Vidin/ Calafat, which will be completed in year 2007, will eliminate the main bottleneck along the corridor and together with the modernisation of the railway line, will create conditions for uninterrupted rail transport between Greece, Bulgaria, Romania and Hungary and Western Europe. There will be also a reduction of waiting time at the border crossing.	The project includes construction of new double track and reconstruction of existing single-track section for speed up to 160 km/h along the Vidin – Sofia – Kulata railway line. The approximate total length is expected to be 420 km (now 480 km). In particular the upgrade of existing single-track sections is needed for 130 km, the upgrade for tunnels is needed for 5 km and for bridges for other 5 km. The construction of new double track sections is needed for 250 km, 25 km of tunnels and 5 km of bridges. All the design and construction works will be in full compliance with Directive 2001/16/EC on the interoperability of trans-European conventional rail system and Directive 96/48/EC on the interoperability of the trans European high-speed rail system. In particular the design and interoperability standards will be TER and ERMTS.	2010	2020
P22.2 Railway line Curtici – Brasov (towards Bucuresti and Constanta)	The objectives of this project are mainly the increase in traffic safety and the reduction in the travel duration that will be of 78 minutes in passengers' traffic and of 120 minutes in freight traffic.	The line will be rehabilitated on its total length of 481 km and it is located in the centre of Romania, in the Transylvania region. This project involves 2 tunnels with a total length of 1448 m. The expected capacity is 148 trains/ day. The design and interoperability standards will be in compliance with EU and UN/ECE standards. In particular they will be AGTC and AGC parameters for railways.	2005	2010
P22.3 Railway line Budapest – Wien, cross-border section	The objective of this section is mainly to contribute to face the high international traffic and its high potential for future increase. Besides, the time at the border will be reduced of several minutes.	The project includes a section of 67 km to be upgraded between Hegyeshalom and Budapest (completion of works already achieved in 1997) and a section of 70 km between Wien – Wampersdorf – Hungarian/ Austrian border (Sopron). It will be added the 2nd track between Wien and Sopron. Design and interoperability standards will be compliant with EU and UN/ECE standards.	2004	2010

P22.4 Railway line Brno – Praha – Nürnberg, with Nürnberg – Praha as cross-border section.	The main objective of the project is to contribute to the improvement of accessibility and transport safety along the corridor.	The project involves the electrification of the line Nurnberg – Marktredwitz – border D/ CZ together with the line Marktredwitz – Reichenbach. There are numerous tunnels involved between Hersbruck and Pegnitz. The expected capacity between Nurnberg – Marktredwitz – Hof is 145 trains per day and direction. The Nurnberg – Marktredwitz line will be 2 tracks and the Marktredwitz – border D/ CZ line will be 1 track. Design and interoperability standards will be compliant with EU and UN/ECE standards.	Not scheduled	Not scheduled

Impact on the level of traffic flows

The impact at the level of traffic flows is identified at infrastructure level as follows:

- Rail passenger flows P22, total interregional,
- Rail passenger flows P22, international,
- Rail freight flows P22, total interregional.
- Rail freight flows P22, international.

The impact at the level of traffic flows is illustrated by the figures hereunder.

Figure 6.69 *Rail passenger flows P22, total interregional*

Figure 6.70 *Rail passenger flows P22, international*

Figure 6.71 *Rail freight flows P22, total interregional*

Figure 6.72 *Rail freight flows P22, international*

6.18.3 Estimated aggregated impacts of the priority project

In the following table, the impact variables for the all projects scenario are presented for all sub-sections of the priority project. Between brackets, the values of the individual project scenarios are given. The methodology of the impact variables is described in D6, Chapter 3.6.

Table 6.36 *Impact variables P22: Railway line Athina-Sofia-Budapest-Wien-Praha-Nürnberg/Dresden*

Objective	Indicator	P22.1	P22.2	P22.3	P22.4	P22 Total
ECONOMIC IMPACTS IN THE TRANSPORT SECTOR						
IMPROVEMENT OF ROAD LEVEL SERVICE	(1) Changes in time costs caused by road congestion, mln. € / year	-10.3 (-2.1)	-1.4 (-0.6)	-1.0 (-1.1)	-4.2 (-1.6)	-16.9 (-5.4)
REDUCTION OF TRAVEL TIME	(2a) Changes in monetary value of the reduction of passenger travel time, mln. € / year	-42.6 (-40)	-101.1 (-94.4)	-12.7 (-14.3)	-45.3 (-50.6)	-201.7 (-199.2)
	(2b) Changes in passenger travel time, mln hour / year	-7.8 (-7.8)	-18.8 (-18.5)	-1.2 (-1.4)	-4.6 (-5.3)	-32.5 (-33)
	(3) Changes in monetary value of the reduction of freight travel time, mln. € / year	-11.2 (-11.1)	-14.8 (-14.8)	-1.4 (-2.7)	-8.4 (-11.8)	-35.8 (-40.3)
ENVIRONMENTAL SUSTAINABILITY						
GLOBAL WARMING	(4a) Change (in monetary value) of the transport contribution to global warming, mln. € / year	0.157 (-3.43)	-3.082 (-3.208)	-0.138 (-0.159)	-4.763 (-2.929)	-7.826 (-9.726)
	(4b) Change of the transport contribution to global warming, 1000 kg CO2 / year	6669 (-145945)	-131139 (-136519)	-5853 (-6749)	-202702 (-124622)	-333025 (-413835)
ATMOSPHERIC POLLUTION	(5a) Change (in monetary value) of the NOX transport emission, mln. € / year	-0.866 (-0.262)	0.076 (0.683)	0.234 (0.36)	-0.530 (0.041)	-1.086 (0.822)
	(5b) Change of the NOX transport emission, 1000 kg NOx / year	-94 (-72)	253 (626)	128 (194)	-20 (78)	267 (826)
	(6a) Change (in monetary value) of particulates' emissions of transport, mln. € / year	0.011 (-0.001)	0.090 (0.172)	0.080 (0.09)	0.028 (0.1)	0.209 (0.361)
	(6b) Change of particulates' emissions of transport, 1000 kg particulates / year	3 (1)	20 (38)	9 (11)	6 (10)	38 (59)
TRANSPORT SAFETY	(7) Variation on monetary value of accidents, mln. € / year	-14.2 (-5.4)	-6.6 (-8.8)	-8.9 (-2.4)	-38.4 (-10.7)	-68.1 (-27.3)
INVESTMENT COST						
INVESTMENT COST	(8) Total project costs, mln. €	2400	1455	1510	510	5875
GENERAL TRANSPORT RELEVANCE						
TOTAL TRAFFIC VOLUME ON THE PROJECT	(10) Total passenger traffic on the project section, mln. passengers / year	1.5 (1.4)	4.1 (4)	1.2 (1.3)	2.5 (2.9)	- -
	(11a) Maximum freight traffic on the project section, mln. ton / year	9.7 (10.3)	27.4 (27.5)	16.0 (18.4)	41.9 (40.5)	41.9 (40.5)
	(11b) Average freight traffic on the project section, mln. ton / year	5.2 (5.5)	15.6 (15.8)	0.6 (0.9)	12.3 (12.6)	- -
	(11c) Total freight traffic on the project section, mln. ton km /year	2255 (2363)	7293 (7420)	173 (258)	7503 (7663)	17224 (17704)
INTERMODALITY	(12) Quantitative appraisal of the project's contribution for an intermodal transport system, mln. ton	2.6 (3.5)	3.1 (3.3)	1.2 (0.5)	2.1 (1.6)	9.0 (8.9)
CREATION OF EUROPEAN VALUE ADDED						
DEVELOPMENT OF INTERNATIONAL PASSENGER TRAFFIC	(13) Share of international passenger traffic on total traffic on the project, %	18.3 (17.3)	36.3 (34.7)	22.6 (33.3)	31.1 (28.4)	- -
	(14) Volume of international passenger traffic on the project, mln. passengers / year	0.3 (0.2)	1.5 (1.4)	0.3 (0.4)	0.8 (0.8)	- -
DEVELOPMENT OF INTERNATIONAL FREIGHT TRAFFIC	(15) Share of international freight traffic on total traffic on the project, %	38.8 (37.9)	60.5 (60.7)	54.4 (70.7)	71.7 (71.9)	- -
	(16) Volume of international freight traffic on the project, mln. tons / year	2.0 (2.1)	9.4 (9.6)	0.3 (0.6)	8.8 (9)	- -
INTEROPERABILITY	(17) Reduction of passengers waiting time at borders for international traffic	N/a	N/a	N/a	N/a	-
	(18) Reduction of freight waiting time at borders for international traffic	N/a	N/a	N/a	N/a	-
	(19) Length of networks becoming interoperable because of the project	N/a	N/a	N/a	N/a	-
IMPROVEMENT OF ACCESSIBILITY						
PASSENGER ACCESSIBILITY	(20) Variation of the STAC centrality index for passenger transport, %	0.01 (0)	0.03 (0.02)	0.00 (0)	0.14 (0.03)	- -
FREIGHT ACCESSIBILITY	(21) Variation of the STAC centrality index for freight transport, %	0.00 (0.04)	0.04 (0.07)	0.00 (0.04)	0.01 (0.04)	- -

Objective	Indicator	P22.1	P22.2	P22.3	P22.4	P22 Total
PERIPHERAL ACCESSIBILITY	(22) Variation of the STAC centrality index for passenger transport in regions identified as peripheral, %	0.01 (0.02)	0.03 (0.05)	0.00 (0)	0.03 (0.02)	- -
	(23) Variation of the STAC centrality index for freight transport in regions identified as peripheral, %	0.00 (0)	0.02 (0)	0.00 (0)	0.00 (0)	- -
ENVIRONMENTAL SUSTAINABILITY						
MODAL REBALANCING	(24) Volume of road freight traffic shifted to rail, IWW or sea transport, mln. t·km / year	657 (2053)	2108 (2322)	828 (265)	2659 (1757)	6252 (6397)
	(25) Volume of road and air passenger traffic shifted to rail, mln. passenger·km / year	-9 (141)	362 (633)	-49 (124)	623 (233)	928 (1131)
LEVEL OF CONCERN :TRAFFIC TRANSFER	(26) Transfer of traffic from infrastructure lying in sensitive zones to the projected infrastructure, % of road traffic transferred from sensitive areas	6.0% (-1,4%)	1.5% (-0,7%)	4.8% (-0,1%)	16.1% (-0,4%)	- -
LEVEL OF CONCERN: DISTANCE	(27) Percentage of the length of the project lying in a sensitive area, % length	9.0%	0.0%	37.0%	27.0%	-
LEVEL OF CONCERN: EMISSIONS	(28a) Changes of inhabitants' level of concern caused by emissions of NOx, % NOx	-0.8% (-1,5%)	-2.2% (-2,4%)	0.1% (-0,2%)	-1.6% (-0,5%)	- -
	(28b) Changes of inhabitants' level of concern caused by emissions of particulates, % particulates	-0.7% (-1,7%)	-2.5% (-2,6%)	-0.1% (-0,1%)	-2.1% (-0,5%)	- -
LEVEL OF CONCERN: PROXIMITY	(29) Synthetic appreciation of the proximity of the project from specially protected areas (SPAs) or densely populated areas. Proximity of the project from SPA, km	38.0%	0.0%	6.0%	7.0%	-
MATURITY AND COHERENCE OF THE PROJECT						
DEVELOPMENT OF THE PROJECT	(30) Appraisal of the project planning status	0	1	1	1	-
INSTITUTIONAL SOUNDNESS	(31) Qualitative appraisal of the project's compliance with national plans	2	2	5	4	-
COHERENCE OF THE PROJECT	(32) Qualitative appraisal of the project's coherence with main international traffic corridors	2	2	2	2	-

Comments on the main results

Impact on passenger volumes and modal shift

- Passenger transport volumes vary on average between 1.2 mln passenger for P22.3 (Railway line Budapest – Wien, cross-border section) and 4.1 mln for P22.2 (Railway line Curtici – Brasov, towards Bucuresti and Constanta).
- The priority project is forecasted to result in a decrease of road passenger transport performance with 928 mln pkm per year.

Impact on freight volumes and modal shift

- The total interregional volumes amount are between 0.6-15.6 mln ton. The share of international transport in total transport is 40-70%;
- The priority project will result in an increase in the transported rail freight tonnage in the priority project of 9.0 mln ton at the expense of (primarily) road freight transport;
- Total transport shift to rail freight of the P22 scenario is 6.3 bill. ton-km.

Impact on infrastructure network use

The detailed analysis carried out by the consortium has revealed the following impacts on infrastructure use:

- The growth of rail passenger traffic flows can be observed all along the priority project, in particular on the border crossing sections between Romania and Hungary. Apart from the links on the priority project an increase in rail passenger flows can be expected for München – Nürnberg and Constanta – Bukuresti – Brasov.

- Road passenger flows are expected to decrease, particularly along Bucuresti/ Brasov – Sibiu – Arad – Szeged – Budapest.
- The freight traffic flows are growing also along the priority project, even up to the Baltics in the North and Western France, South Germany in Bavaria and to the Netherlands. However, rerouting effects are also observed.

Impact on environmental sustainability

- The change in emissions results in a marginal decrease (lower than 3%) of human health risks along the priority project.
- In three of the four sub-sections road traffic will be significantly transferred away from sensitive areas and the transfer varies from 3 till 18%.
- In three of the four sub-sections substantial parts (between 6% and 37%) of the priority project is located within potentially sensitive areas.

Impact on emissions

The overall impact on emission is quantified from the impact at the network level and the differences between the all project scenario and the reference 2 scenario are as follows:

- CO_2: net decrease with 333 thousand tonnes,
- NO_x: net increase with 0.3 thousand tonnes,
- Particulates: net increase with 0.04 thousand tonnes.

The relatively small increase of NO_x and particulates is explained by the further use of diesel locomotives, which show high emission rate.

Development of the project

- P22.1: Railway line Greek/Bulgarian border-Kulata-Sofia-Vidin/Calafat. The assigned score is 0, because the start of design studies is expected to be by the end of 2007 and the start of work in 2010. Some elements on funding have already been considered.
- P22.2: Railway line Curtici-Brasov (towards Bucuresti and Constanta). The score assigned is +1 because of the start of the design studies.
- P22.3: Railway line Budapest-Wien, cross-border section. It includes 2 sections; both of them are at the same level of development +1, because the design studies are ongoing.
- P22.4: Railway line Brno – Praha – Nürnberg, with Nürnberg - Praha as cross-border section. It includes 2 sections; both of them are at the same level of development +1, because the design studies are ongoing.

6.19 P23 RAILWAY LINE GDANSK WARSZAWA-BRNO/BRATISLAVA-WIEN

6.19.1 Description of the priority project

Priority Project	Priority Project name	Sub-sections		Sections	Sub-section start date	Sub-section end date
P23	Railway line Gdansk-Warszawa-Brno/Bratislava-Wien	P23.1	Railway line Gdansk-Warszawa-Katowice	P23 PL Gdansk–Warszawa–Katowice	2005	2015
		P23.2	Railway line Katowice-Brno-Breclav	P23 PL Katowice–Brno-Breclav	2004	2010
				P23 CZ Katowice–Brno-Breclav	2002	2010
		P23.3	Railway line Katowice-Zilina-Nove Misto n.V.	P23 SK Katowice-Zilina-Nove Mesto n.V	2005	2010
				P23 PL Katowice-Zilina-Nove Mesto n.V	2005	2010

The rail corridor trajectory Wien-Bratislava is part of the P17 priority project. The projects involve the upgrading of this North-South railway line which is currently saturated because it already transports significant freight- and passenger volumes.

The main objective is to increase capacity, reduce journey times (by higher speeds) and the cost of transport. The projects aim also, on a more strategic level, to attract new economic activities along the entire trajectory. It is expected that this railway line may prevent the further decline of rail market shares in Poland.

Table 6.37 *Project fiche P23*

Project	Description			
P23 Railway line Gdansk – Warszawa – Brno/ Bratislava – Wien	The modernisation of this rail line will allow faster journeys for both passengers and freight transport services. The development of attractive rail service from the Baltic Sea along a North - South axis constitutes a unique opportunity for providing an alternative to the existing saturated North - South axes from the North Sea. The project's route has a particular interest from a European point of view since it carries a high share of international transport (48 million tonnes of international traffic in transit 2000). Besides, the project contributes to a wider strategy to attract new economic activities along the axis, and to promote a modal shift on long distance traffic, while serving the mobility needs of regional passengers.			
Sections of the Project	Objectives	Description	Start date	End date
P23.1 Railway line Gdansk – Warszawa – Katowice	Objective of this project is the contribution to the improvement of the transportation accessibility for the population, which facilitates the access to the job market, schools, universities and services concentrated in the significant settlement centres. The project will contribute as	The line included in this project is 722 km long. It runs from Gdynia/ Gdansk via Warszawa, Zawiercie, Katowice, Zebrzydowice to the border crossing at the Czech frontier. This line should be upgraded to AGC/AGTC standards and according to UE requirements concerning the Technical Specification for Interoperability. It is expected that in 2020 year the number of passengers-km will increase by 26,5% and reach the level of near 7.5 million passengers and in the international traffic the number of pkm, will increase by 12,2%,	2005	2020

	well to the modernisation of the rail line, allowing faster journeys for both passengers and freight transport services.	reaching the level of 0:9 millions passengers-km. Currently the line is double track line, electrified 3000 V DC and it is used for mixed traffic, including combined transport on the section Gdynia – Warszawa. The section Warszawa – Zawiercie – Katowice is utilised for passenger traffic basically. From Katowice to the Southern frontier the freight traffic is predominant.		
P23.2 Railway line Katowice – Brno – Breclav	The project will contribute to the modernisation of the rail line, allowing faster journeys for both passengers and freight transport services and it will contribute to the development of regions along transport corridors, connection to TEN-T and centres, advance of the ecology transport, proportional economic and tourism development.	The project includes 2 sections to be upgraded. The section between Lichkov and Usti/O and the section Cesk Trebova – Prerov. The length is 277 km in total. The expected capacity is 160 trains/ day. The design and interoperability standards have to be set up according to UE standards. In the section between Lichkov and Usti/O the rail will have a 2/1 track line to 160 km/h, while currently the entire line is 2/1 to 70 - 120 km/h. The intervention is scheduled in the Framework of Transport Network Development in Czech Republic to 2010.	2004	2010
P23.3 Railway line Katowice – Zilina – Nove Misto n.V.	The project will contribute to the modernisation of this rail line allowing faster journeys for both passengers and freight transport services. Through the interoperability there will be a considerable savings in waiting time at the border.	The project is an upgrade of 180 km between Poland and Slovak Republic. The 2 main sections are Nove Mesto nad Vahom – Zilina and Zilina – Cadca. It involves the following tunnels: Tunnel Nove Mesto n/V – Trencianske Bohuslavice 1775 m; Tunnels Puchov – Povazska Bystrica 1080 m and 1280 m; Tunnel Krasno – Cadca 4725 m. The expected capacity between Nove Mesto n/V – Zilina is 230 trains per 24 hours on the planned double track. The design and interoperability will respect EU and UN/ECE standards and will be in accordance with AGC, AGTC agreement. The existing facilities are a track of 25 kV/50 Hz Nove Mesto - Puchov and a track of 3 kV/50 Hz between Puchov – Zilina and Cadca. All the interventions are scheduled in National Plans and the completion of works is expected to be within 2010.	2004	2010

6.19.2 Impact on the level of traffic flows

The impact at the level of traffic flows is identified at infrastructure level as follows:

- Rail passenger flows P23, total interregional,
- Rail passenger flows P23, international,
- Rail freight flows P23, total interregional,
- Rail freight flows P23, international.

The impact at the level of traffic flows is illustrated by the figures hereunder.

Figure 6.73 *Rail passenger flows P23, total interregional*

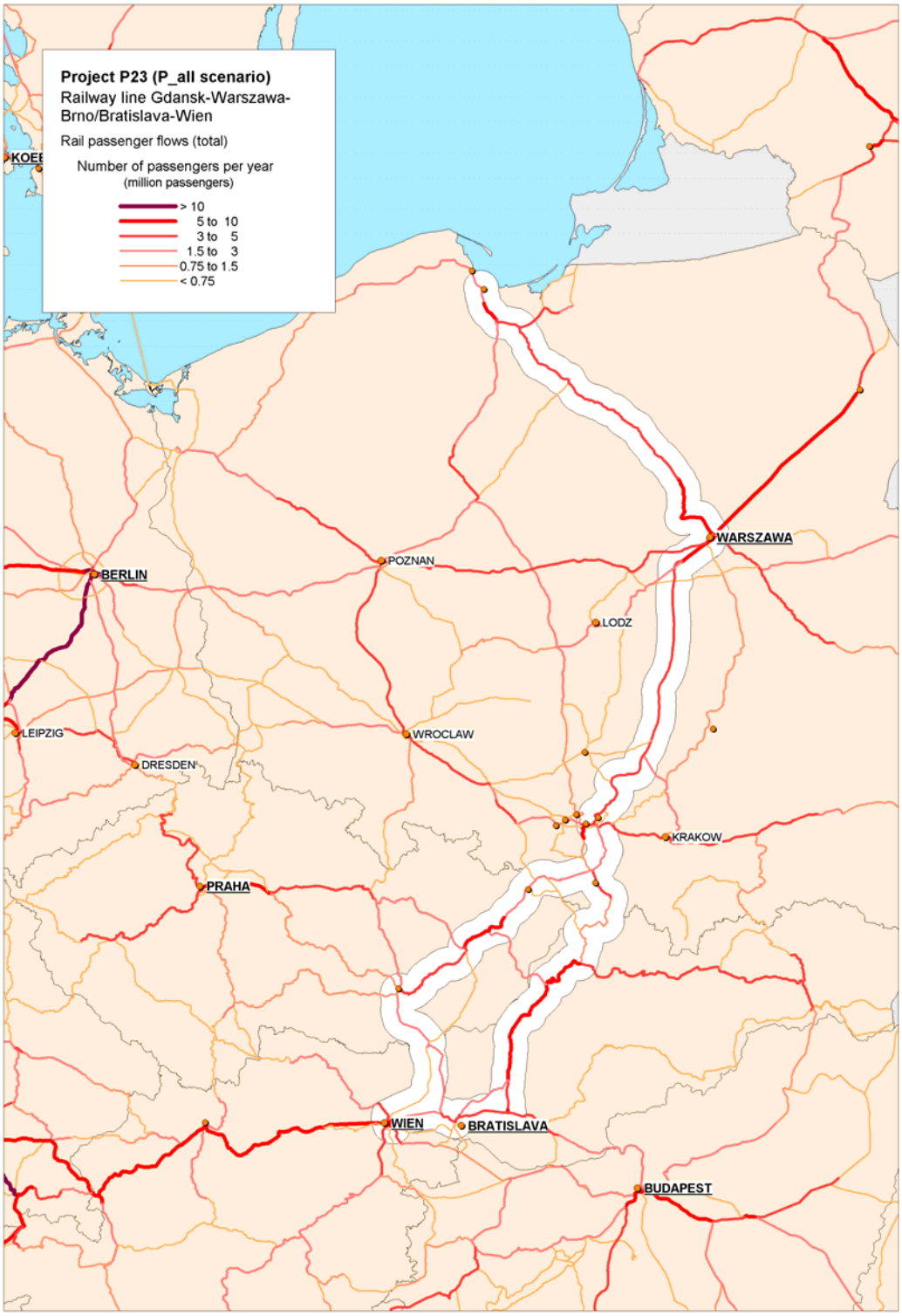


Figure 6.74 *Rail passenger flows P23, international*

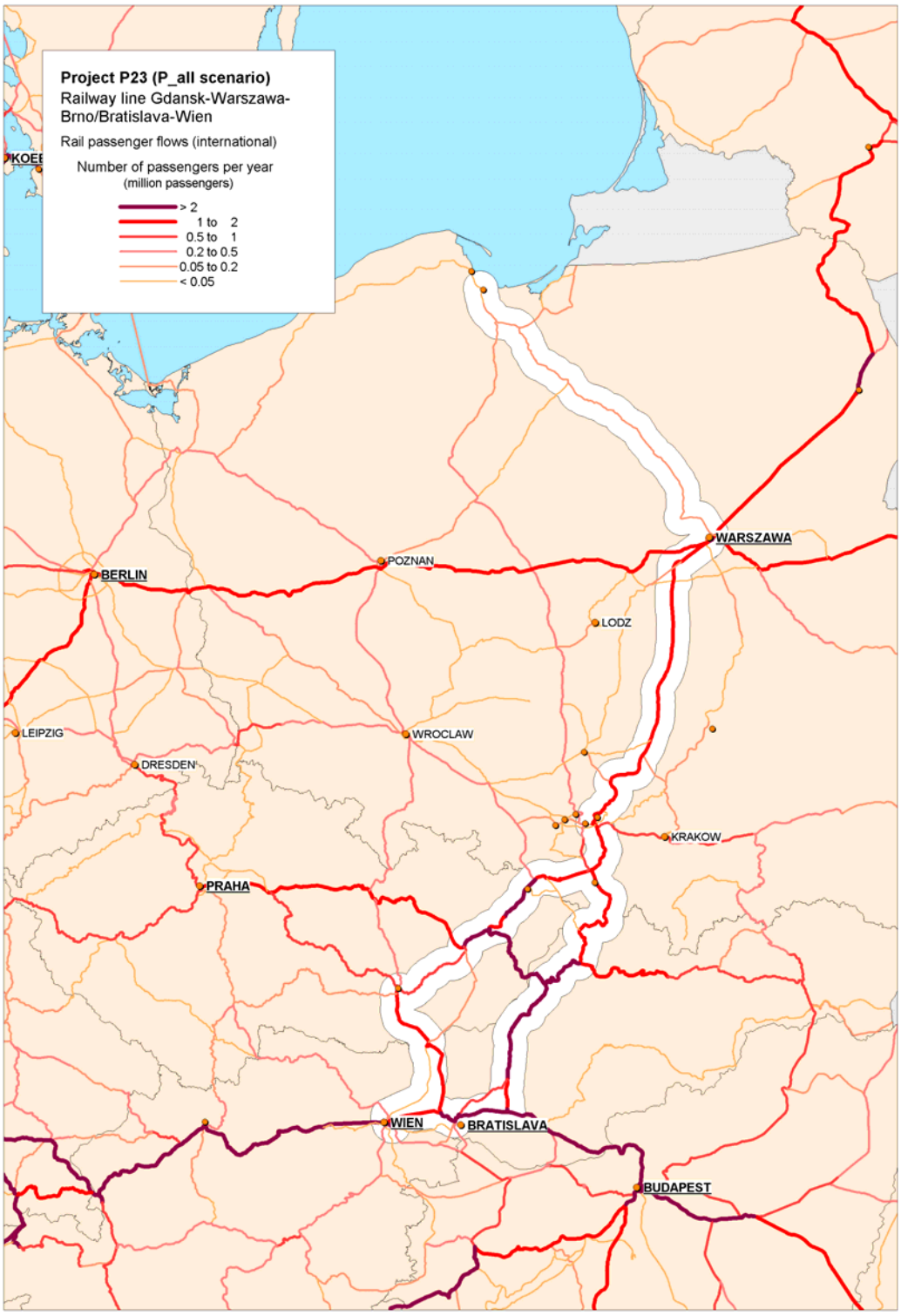


Figure 6.75 *Rail freight flows P23, total interregional*

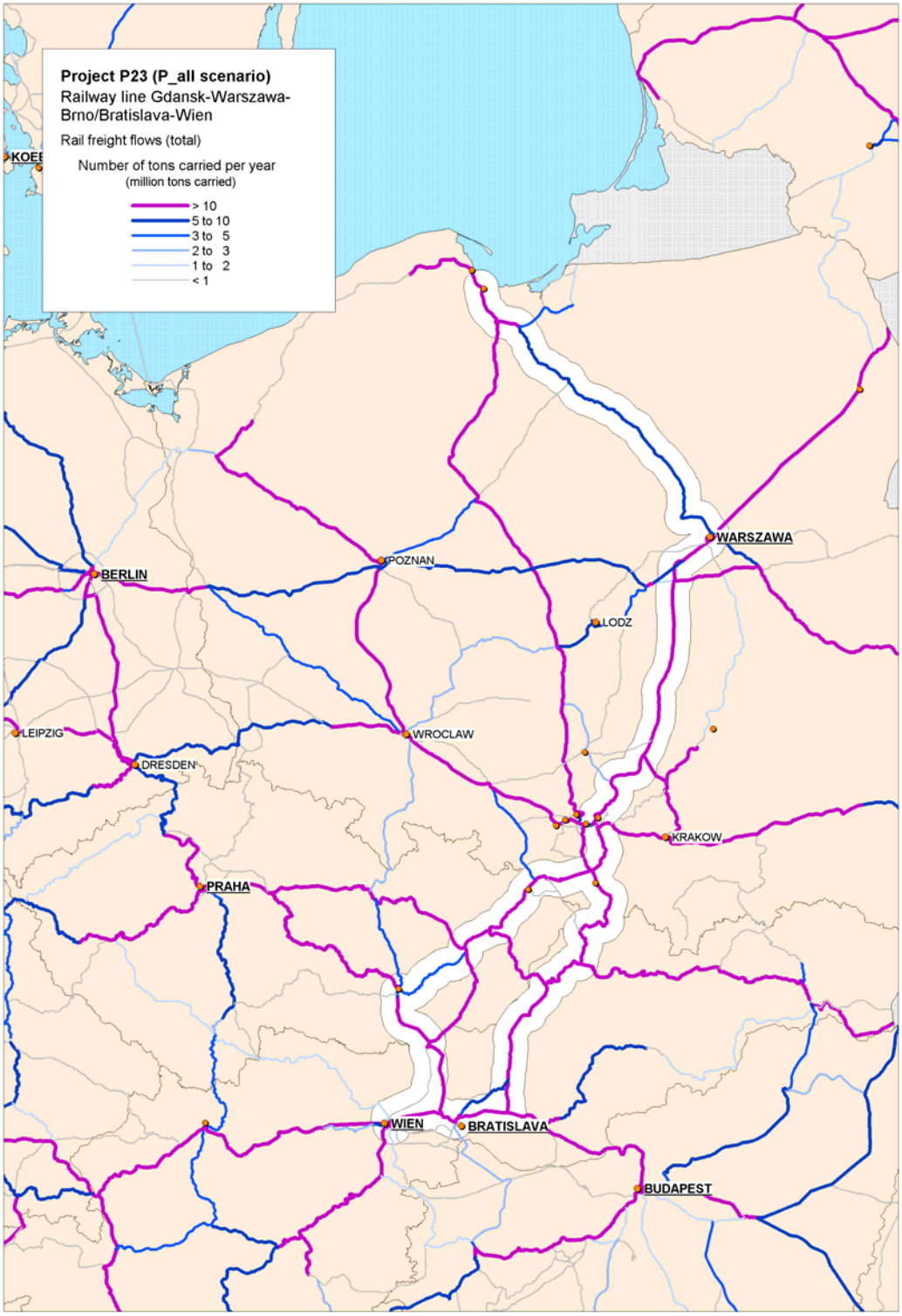
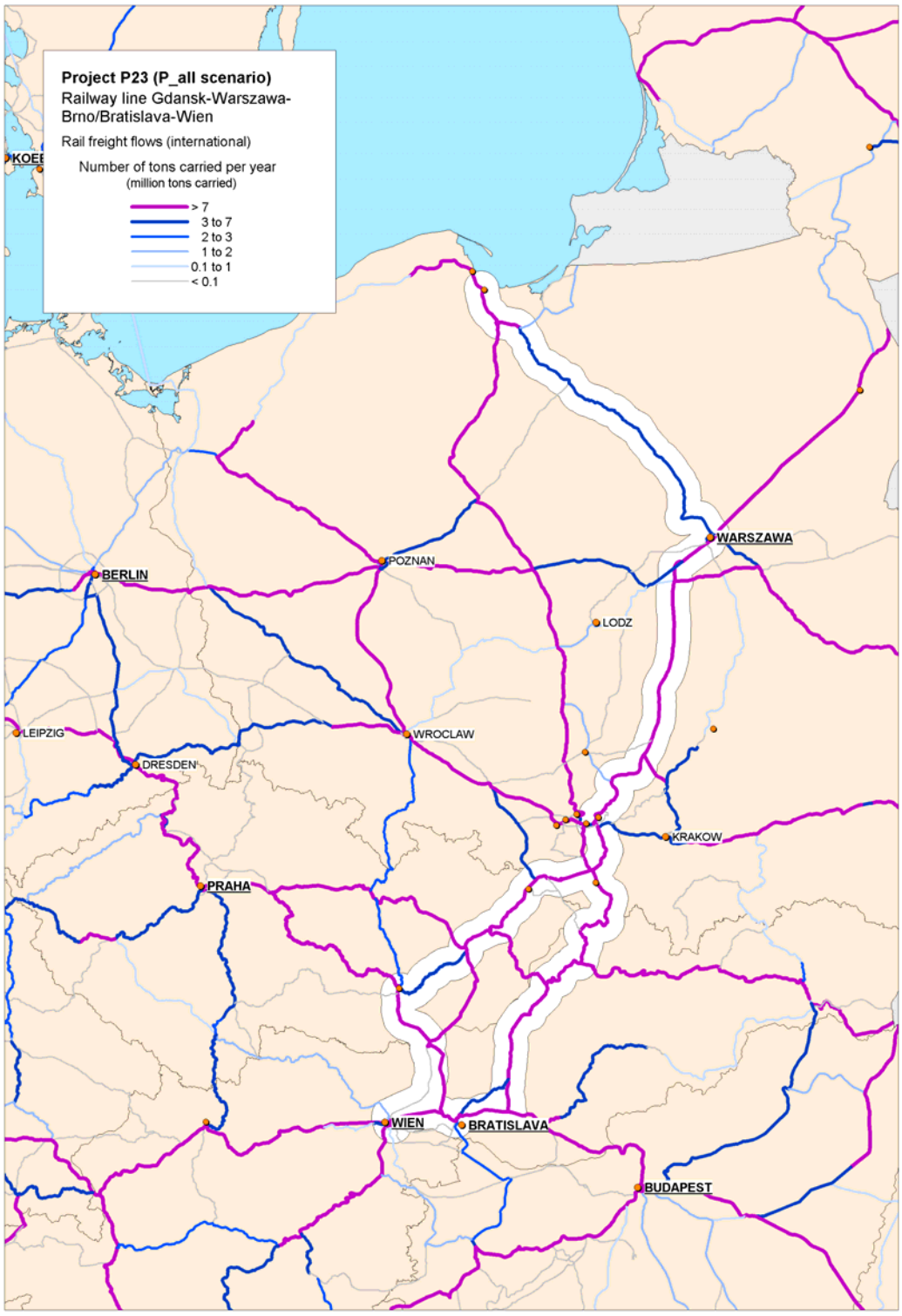


Figure 6.76 *Rail freight flows P23, international*



6.19.3 Estimated aggregated impacts of the priority project

In the following table, the impact variables for the all projects scenario are presented for all sub-sections of the priority project. Between brackets, the values of the individual project scenarios are given. The methodology of the impact variables is described in D6, Chapter 3.6.

Table 6.38 *Impact variables P23: Railway line Gdansk-Warszawa-Brno/Bratislava-Wien*

Objective	Indicator	P23.1	P23.2	P23.3	P23 Total
ECONOMIC IMPACTS IN THE TRANSPORT SECTOR					
IMPROVEMENT OF ROAD LEVEL SERVICE	(1) Changes in time costs caused by road congestion, mln. € / year	-1.6 (-1.5)	-5.6 (-1.8)	-1.8 (-1.8)	-9.0 (-5.1)
REDUCTION OF TRAVEL TIME	(2a) Changes in monetary value of the reduction of passenger travel time, mln. € / year	-1.4 (-2.1)	-18.8 (-18.3)	-25.1 (-23.4)	-45.3 (-43.8)
	(2b) Changes in passenger travel time, mln hour / year	-0.2 (-0.3)	-1.9 (-2)	-2.8 (-2.7)	-4.8 (-4.9)
	(3) Changes in monetary value of the reduction of freight travel time, mln. € / year	-1.6 (-2.1)	-10.3 (-11.5)	-9.4 (-10.7)	-21.4 (-24.3)
ENVIRONMENTAL SUSTAINABILITY					
GLOBAL WARMING	(4a) Change (in monetary value) of the transport contribution to global warming, mln. € / year	2.443 (-15.87)	1.291 (-6.598)	-0.110 (-11.701)	3.624 (-34.169)
	(4b) Change of the transport contribution to global warming, 1000 kg CO2 / year	103939 (-675328)	54929 (-280773)	-4683 (-497932)	154185 (-1454033)
ATMOSPHERIC POLLUTION	(5a) Change (in monetary value) of the NOX transport emission, mln. € / year	-0.261 (-2.124)	0.328 (3.36)	0.454 (0.689)	0.521 (1.925)
	(5b) Change of the NOX transport emission, 1000 kg NOx / year	49 (-619)	268 (1977)	301 (709)	618 (2067)
	(6a) Change (in monetary value) of particulates' emissions of transport, mln. € / year	0.042 (0.174)	0.145 (0.443)	0.157 (0.326)	0.344 (0.943)
	(6b) Change of particulates' emissions of transport, 1000 kg particulates / year	8 (28)	19 (66)	21 (49)	48 (143)
TRANSPORT SAFETY	(7) Variation on monetary value of accidents, mln. € / year	-84.9 (-73)	-69.0 (-38.4)	-38.9 (-58.2)	-192.7 (-169.6)
INVESTMENT COST					
INVESTMENT COST	(8) Total project costs, mln. €	2351	1531	821	4703
GENERAL TRANSPORT RELEVANCE					
TOTAL TRAFFIC VOLUME ON THE PROJECT	(10) Total passenger traffic on the project section, mln. passengers / year	4.3 (4.2)	3.2 (3.2)	3.6 (3.3)	- -
	(11a) Maximum freight traffic on the project section, mln. ton / year	71.8 (71.5)	49.0 (49.8)	31.0 (31.9)	71.8 (71.5)
	(11b) Average freight traffic on the project section, mln. ton / year	20.8 (21.8)	26.3 (26.6)	23.6 (24)	- -
	(11c) Total freight traffic on the project section, mln. ton km /year	8520 (8929)	8610 (8694)	5171 (5251)	22300 (22873)
INTERMODALITY	(12) Quantitative appraisal of the project's contribution for an intermodal transport system, mln. ton	9.7 (20.6)	1.0 (7.8)	2.0 (8)	12.7 (36.4)
CREATION OF EUROPEAN VALUE ADDED					
DEVELOPMENT OF INTERNATIONAL PASSENGER TRAFFIC	(13) Share of international passenger traffic on total traffic on the project, %	7.0 (6.6)	48.9 (49.5)	56.1 (51.7)	- -
	(14) Volume of international passenger traffic on the project, mln. passengers / year	0.3 (0.3)	1.6 (1.6)	2.0 (1.7)	- -
DEVELOPMENT OF INTERNATIONAL FREIGHT TRAFFIC	(15) Share of international freight traffic on total traffic on the project, %	73.5 (71.1)	95.5 (94.6)	85.6 (85.8)	- -
	(16) Volume of international freight traffic on the project, mln. tons / year	15.3 (15.5)	25.1 (25.2)	20.2 (20.6)	- -
INTEROPERABILITY	(17) Reduction of passengers waiting time at borders for international traffic	N/a	N/a	N/a	-
	(18) Reduction of freight waiting time at borders for international traffic	Yes	Yes	N/a	-
	(19) Length of networks becoming interoperable because of the project	N/a	134 km	N/a	-

Objective	Indicator	P23.1	P23.2	P23.3	P23 Total
IMPROVEMENT OF ACCESSIBILITY					
PASSENGER ACCESSIBILITY	(20) Variation of the STAC centrality index for passenger transport, %	0.06 (0.07)	0.02 (0.02)	0.02 (0.03)	- -
FREIGHT ACCESSIBILITY	(21) Variation of the STAC centrality index for freight transport, %	0.11 (0.11)	0.04 (0.11)	0.02 (0.07)	- -
PERIPHERAL ACCESSIBILITY	(22) Variation of the STAC centrality index for passenger transport in regions identified as peripheral, %	0.07 (0.07)	0.01 (0.02)	0.02 (0.02)	- -
	(23) Variation of the STAC centrality index for freight transport in regions identified as peripheral, %	0.07 (0.06)	0.01 (0)	0.01 (0)	- -
ENVIRONMENTAL SUSTAINABILITY					
MODAL REBALANCING	(24) Volume of road freight traffic shifted to rail, IWW or sea transport, mln. t·km / year	3376 (11913)	1552 (5858)	1845 (9257)	6773 (27029)
	(25) Volume of road and air passenger traffic shifted to rail, mln. passenger·km / year	26 (275)	197 (184)	-78 (294)	144 (754)
LEVEL OF CONCERN :TRAFFIC TRANSFER	(26) Transfer of traffic from infrastructure lying in sensitive zones to the projected infrastructure, % of road traffic transferred from sensitive areas	75.4% (-7,2%)	29.4% (-2,3%)	2.2% (-3,6%)	- -
LEVEL OF CONCERN: DISTANCE	(27) Percentage of the length of the project lying in a sensitive area, % length	13.0%	8.0%	68.0%	-
LEVEL OF CONCERN: EMISSIONS	(28a) Changes of inhabitants' level of concern caused by emissions of NOx, % NOx	-1.7% (-3,8%)	0.3% (-2,7%)	0.1% (-3,5%)	- -
	(28b) Changes of inhabitants' level of concern caused by emissions of particulates, % particulates	-3.4% (-4,5%)	-0.4% (-3,2%)	-0.3% (-4,2%)	- -
LEVEL OF CONCERN: PROXIMITY	(29) Synthetic appreciation of the proximity of the project from specially protected areas (SPAs) or densely populated areas. Proximity of the project from SPA, km	16.0%	26.0%	3.0%	-
MATURITY AND COHERENCE OF THE PROJECT					
DEVELOPMENT OF THE PROJECT	(30) Appraisal of the project planning status	1	1	1	-
INSTITUTIONAL SOUNDNESS	(31) Qualitative appraisal of the project's compliance with national plans	3	3	3	-
COHERENCE OF THE PROJECT	(32) Qualitative appraisal of the project's coherence with main international traffic corridors	2	2	2	-

Comments on the main results

Impact on passenger volumes and modal shift

- Passenger transport volumes vary on average between 3.2 mln passengers per year in case of P23.2 (Railway line Katowice – Brno – Breclav) and 4.3 mln passengers in case of P23.1 (Railway line Gdansk – Warszawa – Katowice).
- The priority project will result in decrease of road transport performance by 144 mln pkm.

Impact on freight volumes and modal shift

- Average rail interregional transport volumes vary between 20.8 mln and 26.3 mln ton on the various sub-sections of this priority project. About 75-95% is international freight transport;
- This group of sub-sections realises a modal shift of 12.7 mln tonnes per year in 2020. The shift is achieved mainly at the expense of road freight transport and to a small extent also on inland waterways.
- Total transport shift to rail freight of the P23 scenario is 6.8 bill ton-km.

Impact on infrastructure network use

The detailed analysis carried out by the consortium has revealed the following impacts on infrastructure use:

- The growth of passenger rail traffic flows are observed along the priority project and on fededing relations Warszawa – Lithuanian border, Gdansk/ Gdynia – Bialogard, Katowice – Kraków – Przeworsk and Bratislava – Budapest. up to the border with the Baltics in the North and up to Budapest in the South.
- The high growth of rail freight is observed from Budapest to Vilnius and up to the border with Russia in the North.
- A possible rerouting effect of the traffic flows to and from Russia could be one of the causes of the high volume increase on the priority project.

Impact on environmental sustainability

- The change in emissions results in small decreases and increases of human health risks along the sub-sections of the corridor.
- In the two Northern sub-sections road traffic will very significantly be transferred away from sensitive areas, whereas the impact in the last section is negligible
- In all sub-sections, parts are located within potentially sensitive areas; especially the Katowice - Zilina - Nove Mesto sub-section will to a large degree (68% of the project) be within such areas.

Impact on emissions

The overall impact on emission is quantified from the impact at the network level and the differences between the all project scenario and the reference 2 scenario are as follows:

- CO_2: net increase with 154 thousand tonnes,
- NO_x: net increase with 0.6 thousand tonnes,
- Particulates: slight increase with 48 tonnes.

The relatively small increase of CO_2, NO_x and particulates is explained by the further use of diesel locomotives, which show a high emission rate of these emissions.

Development of the project

- P23.1: Railway line Gdansk-Warszawa-Katowice. The score assigned is +1.
- P23.2: Railway line Katowice-Brno-Breclav. It includes 2 sections, one on the Polish side and the other one on the Czech side; both of them have the same development and the score is +1.
- P23.3: Railway line Katowice-Zilina-Nove Misto n.V. It includes 2 sections, one on the Polish side and the other one on the Slovak side; both of them have the same development and the score is +1.

6.20 P24 RAILWAY LINE LYON/GENOVA-BASEL-DUISBURG-ROTTERDAM/ ANTWERP

6.20.1 Description of the priority project

Priority Project	Priority Project name	Sub-sections		Sections	Sub-section start date	Sub-section end date
P24	Railway line Lyon/Genova-Basel-Duisburg-Rotterdam/Antwerpen	P24.1	Lyon-Dijon	P24 F Lyon – Dole (Dijon)	2010	2018
		P24.2	Genova-Milano/Novara-Swiss border	P24 I Genova – Milano - Gottardo	2005	2013
				P24 I Genova/Alessandria – Novara – Sempione	2003	2010
		P24.3	Basel-Karlsruhe	P24 D Basel - Karlsruhe	1987	2015
		P24.4	Frankfurt-Mannheim	P24 D Frankfurt–Mannheim	2006	2012
		P24.5	Duisburg-Emmerich & "Iron Rhine" Rheidt-Antwerpen	P24 D Duisburg–Emmerich	1997	2009
				P24 B "Iron Rhine" Rheidt–Antwerp	2004	2010
		P24.6	Dijon-Mulhouse-Mülheim	P24 F Dole (Dijon) – Mulhouse	2006	2010
				P24 D Mulhouse - Mülheim	2006	2015

These infrastructure improvements consist of the construction of new high-speed lines in France and Germany, the construction of a dedicated freight line from Antwerp to Belgium, linkages to another dedicated freight line (Betuwe line) and various railway line upgrades. In this priority project, also the Gotthard Tunnel is considered for freight (P24.7).

This priority project aims to attract vast flows of passengers (competing with road and air transport) and freight (competing with road). The aim is that these projects contribute towards establishing dedicated rail freight corridors from Benelux sea ports to Germany, Alpine regions and across the Alps to Mediterranean Ports

Table 6.39 *Project fiche P24*

Project	Description			
P24 Railway line Lyon/ Genova – Basel – Duisburg – Rotterdam/ Antwerpen	Developing a rail axis, from the North Sea to the Mediterranean will contribute to rebalance the modal split on one of the most populated and industrial area in Europe. While establishing a direct connection from the Iberian peninsula to Germany for passengers, the ultimate goal is the development of a rail freight corridor with dedicated rail freight lines. Works comprise the construction of the new high-speed lines in France (South and East branches of the "TGV Rhin – Rhône"), in Germany (between Karlsruhe and Basel and from the Frankfurt airport to Mannheim), upgrade of existing lines to enhance their freight capacity and the construction of a dedicated freight line (the "Iron-Rhine") from Antwerp to the German network.			
Sections of the Project	Objectives	Description	Start date	End date
P24.1 Lyon – Dijon	The objective of this section is to double the congested links which ensure the freight traffic	The section is a part of a transeuropean corridor North - South linking Benelux, la Sarre, UK, the Rhine Valley and the central	2013	2018

	from the North and the East of Europe to the Iberian Peninsula and the Mediterranean area. This section will ensure the continuity with the ongoing upgrades already planned in Spain and France. The project will contribute to reach the interoperability among the European rail networks and it will especially reduce the waiting times at the border between Germany and Switzerland.	Europe with the Mediterranean area (Italy and Iberian Peninsula) passing through Saône and Rhône Valley. The section will be a two tracks mixed traffic line (highs speed passengers trains and freight trains); the mixing traffic principle has to be validated yet. Overtaking tracks (5 km long) are foreseen each 30 km to allow high-speed trains to overtake the freight ones. Electrification will be 25 kV a.c. The expected capacity is 60 high-speed trains and 160 freight trains per day. New rail stations are planned between Louhans et Lons-le-Saunier and (to be decided) close to Dôle.		
P24.2 Genova – Milano/ Novara-Swiss border	The main objective of this project is the improvement of passengers' service between Genova and Milano and the improvement of the connection to/ from Genova and its port, eliminating existing bottlenecks.	The section is a part of a trans European corridor passing through the Gottardo tunnel. Particularly is a part of the link between Genova and its port to Central and Northern Europe, an essential intermodal rail freight corridor from the Genova port. Passengers' service also will be improved between Milan and Genoa. The Genova – Milano section is a new two tracks high-speed line. The first section between Genova and Novi Ligure/ Tortona (53.9 km long) will pass through the Apennine under a new tunnel of 38.9 km ("Terzo Valico dei Giovi"). This section will be connected to the existing lines in Genova and Novi Ligure. The line will be built at the high-speed standards (max. speed 300 km/ h) and electrified at 25 kV a.c. Total capacity of the new infrastructure is estimated at 220 trains/ day.	2005	2013
P24.3 Basel – Karlsruhe	The objective of this section is to improve the congested link which ensure the freight traffic from the North and the East of Europe to the Iberian Peninsula and the Mediterranean area The project will contribute to reach the interoperability among the European rail networks and it will especially reduce the waiting times at the border between Germany and Switzerland.	The section is an essential element of a transnational axis, concerning Netherlands, Germany, Switzerland and Italy and, as cross-border connectivity, Emmerich (NL/ D) and Basel (D /CH). The project comprises the upgrading of the existing 123 km double track line between Karlsrue and Basel and the construction of a new high-speed line (two tracks) between Kenzingen and Buggingen to reach a total 193 km length. The section also involves a tunnel between Schliengen and Eimeldingen. The expected total capacity is 378 trains/ day.	1987	2015
P24.4 Frankfurt – Mannheim	The objective of this section is to improve the congested link, which ensures the freight traffic from the North and the East of Europe to the Iberian Peninsula and the Mediterranean area.	The section is an essential element of a transnational axis: Amsterdam - Frankfurt (M) – Milano – Paris – Frankfurt (M) – Berlin and, as cross-border connectivity Aachen. The project comprises the construction of a new high-speed line between Frankfurt and Mannheim and the connection with the existing high-speed line Mannheim – Stuttgart, for a total 66 km length. The line is a double track railway. The expected capacity is 366 trains/ day.	2006	2012

P24.5 Duisburg-Emmerich & "Iron Rhine" Rheidt-Antwerpen	The objective of this section is to improve the congested link, which ensures the freight traffic from the North and the East of Europe to the Iberian Peninsula and the Mediterranean area.	The section Duisburg - Emmerich is an essential element of a transnational axis, concerning Netherlands, Germany, Switzerland and Italy and, as cross-border connectivity, Zevenaar-Emmerich (NL/ D) and Basel (D/ CH-I). The project comprises the upgrading with a 3rd track of the existing 73 km line border D/ NL and other measures improving the line capacity. The line is a 2-3 tracks railway. Its expected capacity is: 366 trains/day on the 2 tracks line Emmerich – Oberhausen; 72 trains/day on the 3rd track Wesel – Oberhausen. The section Iron Rhine is an essential element of a transnational axis, concerning Belgium, Netherlands (specifically, the cities of Antwerpen andMönchengladbach) and Germany and, as cross-border connectivities, Rohermond – Dalheim. The project comprises German section: the upgrading of the existing 20 km line border D/ NL Rohermond – Dalheim, the new construction of the passing station at Dalheim and the modernising of the signalling system. The line is a 1 track railway. Its expected capacity is 80 trains/day. Dutch sections Part 1) upgrade of 8.5 km existing rail, between Belgium border (Budel) and Weert, in use with 2 trains/ week; Part 2) adaptation of 20 km existing railroad between Weert and Roermond, intensely in use (100 - 120 trains/ day); Part 3) new railroad: 6.5 km (diversion around city of Roermond); Part 4) upgrade of 9.7 km existing railroad, between Roermond and German border (Dalheim), not used since 10 years. Belgian section: upgrade of the historic 2-tracks line between the Dutch border and Antwerpen. This axis will be two tracks, except for the line around Roermond (1 track) and the German section. The capacity is expected to reach 43 freight trains/ day in 2020.	1997 (2004) [13]	2010
P24.6 Dijon – Mulhouse – Mulheim	The interventions on this section will allow avoiding a long section with a reduced speed.	The Dijon – Mulhouse section is the East branch of the LGV Rhin-Rhône. It will help to improve 2 European axes: North – South	2005 (2006) [14]	2015 (2010) [15]

[13] According to the "A European Initiative for growth investing in networks and knowledge for growth and jobs – Final report to the European Council" document, the start of works for this section is expected to be in 2004. The 1997, found in fiches, is probably referred to some other works already undertaken.

	An important objective is the progressive opening to the Central Europe countries concerning the freight traffic.	linking the Rhine and the Rhône valley with Italy, Spain and the Mediterranean area, and East – West linking Paris – Brussels with the Rhine valley and Switzerland. The section will be a two tracks high-speed line (maximum speed up to 350 km/h) over 350 km. It includes as main tunnel the Chavanne one (1.7 km), and 10 bridges longer than 500 m. Electrification will be 25 kV a.c. The expected capacity of the new line is 300 passenger trains per day. The new infrastructure also allows releasing some capacity for freight trains on the existing line Dijon – Mulhouse (the tunnel gauge of the latter will also be enlarged). New rail stations are planned in Auxon et Méroux. Interventions are planned also in the Dijon node. The Mulhouse - Müllheim section will be an international section 20 km long. The end of works is expected to be in 2015.		

6.20.2 Impact on the level of traffic flows

The impact at the level of traffic flows is identified at infrastructure level as follows:

- Rail passenger flows P24, total interregional,
- Rail passenger flows P24, international,
- Rail freight flows P24, total interregional,
- Rail freight flows P24, international.

The impact at the level of traffic flows is illustrated by the figures hereunder.

[14] According to the "A European Initiative for growth investing in networks and knowledge for growth and jobs – Final report to the European Council" document, the start of works is expected to be in 2006 and the end in 2010.
[15] See footnote 9 above,

Figure 6.77 *Rail passenger flows P24, total interregional*

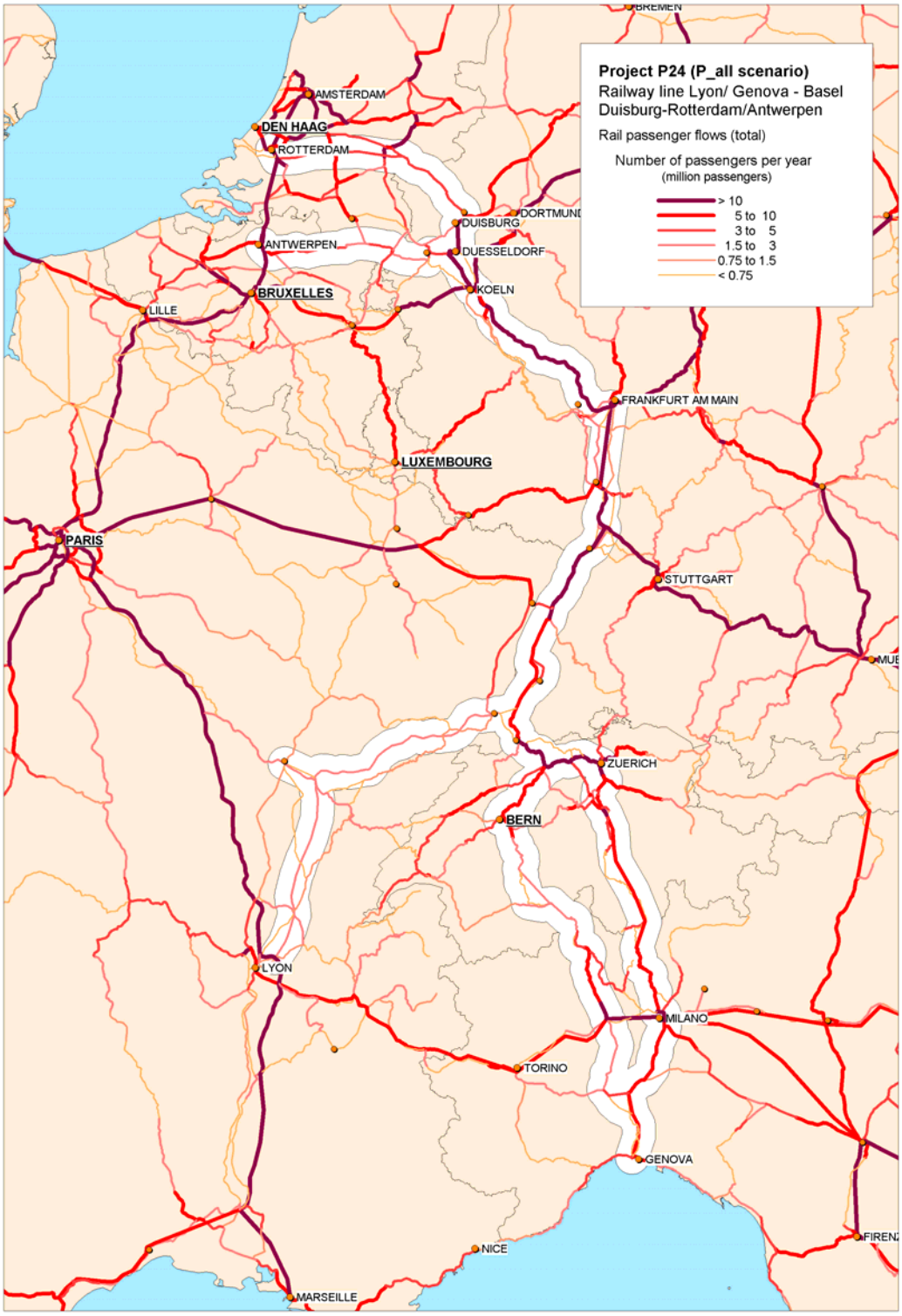


Figure 6.78 *Rail passenger flows P24, international*

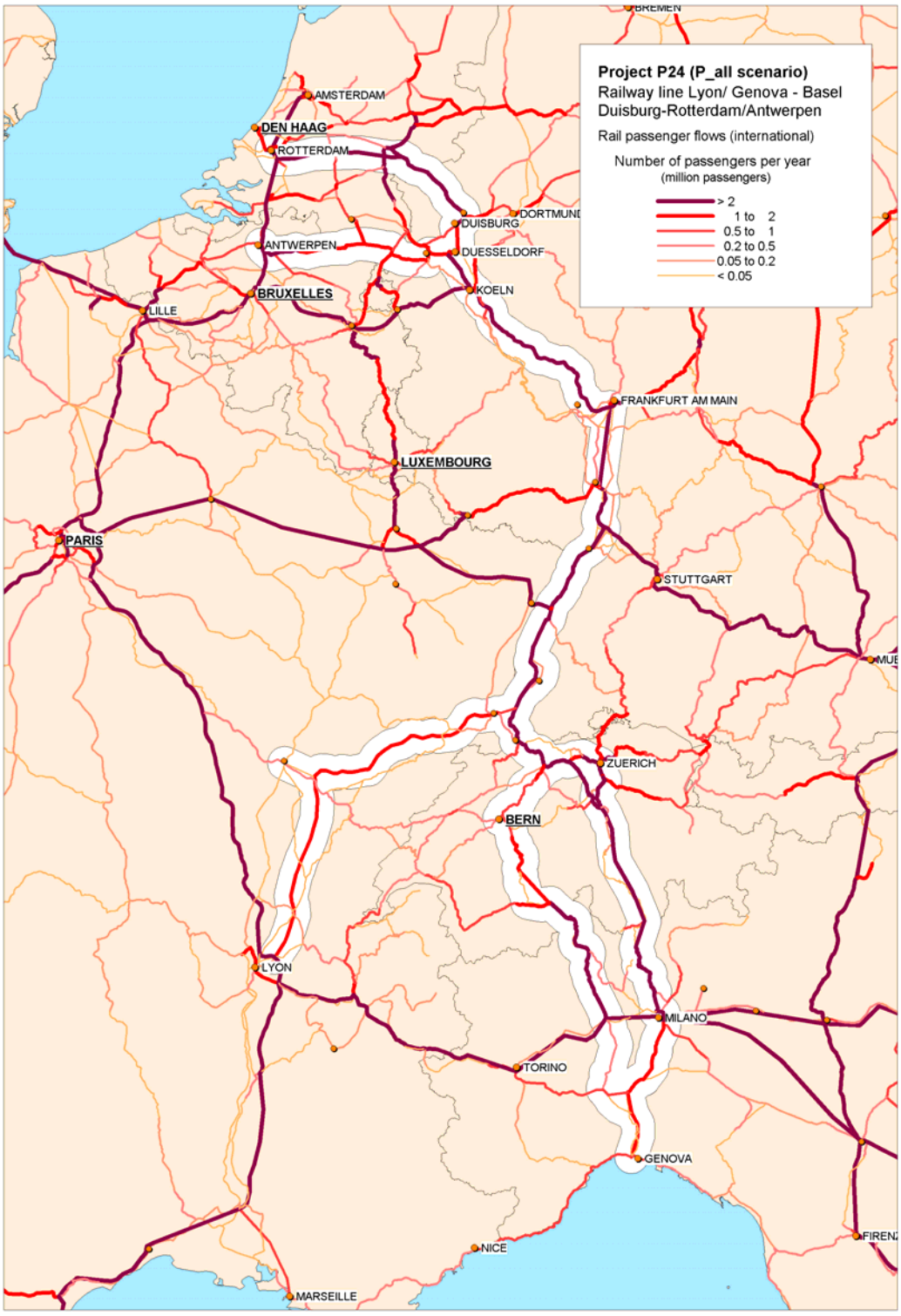


Figure 6.79 *Rail freight flows P24, total interregional*

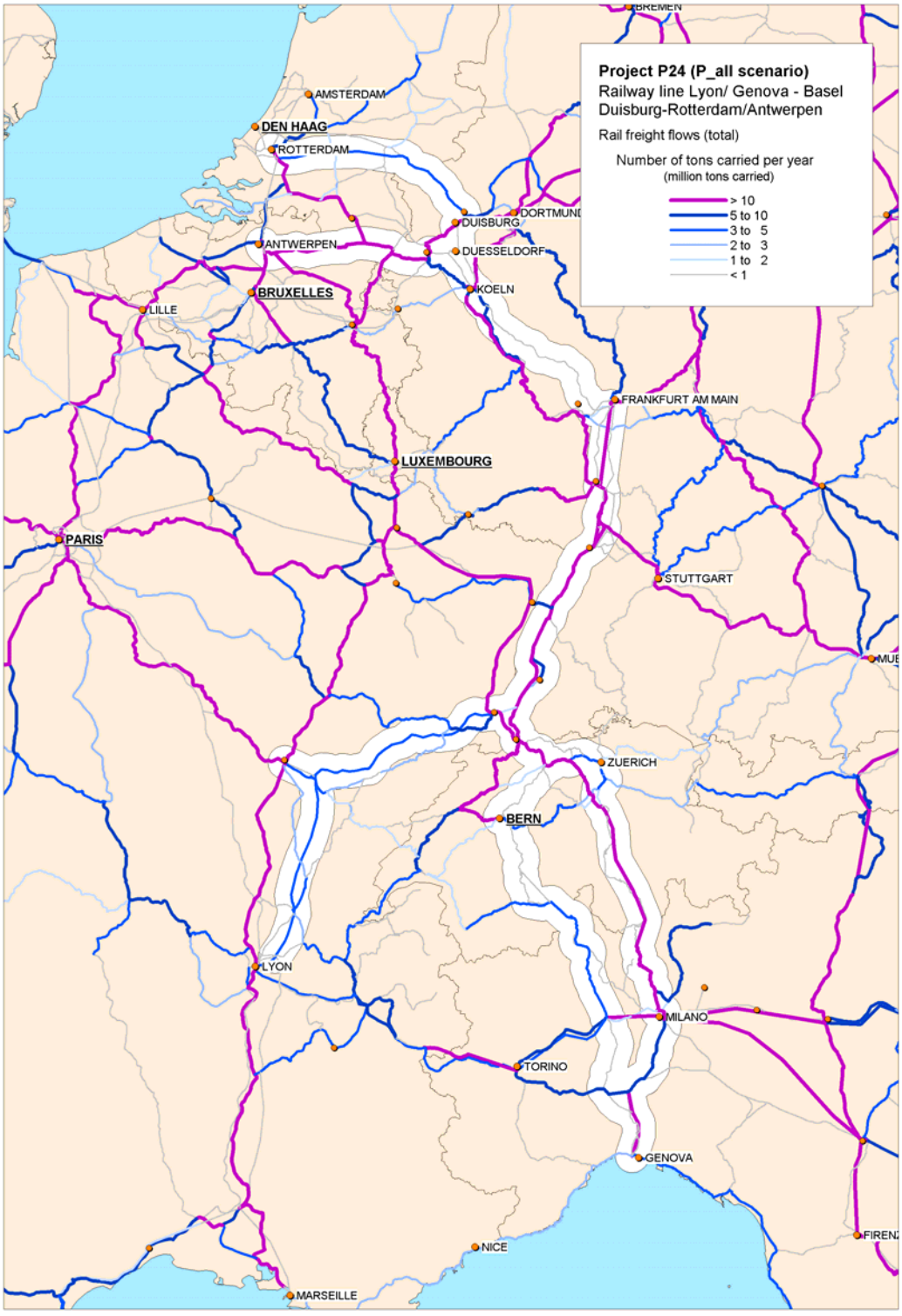
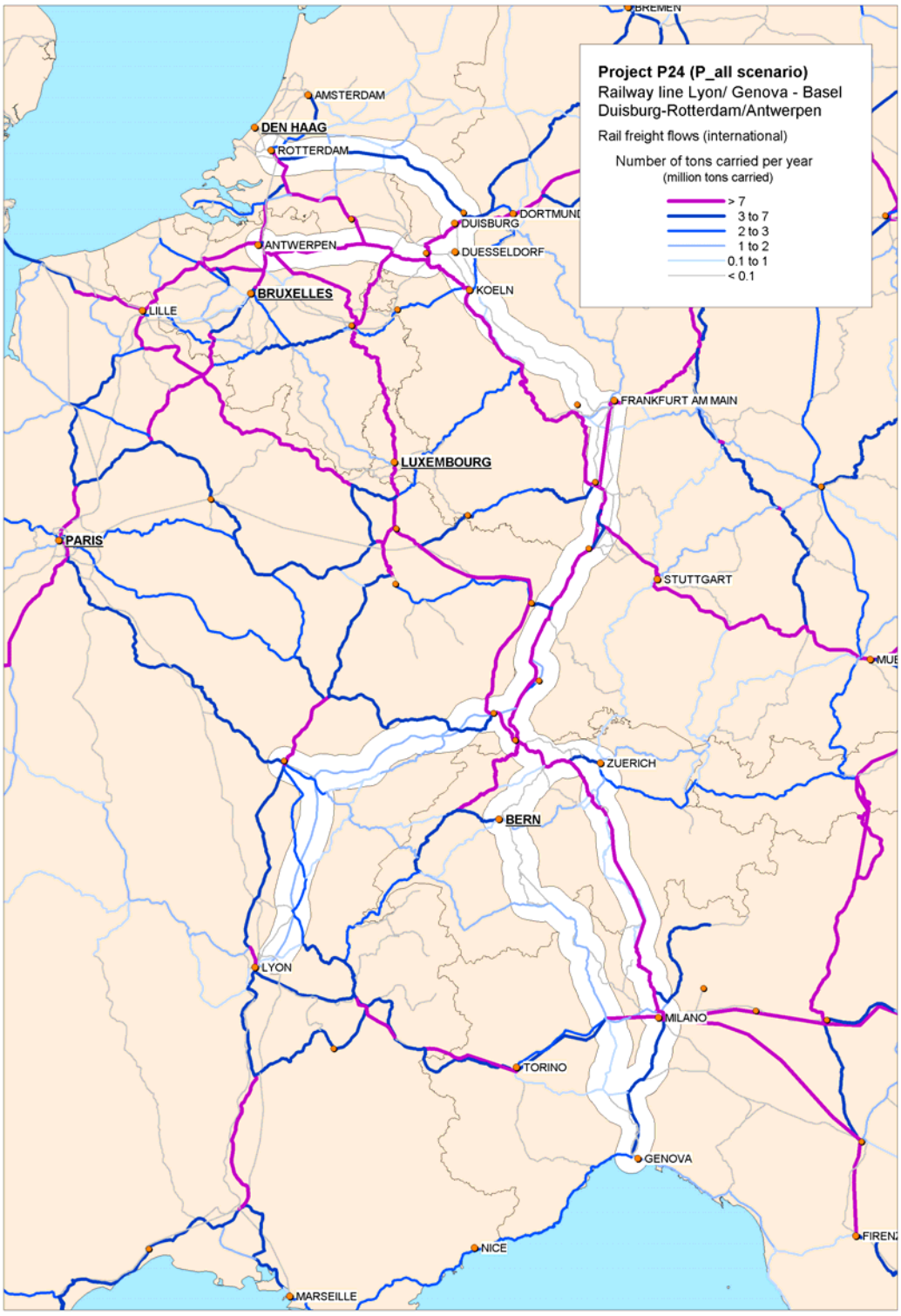


Figure 6.80 *Rail freight flows P24, international*



6.20.3 Estimated aggregated impacts of the priority project

In the following table, the impact variables for the all projects scenario are presented for all sub-sections of the priority project. Between brackets, the values of the individual project scenarios are given. The methodology of the impact variables is described in D6, Chapter 3.6.

Table 6.40 *Impact variables P24: Railway line Lyon/Genova-Basel-Duisburg-Rotterdam/Antwerp*

Objective	Indicator	P24.1	P24.2	P24.3	P24.4	P24.5	P24.6	P24.7	P24 Total
ECONOMIC IMPACTS IN THE TRANSPORT SECTOR									
IMPROVEMENT OF ROAD LEVEL SERVICE	(1) Changes in time costs caused by road congestion, mln. € / year	-1.1 (-0.3)	-5.0 (-18.6)	-4.5 (-9.2)	-4.1 (-11.2)	-15.8 (-13.2)	-2.1 (-3.9)	N/a (N/a)	-32.5 (-56.2)
REDUCTION OF TRAVEL TIME	(2a) Changes in monetary value of the reduction of passenger travel time, mln. € / year	-2.8 (-33.8)	-298.9 (-275.2)	-40.5 (-39)	-185.8 (-164)	-93.3 (-103.1)	-3.0 (-32.5)	N/a (N/a)	-624.3 (-647.5)
	(2b) Changes in passenger travel time, mln hour / year	-0.2 (-2.8)	-21.8 (-21.2)	-2.4 (-2.5)	-12.9 (-12.8)	-6.1 (-6.7)	-0.2 (-2.7)	N/a (N/a)	-43.5 (-48.7)
	(3) Changes in monetary value of the reduction of freight travel time, mln. € / year	0.0 (0)	-30.6 (-38.6)	-11.0 (-7.2)	0.0 (0)	-3.6 (-3.9)	-0.9 (-1.5)	N/a (N/a)	-46.2 (-51.2)
ENVIRONMENTAL SUSTAINABILITY									
GLOBAL WARMING	(4a) Change (in monetary value) of the transport contribution to global warming, mln. € / year	-3.437 (-1.129)	-4.710 (-6.565)	-5.786 (-5.677)	-5.158 (-5.189)	-4.555 (-2.693)	-3.802 (-3.123)	N/a (N/a)	-27.448 (-24.376)
	(4b) Change of the transport contribution to global warming, 1000 kg CO2 / year	-146275 (-48047)	-200406 (-279379)	-246218 (-241590)	-219478 (-220829)	-193816 (-114596)	-161804 (-132915)	N/a (N/a)	-1167997 (-1037356)
ATMOSPHERIC POLLUTION	(5a) Change (in monetary value) of the NOX transport emission, mln. € / year	-1.458 (-0.506)	-2.143 (-2.392)	-1.946 (-1.437)	-2.017 (-1.313)	-1.359 (-0.672)	-1.154 (-0.933)	N/a (N/a)	-10.077 (-7.253)
	(5b) Change of the NOX transport emission, 1000 kg NOx / year	-176 (-49)	-239 (-292)	-250 (-181)	-294 (-206)	-151 (-105)	-148 (-100)	N/a (N/a)	-1258 (-933)
	(6a) Change (in monetary value) of particulates' emissions of transport, mln. € / year	-0.036 (0.027)	0.053 (0.061)	-0.006 (0.05)	0.066 (0.005)	0.134 (0.09)	-0.005 (0.138)	N/a (N/a)	0.206 (0.371)
	(6b) Change of particulates' emissions of transport, 1000 kg particulates / year	-2 (1)	4 (2)	1 (3)	3 (-1)	4 (4)	0 (7)	N/a (N/a)	11 (16)
TRANSPORT SAFETY	(7) Variation on monetary value of accidents, mln. € / year	-6.4 (-7.3)	-21.1 (-36.2)	-13.9 (-25.1)	-14.8 (-29.1)	-9.6 (-11.9)	-6.5 (-12.7)	N/a (N/a)	-72.3 (-122.3)
INVESTMENT COST									
INVESTMENT COST	(8) Total project costs, mln. €	2500	4780	4235	1771	1369	2080	N/a	16735
GENERAL TRANSPORT RELEVANCE									
TOTAL TRAFFIC VOLUME ON THE PROJECT	(10) Total passenger traffic on the project section, mln. passengers / year	1.9 (1.9)	6.2 (6.2)	6.3 (5.5)	28.6 (28.7)	4.7 (5.5)	2.2 (2.3)	N/a (N/a)	- -
	(11a) Maximum freight traffic on the project section, mln. ton / year	4.2 (4.2)	24.2 (26.5)	20.1 (22.5)	24.0 (24.8)	41.6 (45.6)	21.0 (17.1)	24.2 (25.9)	41.6 (45.6)
	(11b) Average freight traffic on the project section, mln. ton / year	3.2 (3.1)	7.4 (8.5)	12.5 (14.5)	24.0 (24.8)	13.7 (14)	3.9 (3.7)	24.2 (25.9)	- -
	(11c) Total freight traffic on the project section, mln. ton km /year	652 (638)	2886 (3314)	2093 (2422)	1631 (1684)	3290 (3372)	755 (715)	3048 (3267)	14354 (15412)
INTERMODALITY	(12) Quantitative appraisal of the project's contribution for an intermodal transport system, mln. ton	0.4 (0.8)	3.1 (6)	1.9 (2.3)	2.1 (3.7)	1.5 (2.5)	0.8 (1.9)	1.2 (4.1)	11.0 (21.3)
CREATION OF EUROPEAN VALUE ADDED									
DEVELOPMENT OF INTERNATIONAL PASSENGER TRAFFIC	(13) Share of international passenger traffic on total traffic on the project, %	43.1 (48.9)	32.7 (33.7)	82.2 (80.1)	20.3 (19.4)	51.7 (58.4)	47.7 (55.3)	N/a (N/a)	- -
	(14) Volume of international passenger traffic on the project, mln. passengers / year	0.8 (0.9)	2.0 (2.1)	5.2 (4.4)	5.8 (5.6)	2.4 (3.2)	1.0 (1.3)	N/a (N/a)	- -
DEVELOPMENT OF INTERNATIONAL FREIGHT TRAFFIC	(15) Share of international freight traffic on total traffic on the project, %	31.5 (30)	58.4 (61.2)	82.6 (86.6)	42.6 (44.9)	95.4 (95.8)	45.9 (42.9)	88.7 (89.5)	- -
	(16) Volume of international freight traffic on the project, mln. tons / year	1.0 (0.9)	4.3 (5.2)	10.3 (12.6)	10.2 (11.1)	13.0 (13.4)	1.8 (1.6)	21.5 (23.2)	- -
INTEROPERABILITY	(17) Reduction of passengers waiting time at borders for international traffic	N/a	N/a	N/a	N/a	N/a	N/a	N/a	-
	(18) Reduction of freight waiting time at borders for international traffic	N/a	Yes	N/a	N/a	N/a	Yes	N/a	-
	(19) Length of networks becoming interoperable because of the project	N/a	515 km	N/a	N/a	N/a	N/a	N/a	-

Objective	Indicator	P24.1	P24.2	P24.3	P24.4	P24.5	P24.6	P24.7	P24 Total
IMPROVEMENT OF ACCESSIBILITY									
PASSENGER ACCESSIBILITY	(20) Variation of the STAC centrality index for passenger transport, %	0.00 (0.09)	0.14 (0.33)	0.01 (0.12)	0.06 (0.12)	0.06 (0.04)	0.00 (0.1)	N/a (N/a)	- -
FREIGHT ACCESSIBILITY	(21) Variation of the STAC centrality index for freight transport, %	0.00 (0)	0.11 (0.14)	0.01 (0.04)	0.00 (0)	0.00 (0)	0.00 (0)	N/a (N/a)	- -
PERIPHERAL ACCESSIBILITY	(22) Variation of the STAC centrality index for passenger transport in regions identified as peripheral, %	0.01 (0.12)	0.14 (0.26)	0.02 (0.09)	0.12 (0.12)	0.11 (0.05)	0.00 (0.14)	N/a (N/a)	- -
	(23) Variation of the STAC centrality index for freight transport in regions identified as peripheral, %	0.00 (0)	0.04 (0.06)	0.00 (0.06)	0.00 (0)	0.00 (0)	0.00 (0)	N/a (N/a)	- -
ENVIRONMENTAL SUSTAINABILITY									
MODAL REBALANCING	(24) Volume of road freight traffic shifted to rail, IWW or sea transport, mln. t·km / year	1533 (561)	2518 (3363)	2865 (2783)	2672 (2540)	3212 (1492)	1835 (1672)	N/a (N/a)	14635 (12410)
	(25) Volume of road and air passenger traffic shifted to rail, mln. passenger·km / year	141 (76)	815 (675)	273 (433)	354 (575)	91 (240)	139 (104)	N/a (N/a)	1814 (2102)
LEVEL OF CONCERN :TRAFFIC TRANSFER	(26) Transfer of traffic from infrastructure lying in sensitive zones to the projected infrastructure, % of road traffic transferred from sensitive areas	-2.7% (-1,1%)	-1.1% (-1,2%)	-1.5% (-1,7%)	-1.0% (-1,2%)	-1.1% (-0,5%)	-1.7% (-1,1%)	N/a (N/a)	- -
LEVEL OF CONCERN: DISTANCE	(27) Percentage of the length of the project lying in a sensitive area, % length	0.0%	37.0%	0.0%	75.0%	20.0%	0.0%	N/a	-
LEVEL OF CONCERN: EMISSIONS	(28a) Changes of inhabitants' level of concern caused by emissions of NOx, % NOx	-1.9% (-0,4%)	-0.7% (-0,6%)	-1.3% (-0,7%)	-1.2% (-0,7%)	-0.5% (-0,3%)	-1.5% (-0,6%)	N/a (N/a)	- -
	(28b) Changes of inhabitants' level of concern caused by emissions of particulates, % particulates	-1.7% (-0,4%)	-0.6% (-0,6%)	-1.3% (-0,7%)	-1.2% (-0,7%)	-0.5% (-0,3%)	-1.4% (-0,6%)	N/a (N/a)	- -
LEVEL OF CONCERN: PROXIMITY	(29) Synthetic appreciation of the proximity of the project from specially protected areas (SPAs) or densely populated areas. Proximity of the project from SPA, km	0.0%	25.0%	0.0%	3.0%	2.0%	2.0%	N/a	-
MATURITY AND COHERENCE OF THE PROJECT									
DEVELOPMENT OF THE PROJECT	(30) Appraisal of the project planning status	2	2	5	3	3	0	N/a	-
INSTITUTIONAL SOUNDNESS	(31) Qualitative appraisal of the project's compliance with national plans	5	5	5	5	5	5	N/a	-
COHERENCE OF THE PROJECT	(32) Qualitative appraisal of the project's coherence with main international traffic corridors	1	3	2	4	2	1	5	-

Comments on the main results

Impact on passenger volumes and modal shift

- Passenger transport volumes are forecasted to vary on average between 1.9 mln (P24.1, Lyon – Dijon), and 28.6 mln passengers per year (P24.4, Frankfurt – Mannheim).
- The priority project will result in decrease of road passenger transport performance by 1.8 bln pkm.
- The values for changes in (potential) passenger transport costs reflect two dimensions: the demand on the sub-sections and the dimension of the infrastructure project in terms of length of transport infrastructure subject to improvements and type of infrastructure measures (e.g. upgrade versus new construction). These dimensions have to be taken into account for the interpretation of the results: large sub-sections with a high level of expected demand, like P24.2 highlights with strong performances due to relatively high demand levels and the large-scale dimension of the infrastructure investments.

Impact on freight volumes and modal shift

- Average total interregional transport volumes vary between 3.2 mln ton (P24.1) and 24.2 mln ton (P24.4 \ P24.7) on certain sub-sections. The share of international freight transport also varies but is generally higher than 40% ;
- The priority project will result in an increase in the transported rail freight tonnage in the priority project of 11.0 mln tonnes at the expense of road freight transport and, to a small extent, of inland waterways.
- Total transport shit to rail freight is 14.6 bill. ton-km.

Impact on infrastructure network use

The detailed analysis carried out by the consortium has revealed the following impacts:

- The priority project's impact on traffic flows have a widespread impact, both concerning passenger and freight transport.
- The passenger rail traffic volume is forecasted to increase along the whole priority project and particulyrly on following feeding relations: Bremen – Dortmund/ Duisburg, Hamburg/ Berlin/ Leipzig – Fulda – Frankfurt, Saarbrücken – Mannheim – Mannheim – München, Lyon – Nîmes – Narbonne, Milano – Bolgona – (Roma/ Fóggia), as well as Milano – Venezia.
- Passenger road traffic flows tend to reveal decreasing pattern, especially on the road links along the priority project, as well as between Lyon and Torino via Fréjus, Stuttgart – Singen and between Rìmini and Fóggia.
- The freight rail traffic is also growing all along the priority project route and especially on the extension of the Betuwe line all along the Rhine up to the North of Switzerland and up to Paris and Bordeaux on the Western part of Europe.

Impact on environmental sustainability

- The reduction in emissions results in a marginal decrease (up till 2%) of human health risks along the corridor.
- In all sub-sections road traffic will marginally be transferred to sensitive areas. However, in all sub-sections the changes are marginal (less than 2%).
- In half of the sub-sections, parts are located within potentially sensitive areas, and the share of these parts in these sub-sections varies from 20% to 75% of the project lengths.

Impact on emissions

The overall impact on emission is quantified from the impact at the network level and the differences between the all project scenario and the reference 2 scenario are as follows:

- CO_2: net decrease with 1,168 thousand tonnes,
- NO_x: net decrease with 1.3 thousand tonnes,
- Particulates: no significant increase.

Development of the project

- P24.1: Lyon-Dijon. The score attributed is +2. Actually, the "Comité de Pilotage" approved the requirement specifications for the infrastructure in November 2002. The specifications are under the examination of the Infrastructure Ministry. The start of works is expected to be in 2013. Financial plans are not provided yet.
- P24.2: Genoa-Milan/Novara-Swiss border. It involves 2 sections with different level of planning and funding. Concerning the Genoa- Milan – Gottardo the assigned score is +3, because the start of design studies was in 1992. Especially for the part Genoa - Novi Ligure – Tortona, the committee of involved actors ("Conferenza dei Servizi") achieved the procedure to identify the route in September 2002. Start of works is expected to be in 2005. For the Genoa/Alessandria – Novara – Simplon design studies are ongoing. The assigned score is +2. The overall score of the sub-section carried out as an average of the single score and costs of each section, is +2.
- P24.3: Basel-Karlsruhe. Interventions are ongoing. Therefore the assigned score is +5.
- P24.4: Frankfurt-Mannheim. Assigned score is +3.
- P24.5: Duisburg - Emmerich & "Iron Rhine" Rheidt - Antwerp. It includes 2 sections with different level of development. Works on the Duisburg–Emmerich section are ongoing, so the assigned score is +5, while on the "Iron Rhine" Rheidt–Antwerp they will start in 2004 and the design studies started in 2000. Therefore the score assigned is +1. For the overall score, the costs of the 2 sections have been taken into account and the average score carried out is +3.
- P24.6: Dijon - Mulhouse – Mulheim. It involves 2 sections with different level of development. For the Dole (Dijon) – Mulhouse the score is +1 because design studies are ongoing, but no any decisions on funding have been carried out, while for the Mulhouse – Mülheim section there are no decisions either on funding or on design studies and the score assigned is 0. For the entire section, the score has been calculated as an average of the 2 scores, considering as a weight, the costs of each section. The final score carried out is 0.

6.21 P25 MOTORWAY ROUTE GDANSK-BRNO/BRATISLAVA-WIEN

6.21.1 Description of the priority project

Priority Project	Priority Project name	Sub-sections		Sections	Sub-section start date	Sub-section end date
P25	Motorway route Gdansk-Brno/Bratislava-Wien	P25.1	Gdansk-Katowice motorway	P25 PL Gdansk–Katowice	2003	2010
		P25.2	Katowice-Brno/Zilina motorway, cross-border section	P25 PL Katowice – Brno	2003	2010
				P25 CZ Katowice – Brno	2003	2010
				P25 PL Katowice – Zilina	2003	2010
				P25 SK Katowice – Zilina	2003	2010
		P25.3	Brno-Wien motorway, cross-border section	P25 CZ Brno – Wien	2003	2010
				P25 A Brno – Wien	2003	2010

These sub-sections involve partly the new construction and partly upgrading of existing Polish and Czech motorways as well as providing an access link to the port of Gdansk.

The aim is to increase transport capacity in the already intensively used corridor from the Baltic Sea to Central Europe in cross-border transport, to contribute towards economic development of regions along the corridor and to improve the level of the Polish road network.

Table 6.41 *Project fiche P25*

Project	Description			
P25 Motorway route Gdansk – Brno/ Bratislava – Wien	The project is to build a new motorway with two lanes in each direction from Gdansk to Wien through Loz in Poland and Brno in Czech Republic. On some sections between Katowice and Brno/ Zilina, the works are to upgrade existing roads. The project includes the construction of a new access link to the port of Gdansk, which plans to build a new container and ferry terminal. The construction of this motorway will contribute to develop the economy in the new Member States involved and it will provide an alternative to the existing saturated North/ South axes from the North Sea.			
Sections of the Project	Objectives	Description	Start date	End date
P25.1 Gdansk – Katowice motorway	A fundamental objective of this section is to contribute to the economic growth along the corridor and the Baltic coast in neighbouring regions and countries and to improve the accessibility for the Accession countries to the European transport network.	The project consists in the construction of a 468 km of motorway with 4 lanes and the upgrading of 99 km. Accordingly to the EU and UN/ECE standards the design and interoperability will follow the AGR, TEM standards scheme. Journey times will be reduced as well as the vehicle operation costs due to faster speed and lower congestion level on existing section and alternative roads.	2003	2010
P25. 2 Katowice – Brno/ Zilina motorway, cross-border section	The objective of this section is to eliminate bottlenecks on roads in Polish-Czech and Slovak border region and completion of missed link between Poland and	The Katowice – Zilina/ Brno motorway can be divided in 2 parts. The Polish part involves 56 km of upgrading, between Katowice and Biala and 48 km of new section to be built: 20 km between Bielsko and Zywiec and 28 km between Zywiec and Zwardon. The motorway	2003	2010

	Slovakia. It will also contribute to improve the accessibility for the Accession Countries to the European network.	will have 4 lanes and the design and interoperability will be in accordance with EU and UN/ECE standards. The Czech part is about 196 km long.		
P25.3 Brno – Wien motorway, cross-border section	The objective of this section is to eliminate bottlenecks on roads in Austria. It will also contribute to improve the accessibility for the Accession Countries to the European network. The interventions on the section will reduce significantly the travel time and it will increase reliability and capacity. Besides, the interventions on this section will favourite the development of regions along transport corridors and the advance of the ecology transport.	This project involved 59.3 km of new motorway construction on the Austrian side. The motorway will have 4 lanes. The design and interoperability standards will be in accordance with EU and UN/ECE standards. On the Czech side there will be 20 km of motorways to be built between Pohorelice and the Czech/ Austrian border, 102.7 km between Olomouc and Breclav. The motorway will have 4 lanes.	2003 (2005)[16]	2010

6.21.2 Impact on the level of traffic flows

The impact at the level of traffic flows is identified at infrastructure level as follows:

- Road passenger flows P25, total interregional,
- Road passenger flows P25, international,
- Road freight flows P25, total interregional,
- Road freight flows P25, international.

The impact at the level of traffic flows is illustrated by the figures hereunder.

[16] According to the "A European initiative for growth investing in networks and knowledge for growth and jobs – Final Report to the European Council" document.

Figure 6.81 *Road passenger flows P25, total interregional*

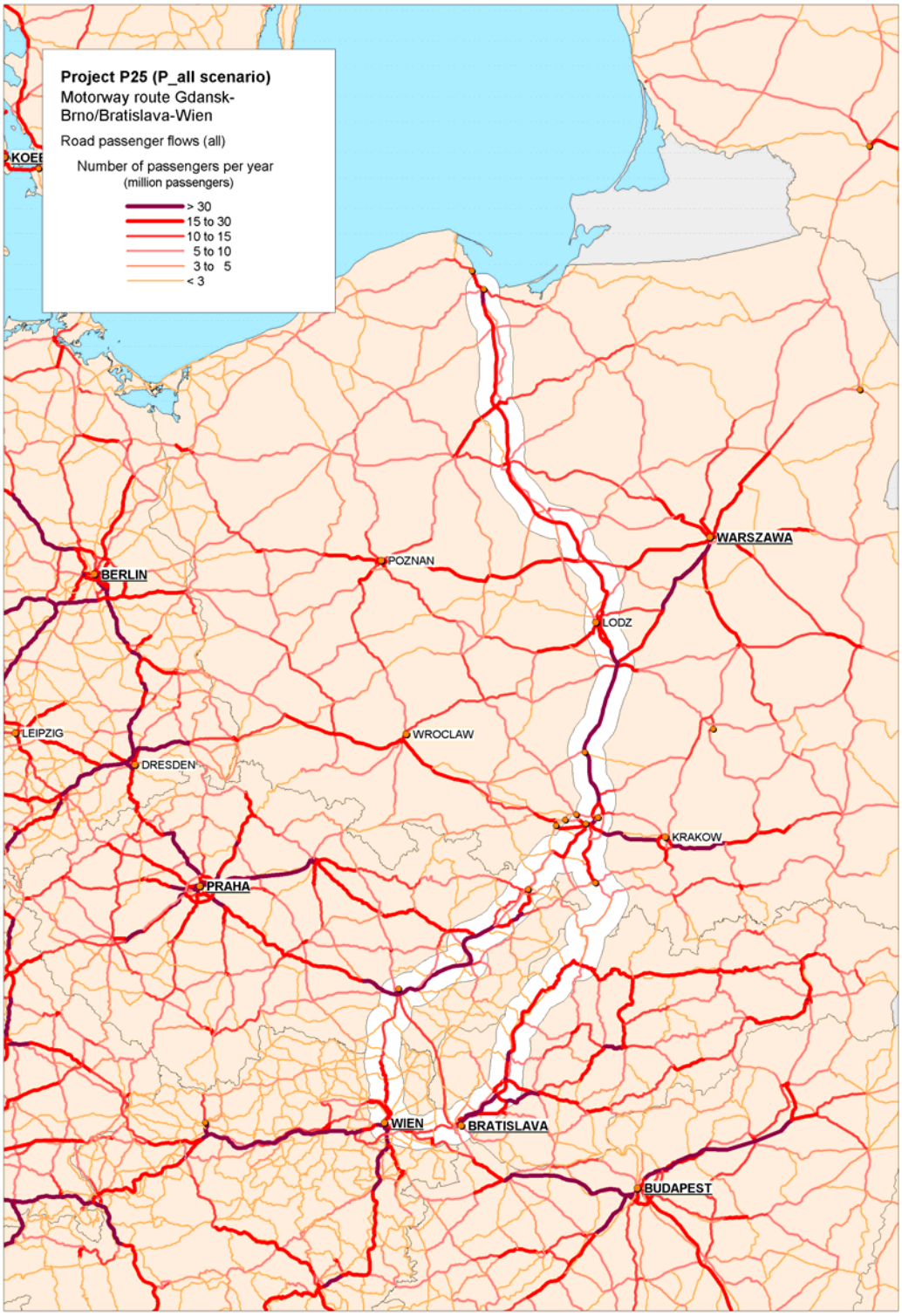


Figure 6.82 *Road passenger flows P25, international*

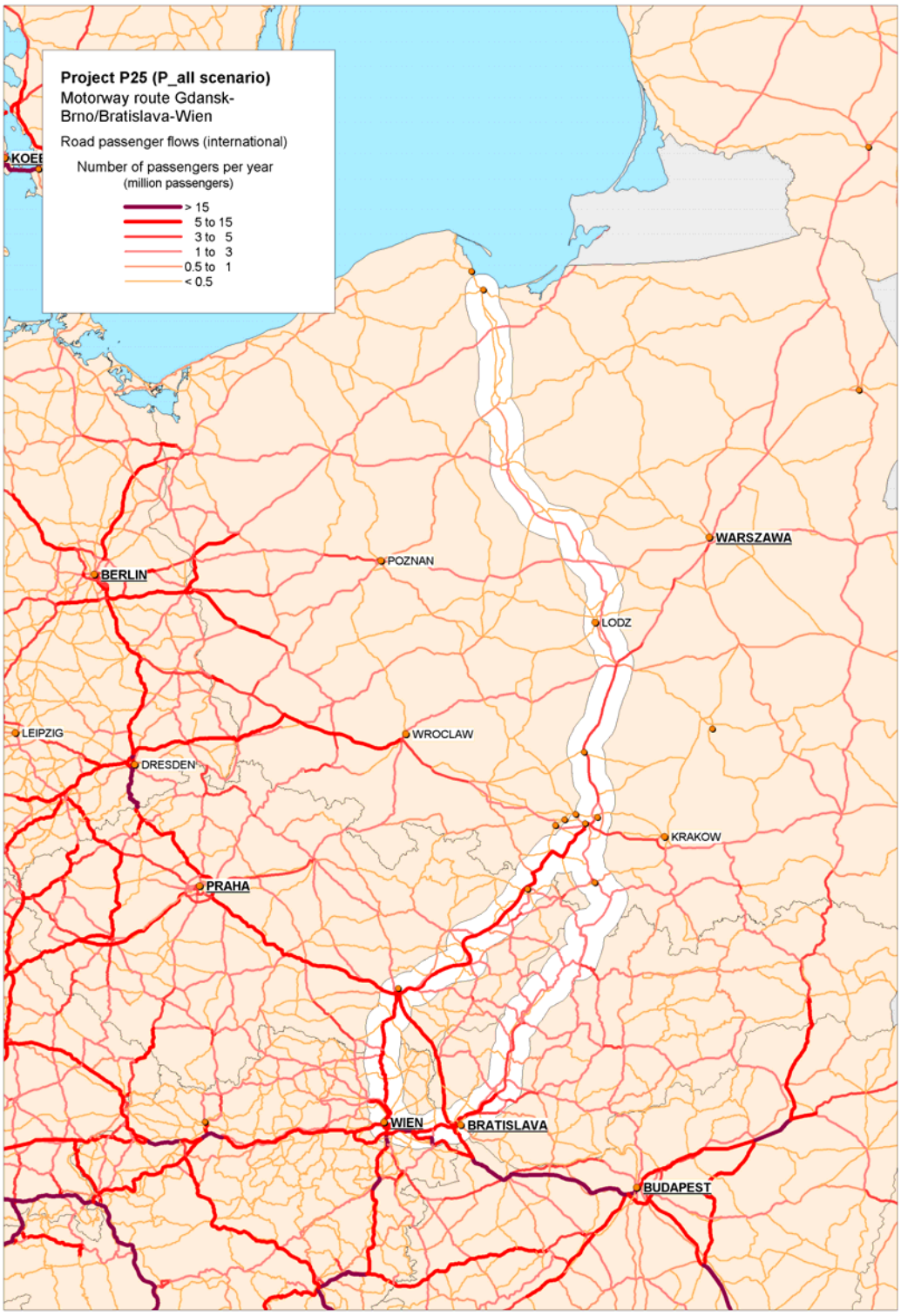


Figure 6.83 *Road freight flows P25, total interregional*

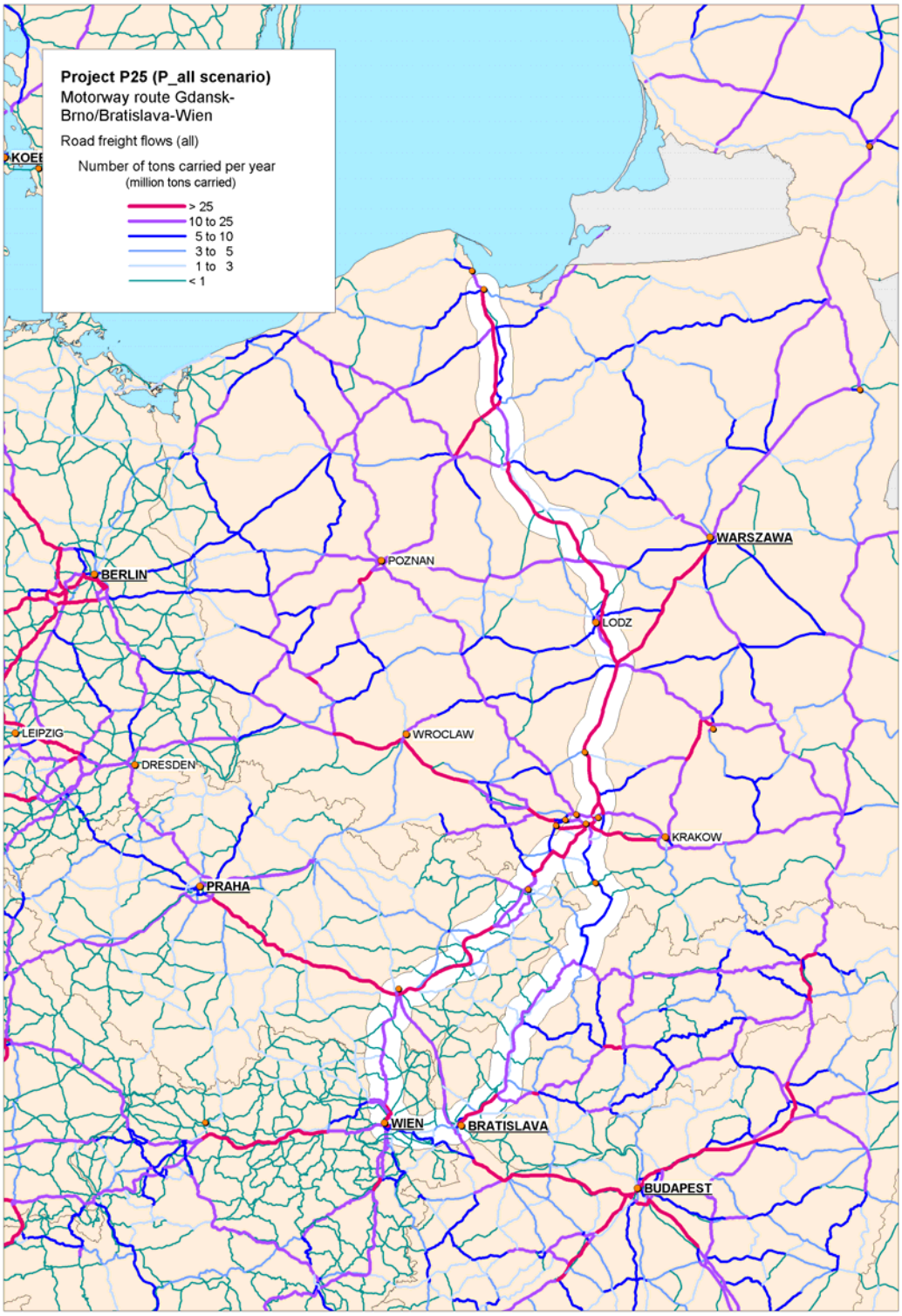
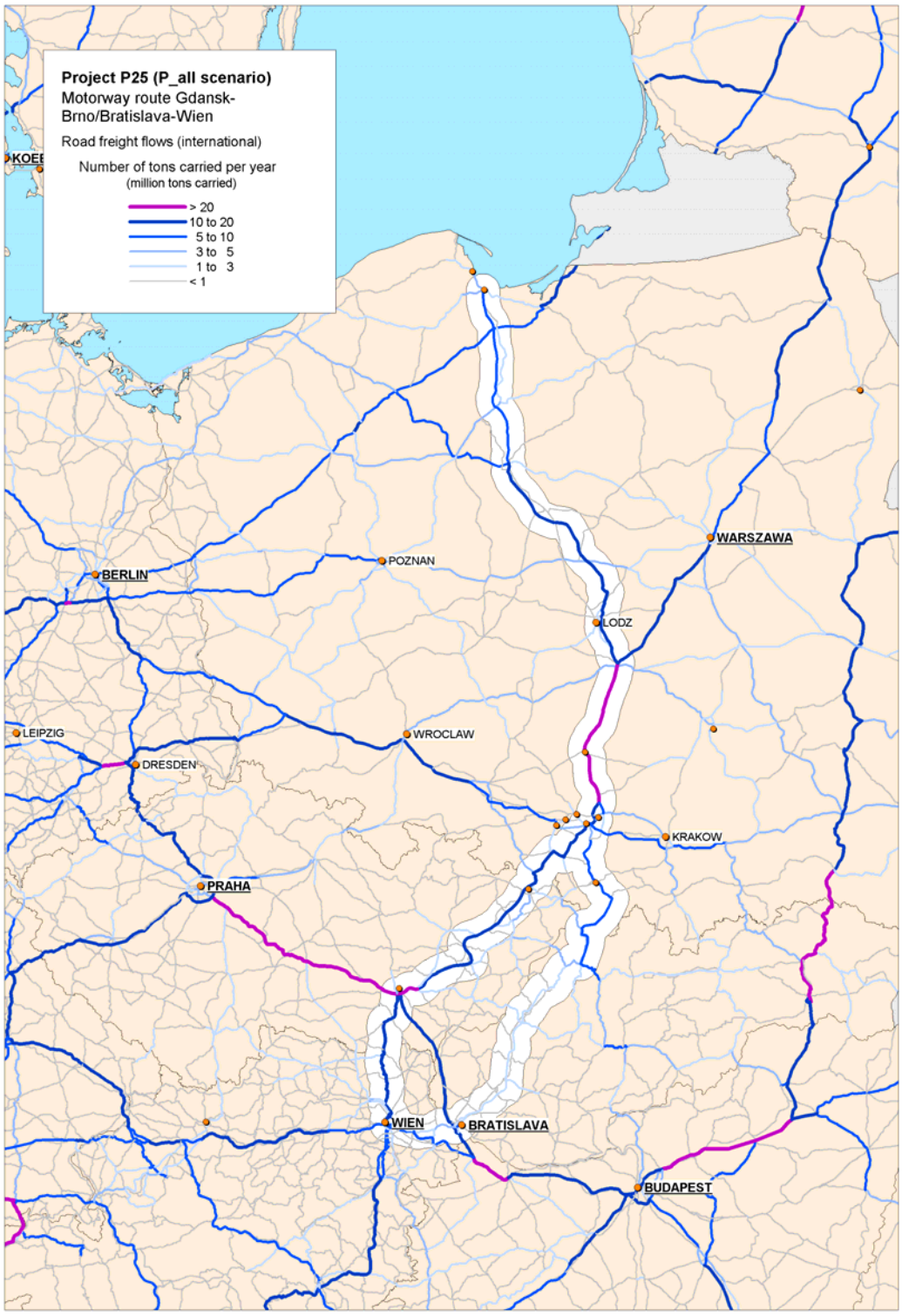


Figure 6.84 *Road freight flows P25, international*



6.21.3 Estimated aggregated impacts of the priority project

In the following table, the impact variables for the all projects scenario are presented for all sub-sections of the priority project. Between brackets, the values of the individual project scenarios are given. The methodology of the impact variables is described in D6, Chapter 3.6.

Table 6.42 *Impact variables P25: Motorway route Gdansk-Brno/Bratislava-Wien*

Objective	Indicator	P25.1	P25.2	P25.3	P25 Total
ECONOMIC IMPACTS IN THE TRANSPORT SECTOR					
IMPROVEMENT OF ROAD LEVEL SERVICE	(1) Changes in time costs caused by road congestion, mln. € / year	-1.1 (0.1)	-3.9 (0.1)	-2.3 (0)	-7.2 (0.2)
REDUCTION OF TRAVEL TIME	(2a) Changes in monetary value of the reduction of passenger travel time, mln. € / year	-1.7 (-1.7)	-156.7 (-147.3)	-56.8 (-53.3)	-215.2 (-202.3)
	(2b) Changes in passenger travel time, mln hour / year	-0.2 (-0.2)	-19.3 (-19.1)	-4.2 (-4.2)	-23.7 (-23.5)
	(3) Changes in monetary value of the reduction of freight travel time, mln. € / year	-8.3 (-9.2)	-137.3 (-139.9)	-52.3 (-56.9)	-198.0 (-206.1)
ENVIRONMENTAL SUSTAINABILITY					
GLOBAL WARMING	(4a) Change (in monetary value) of the transport contribution to global warming, mln. € / year	2.293 (30.548)	-2.288 (21.066)	1.094 (8.21)	1.099 (59.824)
	(4b) Change of the transport contribution to global warming, 1000 kg CO2 / year	97585 (1299911)	-97368 (896423)	46541 (349345)	46758 (2545679)
ATMOSPHERIC POLLUTION	(5a) Change (in monetary value) of the NOX transport emission, mln. € / year	-0.279 (-0.439)	-0.236 (-0.595)	-0.298 (-0.304)	-0.813 (-1.338)
	(5b) Change of the NOX transport emission, 1000 kg NOx / year	36 (-221)	103 (-220)	26 (-32)	165 (-473)
	(6a) Change (in monetary value) of particulates' emissions of transport, mln. € / year	0.057 (-0.096)	0.089 (-0.207)	0.079 (-0.132)	0.225 (-0.435)
	(6b) Change of particulates' emissions of transport, 1000 kg particulates / year	10 (-12)	15 (-22)	8 (-9)	32 (-43)
TRANSPORT SAFETY	(7) Variation on monetary value of accidents, mln. € / year	-125.9 (-261.6)	-87.9 (-247.3)	-25.3 (-155.4)	-239.1 (-664.4)
INVESTMENT COST					
INVESTMENT COST	(8) Total project costs, mln. €	2754	4014	483	7251
GENERAL TRANSPORT RELEVANCE					
TOTAL TRAFFIC VOLUME ON THE PROJECT	(10) Total passenger traffic on the project section, mln. passengers / year	27.8 (27.9)	16.6 (16.8)	17.5 (17.6)	- -
	(11a) Maximum freight traffic on the project section, mln. ton / year	64.7 (74)	33.6 (37.1)	40.9 (41.3)	64.7 (74)
	(11b) Average freight traffic on the project section, mln. ton / year	37.2 (43.5)	17.7 (19.3)	22.9 (25.1)	- -
	(11c) Total freight traffic on the project section, mln. ton km /year	18207 (21285)	6282 (6843)	2400 (2638)	26889 (30765)
INTERMODALITY	(12) Quantitative appraisal of the project's contribution for an intermodal transport system, mln. ton	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
CREATION OF EUROPEAN VALUE ADDED					
DEVELOPMENT OF INTERNATIONAL PASSENGER TRAFFIC	(13) Share of international passenger traffic on total traffic on the project, %	6.0 (6.2)	27.9 (28.2)	62.0 (62.2)	- -
	(14) Volume of international passenger traffic on the project, mln. passengers / year	1.7 (1.7)	4.6 (4.7)	10.9 (11)	- -
DEVELOPMENT OF INTERNATIONAL FREIGHT TRAFFIC	(15) Share of international freight traffic on total traffic on the project, %	34.6 (39.9)	70.1 (72)	78.6 (80)	- -
	(16) Volume of international freight traffic on the project, mln. tons / year	12.9 (17.4)	12.4 (13.9)	18.0 (20.1)	- -
INTEROPERABILITY	(17) Reduction of passengers waiting time at borders for international traffic	N/a	N/a	N/a	-
	(18) Reduction of freight waiting time at borders for international traffic	Yes	Yes	N/a	-
	(19) Length of networks becoming interoperable because of the project	N/a	N/a	N/a	-

Objective	Indicator	P25.1	P25.2	P25.3	P25 Total
IMPROVEMENT OF ACCESSIBILITY					
PASSENGER ACCESSIBILITY	(20) Variation of the STAC centrality index for passenger transport, %	0.12 (0.16)	0.28 (0.42)	0.07 (0.12)	- -
FREIGHT ACCESSIBILITY	(21) Variation of the STAC centrality index for freight transport, %	0.09 (0.14)	0.59 (0.83)	0.22 (0.31)	- -
PERIPHERAL ACCESSIBILITY	(22) Variation of the STAC centrality index for passenger transport in regions identified as peripheral, %	0.11 (0.19)	0.13 (0.23)	0.02 (0.07)	- -
	(23) Variation of the STAC centrality index for freight transport in regions identified as peripheral, %	0.06 (0.13)	0.10 (0.19)	0.03 (0.06)	- -
ENVIRONMENTAL SUSTAINABILITY					
MODAL REBALANCING	(24) Volume of road freight traffic shifted to rail, IWW or sea transport, mln. t·km / year	4402 (-7174)	3566 (-5927)	561 (-1535)	8528 (-14635)
	(25) Volume of road and air passenger traffic shifted to rail, mln. passenger·km / year	870 (-970)	557 (-828)	-49 (-418)	1378 (-2216)
LEVEL OF CONCERN :TRAFFIC TRANSFER	(26) Transfer of traffic from infrastructure lying in sensitive zones to the projected infrastructure, % of road traffic transferred from sensitive areas	74.0% (20,3%)	14.2% (23,2%)	19.7% (28,8%)	- -
LEVEL OF CONCERN: DISTANCE	(27) Percentage of the length of the project lying in a sensitive area, % length	19.0%	16.0%	21.0%	-
LEVEL OF CONCERN: EMISSIONS	(28a) Changes of inhabitants' level of concern caused by emissions of NOx, % NOx	-1.5% (4,2%)	-0.8% (4,9%)	1.7% (6,6%)	- -
	(28b) Changes of inhabitants' level of concern caused by emissions of particulates, % particulates	-2.7% (3,9%)	-1.3% (5,0%)	0.9% (5,8%)	- -
LEVEL OF CONCERN: PROXIMITY	(29) Synthetic appreciation of the proximity of the project from specially protected areas (SPAs) or densely populated areas. Proximity of the project from SPA, km	12.0%	2.0%	23.0%	-
MATURITY AND COHERENCE OF THE PROJECT					
DEVELOPMENT OF THE PROJECT	(30) Appraisal of the project planning status	1	1	1	-
INSTITUTIONAL SOUNDNESS	(31) Qualitative appraisal of the project's compliance with national plans	3	3	4	-
COHERENCE OF THE PROJECT	(32) Qualitative appraisal of the project's coherence with main international traffic corridors	3	3	3	-

Comments on the main results

Impact on passenger volumes and modal shift

- Road passenger transport volumes vary on average between 16.6 mln (P25.2, Katowice-Brno/Zilina motorway, cross-border section) and 27.8 mln (P25.1, Gdansk-Katowice motorway).
- P25.1 highlights with low improvements of potential travel time saving, although the dimension of the infrastructure measure is large and the expected demand at an upper level. This effect is mainly caused by the methodology applied for estimation of the indicator's performance: the changes in (potential) travel times measure the differences in travel times between the all projects scenario and the Reference 2 scenario, in an unloaded network, and on the route with the minimum generalised costs. In the Northern part sub-section P25.1 is significantly loaded by travel flows between Gdansk and Warszawa. In the Reference 2 scenario, without the motorway Gdansk – Torun – Lodz – Katowice being constructed, much demand is routed on the trunk road via Ostroda, which represents the most direct connection between Gdansk and Warszawa. With P25.1 being realised, demand is shifted from the trunk road to the new motorway. The new motorway however, constitutes an increased trip length for this important relation, which results in the effect that time saving due to improvements of the road level-of-service are compensated by an increase in trip length, such that differences in (potential) travel times, i.e. in unloaded networks, are negligible. P25.2 however, the motorway section from Katowice to the Slovak Republic, results in a comparatively high improvement of (potential) travel times, due to the

significant differences in the road level-of-service between the Reference 2 and the all projects scenario.

- The share of international volumes on a sub-section inform about the sub-section's relevance for international transport flows. For the interpretation of the performance values, the scope and the definition of the sub-sections have to be considered: A relatively short border-crossing sub-section is more likely to represent a high value than a large sub-section with a border-crossing link. Some sub-sections with a low share of international traffic volumes. P25.1 suggests the conclusion that their significance is mainly at national level, for passenger.

Impact on freight volumes and modal shift

- This priority project shows a decrease of road freight traffic with 8.5 bln. ton/km for the same reasons as in case of passenger transport, due to stronger competition with other rail projects.

Impact on accessibility

- Sub-section P25.1 highlights a relative strong improvement of centrality values of relatively poor and peripheral regions due to the associated improvement of centrality in the Polish regions Dolnoslaskie and Opolskie as well as the Czech regions Severovýchod, Strední Cechy and Jihovýchod.

Impact on transport safety

- There is a positive effect for sub-sections that comprise road projects and are not located in the peripheral areas of Europe. These effects can also be observed for all sub-sections in P25. The improvement of the road infrastructure will result in safer roads and therefore a decrease in the number of accidents.

Impact on environmental sustainability

- The change in emissions results in a decrease of about 3% of human health risks in the Gdansk-Katowice sub-section and an increase of about 2% in the Brno - Wien sub-section.
- In all sub-sections road traffic will very significantly be transferred away from sensitive areas.
- In all sub-sections, parts are located within potentially sensitive areas - between 16% and 21% of project lengths.

Impact on emissions

The overall impact on emission is quantified from the impact at the network level and the differences between the all project scenario and the reference 2 scenario are as follows:

- CO_2: net increase with 46.8 thousand tonnes,
- NO_x: net increase with 0.2 thousand tonnes,
- PM-10: net increase with 0.03 thousand tonnes.

The increase in emissions can be explained by the shift towards rail on the priority projects OD's. Further, the use of diesel locomotives makes possible this slight increase in emissions.

Development of the project

- P25.1: Gdansk-Katowice motorway. The design studies are ongoing and a financial plan is provided. The assigned score is +1.
- P25.2: Katowice-Brno/Zilina motorway, cross-border section. It involves 3 sections with the same level of development in planning and funding. The design studies are still ongoing. +1 is the score assigned.
- P25.3: Brno-Wien motorway, cross-border section. It involves 2 sections with the same level of development in planning and funding. The design studies are still ongoing. +1 is the score assigned.

6.22 P26 RAILWAY LINE/ ROAD IRELAND/UNITED KINGDOM/ CONTINENTAL EUROPE

6.22.1 Description of the priority project

Priority Project	Priority Project name	Sub-sections		Sections	Sub-section start date	Sub-section end date
P26	Railway line/road Ireland/United Kingdom/continental Europe	P26.1	Road/railway corridor linking Dublin with the North (Belfast-Larne) and South (Cork)	P26 IRL Strategic Road/Railway corridor linking Dublin with the North and South	2003	2010
		P26.2	Road/railway corridor Hull-Liverpool	P26 UK Road/Railway corridor Liverpool – Hull	2003	2020
		P26.3	Railway line Felixstowe-Nuneaton - Crewe - Holyhead	P26 UK Felixstowe–Nuneaton	2003	2012
				P26 UK Crewe–Holyhead rail line	2003	2008

The proposed improvements in this priority project are described elaborately in Table 6.43.

Table 6.43 *Project fiche P26*

Project	Description			
P26 Railway line/ road Ireland/ United Kingdom/ Continental Europe	The project is to improve and modernise road and rail links. This will reduce journey times between Ireland, the United Kingdom and the heart of mainland Europe, which will contribute to a better accessibility of all regions of the Community, while also improving network reliability and safety conditions			
Sections of the Project	Objectives	Description	Start date	End date
P26.1 Road/ railway corridor linking Dublin with the North (Belfast – Larne) and South (Cork)	Further investments in rail and road are required to better connect Dublin with the North and the South, given the economic and traffic developments and the need to improve links between outlying regions and the rest of Europe. In the rail transport sector, further modernisation is needed to increase the frequency, reliability and safety of trains. In the road transport sector, investment is needed to complete the upgrading of the major inter-urban routes to the North and to the South from Dublin, linking the three principal cities on the island and to set up a driver information system to improve traffic management.	The project sections are extensions of the priority road and rail projects adopted by the Essen European Council in 1994 [the Cork-Dublin – Belfast – Larne – Stranraer conventional rail link and the Ireland – United Kingdom – Benelux road link]. The new Irish rail network modernisation and upgrading projects will help increase the speed and frequency of passenger and freight services. It is estimated that 30 minutes will be saved on the journey time between Dublin and Cork, and a saving of 15 minutes on the journey time between Dublin and Belfast, thus making this means of transport more attractive. Road investments include new sections of the M/N1 from Dundalk to Newry and the border, work on the M7 and several bypasses. Development of a driver information system, will also help to optimise the use of the system, with benefits in terms of traffic flow and safety. It is anticipated that the road infrastructure investment on the Dublin –	2003	2010

		Border route will result in journey time savings of 24 minutes on the full route (based on 1999 journey times) and investment on the Dublin – Cork route will result in journey time savings of 58 minutes on the full route.		
P26.2 Road/ railway corridor Hull – Liverpool	The project between Liverpool and Hull will significantly shorten journey times for passengers and freight between Ireland and the ports of Belgium and the Netherlands, contributing to the economic and social cohesion of one of Europe's peripheral regions.	This section of about 190 km includes improvements on a road/ railway East-West axis between Liverpool and Hull. This route is of particular importance for the transport of freight, linking two major ports of the East and West coasts of the United Kingdom, and requesting therefore the necessary upgrading to increase the capacity.	2003	2015
P26.3 Railway line Felixstowe – Nuneaton – Crewe – Holyhead	The construction works and the modernization of the Felixstowe - Nuneaton rail line should help increase the capacity of a main line crossing the United Kingdom from east to west linking Ireland and the United Kingdom with Continental Europe and the main ports. Felixstowe is Europe's fourth largest container port. Connecting with the West Coast Main Line, this line is a key route for the shipment of containers to terminals in Birmingham, Crewe, Holyhead, Manchester, Liverpool and Scotland. A longer term objective is the potential release of additional paths on the existing routes of the Great Eastern, North London Line and the West coast main line south of Nuneaton for passenger and freight.	The United Kingdom's modernisation projects relate firstly to the Felixstowe-Nuneaton railway link. In addition, there are plans to install the ERTMS rail traffic management system along the length of the Crewe-Holyhead railway line. These projects should help increase the capacity of a line crossing the United Kingdom from east to west, from the port of Felixstowe, from the current 13 trains to approximately 30 trains a day in each direction. Upgrading to permit high containers on standard wagons, incl. 1 tunnel, bridge reconstruction at 4 locations, overhead line modification, track lowering, platform modification are also included. The first phase of installation of the ERTMS rail traffic management system is scheduled to be launched by 2005 on the Crewe-Holyhead route. When the upgrade is complete the capacity will double from 15 to 30 trains a day in each direction. This is in line with the strategy of developing rail-based freight transport and rail-sea intermodality.	2003	2011

6.22.2 Impact on the level of traffic flows

The impact at the level of traffic flows is identified at infrastructure level as follows:

- Rail passenger flows P26, total interregional,
- Rail passenger flows P26, international,
- Rail freight flows P26, total interregional,
- Rail freight flows P26, international,
- Road passenger flows P26, total interregional,
- Road passenger flows P26, international,
- Road freight flows P26, total interregional,
- Road freight flows P26, international.

The impact at the level of traffic flows is illustrated by the figures hereunder.

Figure 6.85 *Rail passenger flows P26, total interregional*

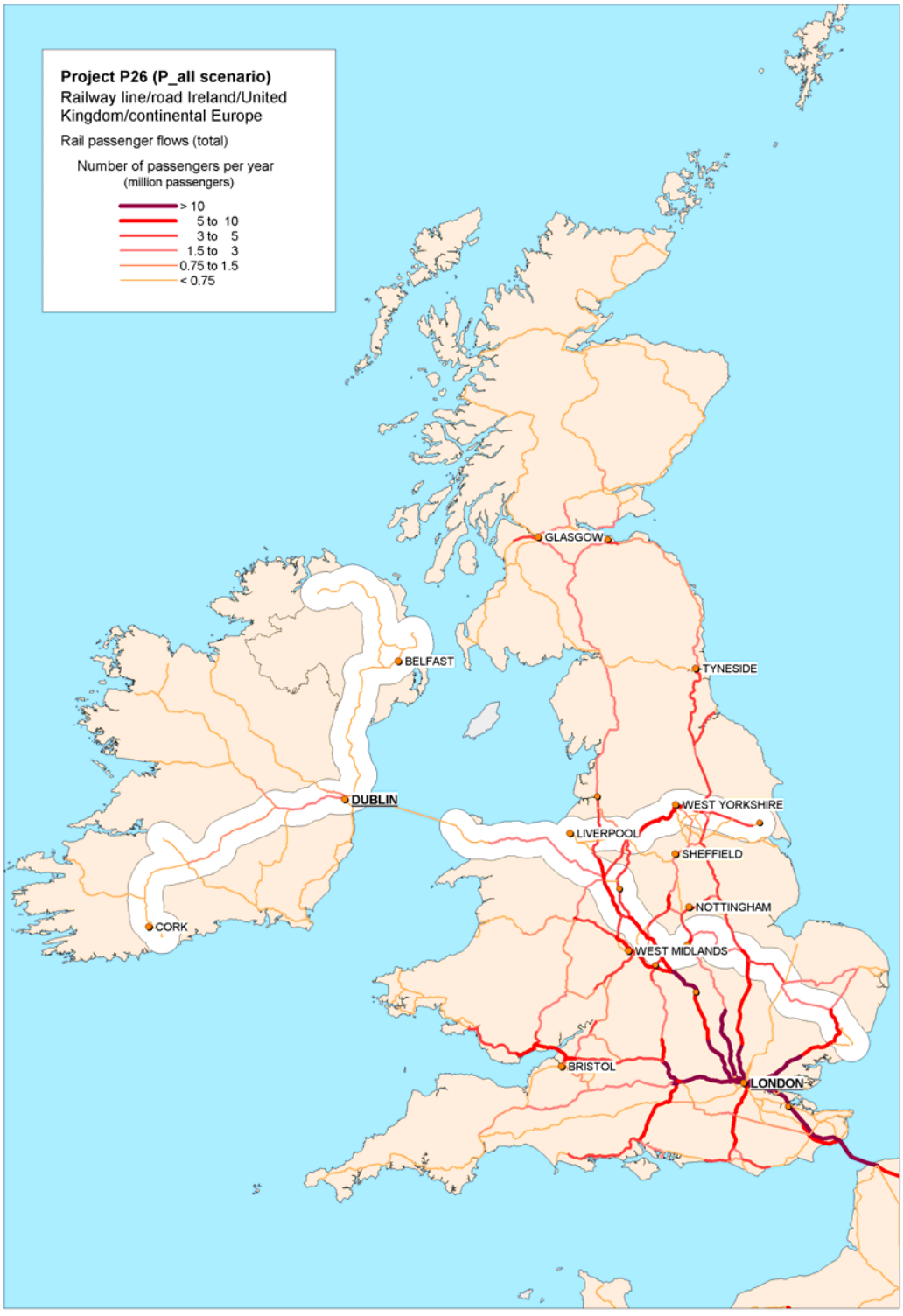


Figure 6.86 *Rail passenger flows P26, international*

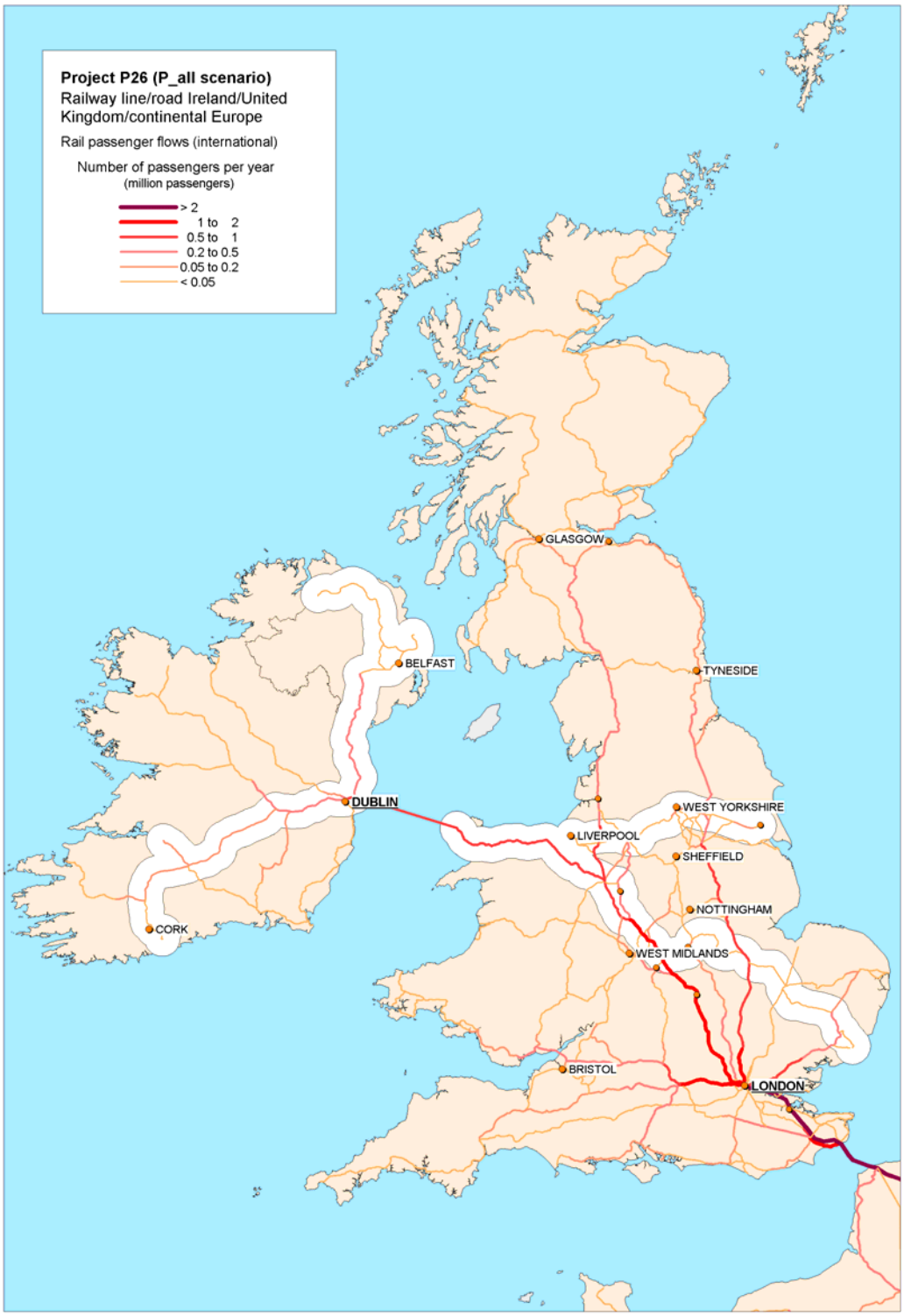


Figure 6.87 *Rail freight flows P26, total interregional*

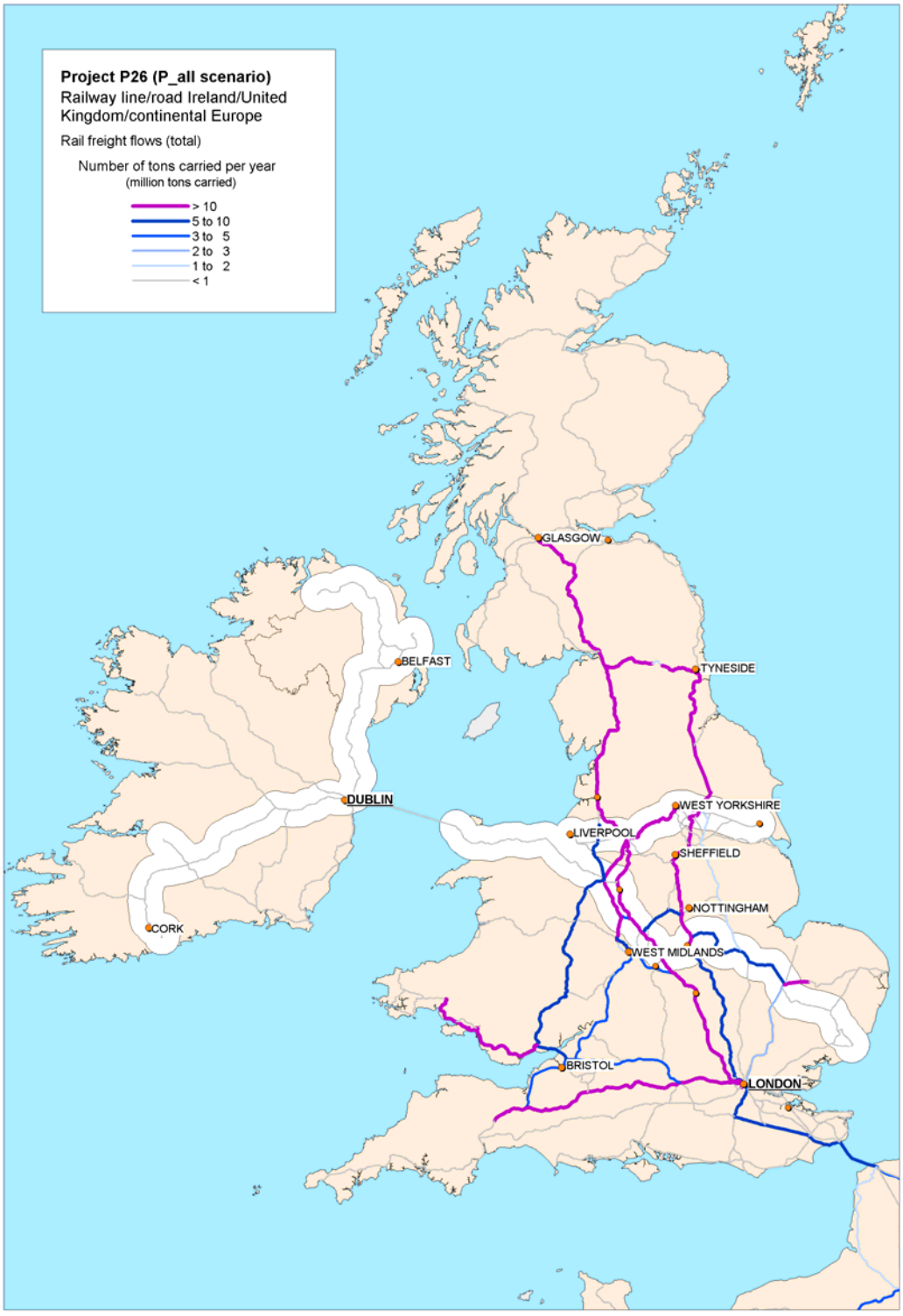


Figure 6.88 *Rail freight flows P26, international*

Figure 6.89 *Road passenger flows P26, total interregional*

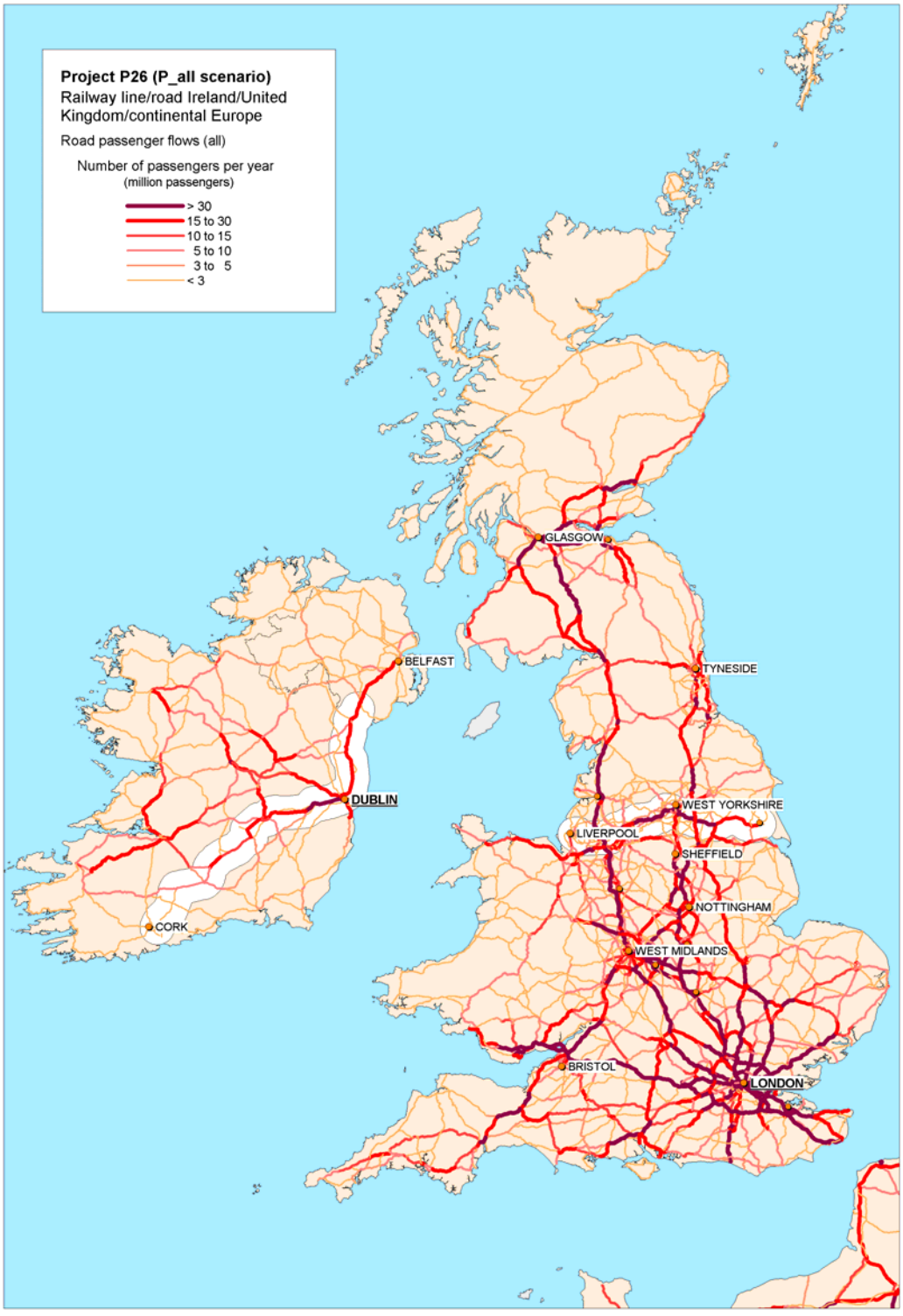


Figure 6.90 *Road passenger flows P26, international*

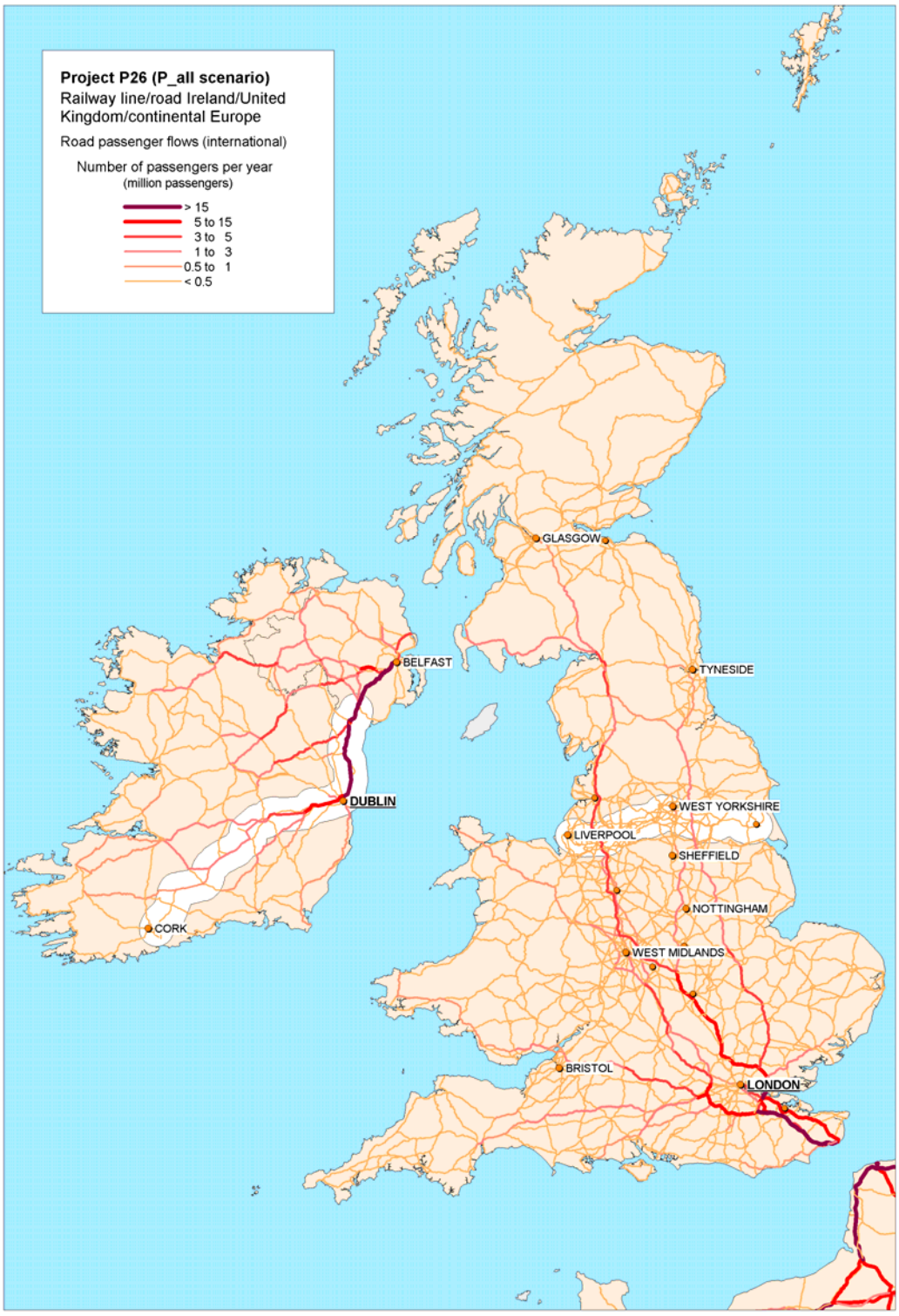


Figure 6.91 *Road freight flows P26, total interregional*

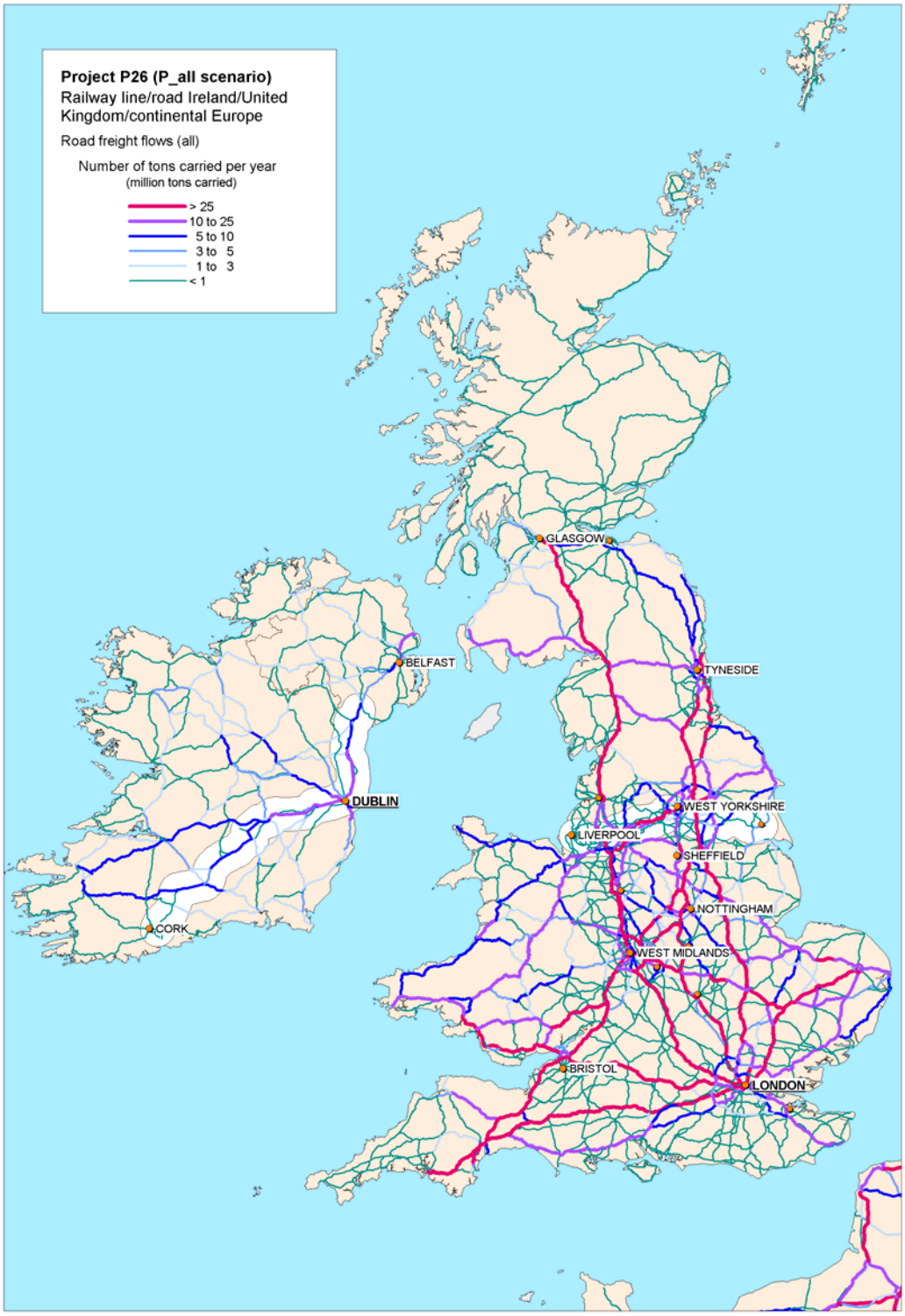
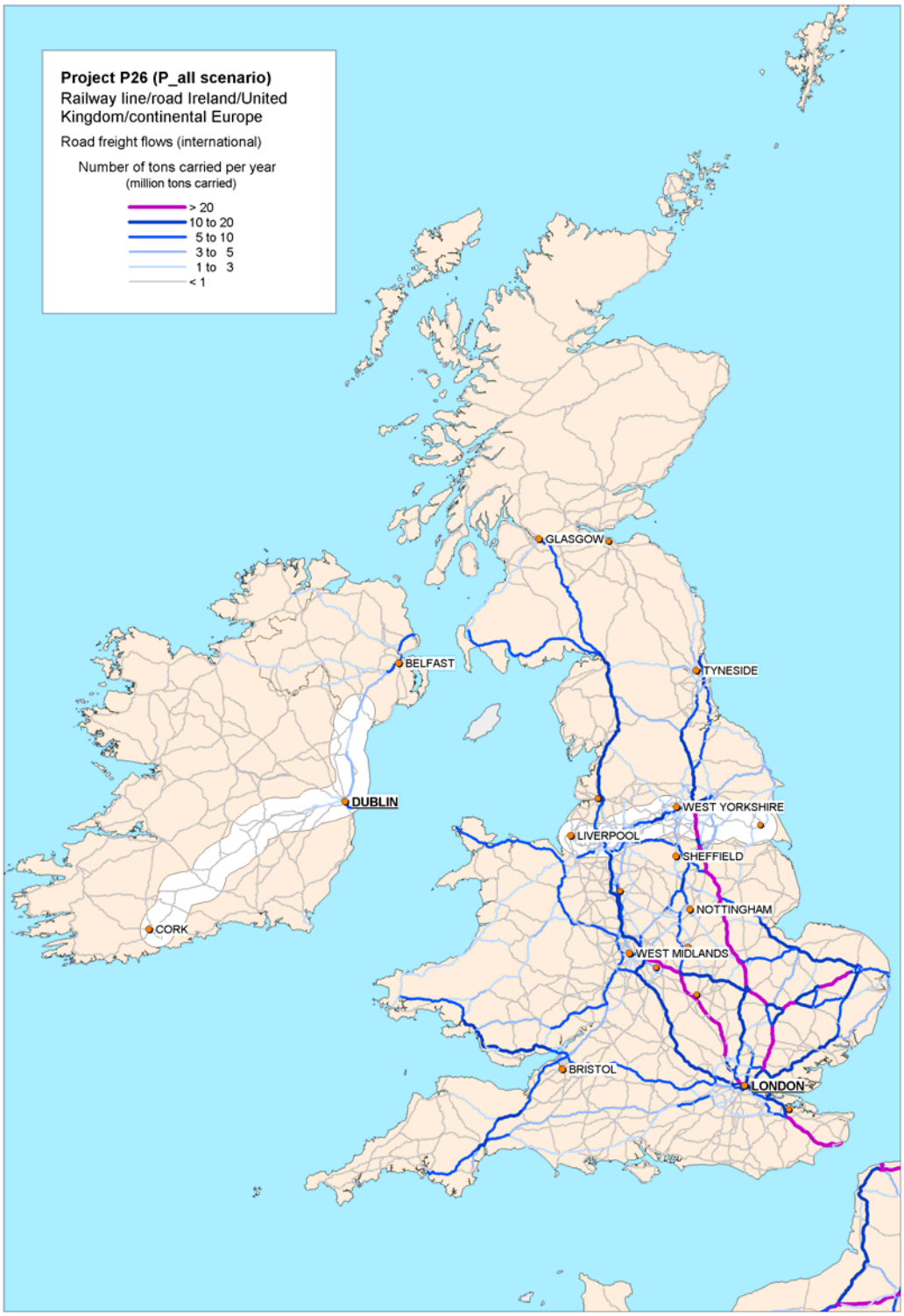


Figure 6.92 *Road freight flows P26, international*



6.22.3 Estimated aggregated impacts of the priority project

This project was approached at a high level of detail: NUTS3 zoning system for UK and 169 ports considered as origin / destinations of the sea related freight flows, in order to catch the hinterland of the UK ports on all land modes – road and rail, and in this way to better identify the share of international traffic on the infrastructure.

In the following table, the impact variables for the all projects scenario are presented for all sub-sections of the priority project. Between brackets, the values of the individual project scenarios are given. The methodology of the impact variables is described in D6, Chapter 3.6.

Table 6.44 *Impact variables P26: Railway line/road Ireland/United Kingdom/continental Europe*

Objective	Indicator	P26.1	P26.2	P26.3	P26 Total
ECONOMIC IMPACTS IN THE TRANSPORT SECTOR					
IMPROVEMENT OF ROAD LEVEL SERVICE	(1) Changes in time costs caused by road congestion, mln. € / year	-15.3 (-90)	0.2 (-36.6)	-4.2 (-100.5)	-19.3 (-227.2)
REDUCTION OF TRAVEL TIME	(2a) Changes in monetary value of the reduction of passenger travel time, mln. € / year	-105.7 (-99.9)	-72.4 (-67)	-58.3 (-53.7)	-236.4 (-220.6)
	(2b) Changes in passenger travel time, mln hour / year	-6.6 (-6.6)	-5.8 (-5.7)	-4.7 (-4.6)	-17.1 (-16.8)
	(3) Changes in monetary value of the reduction of freight travel time, mln. € / year	-2.9 (-3.2)	-8.7 (-8.6)	-12.5 (-12.5)	-24.1 (-24.3)
ENVIRONMENTAL SUSTAINABILITY					
GLOBAL WARMING	(4a) Change (in monetary value) of the transport contribution to global warming, mln. € / year	4.785 (5.747)	1.057 (0.015)	-0.010 (1.586)	5.832 (7.348)
	(4b) Change of the transport contribution to global warming, 1000 kg CO2 / year	203602 (244570)	44969 (657)	-426 (67507)	248145 (312734)
ATMOSPHERIC POLLUTION	(5a) Change (in monetary value) of the NOX transport emission, mln. € / year	-0.225 (-0.516)	0.275 (-0.093)	-1.017 (-0.43)	-0.967 (-1.039)
	(5b) Change of the NOX transport emission, 1000 kg NOx / year	-38 (-142)	113 (-27)	-174 (-117)	-99 (-286)
	(6a) Change (in monetary value) of particulates' emissions of transport, mln. € / year	0.024 (0)	0.090 (0.009)	-0.011 (-0.005)	0.103 (0.004)
	(6b) Change of particulates' emissions of transport, 1000 kg particulates / year	4 (2)	7 (1)	0 (0)	11 (3)
TRANSPORT SAFETY	(7) Variation on monetary value of accidents, mln. € / year	-74.9 (-122.2)	-10.7 (-1.2)	-22.5 (-6.5)	-108.1 (-129.9)
INVESTMENT COST					
INVESTMENT COST	(8) Total project costs, mln. €	469	1750	420	2639
GENERAL TRANSPORT RELEVANCE					
TOTAL TRAFFIC VOLUME ON THE PROJECT	(10) Total passenger traffic on the project section, mln. passengers / year	13.9 (13.8)	3.9 (3.9)	2.6 (2.6)	- -
	(11a) Maximum freight traffic on the project section, mln. ton / year	13.7 (17.2)	28.9 (24.7)	14.9 (17.2)	28.9 (24.7)
	(11b) Average freight traffic on the project section, mln. ton / year	7.1 (7.4)	9.2 (10.7)	3.0 (4.4)	- -
	(11c) Total freight traffic on the project section, mln. ton km /year	6425 (6718)	1836 (2135)	1294 (1942)	9555 (10795)
INTERMODALITY	(12) Quantitative appraisal of the project's contribution for an intermodal transport system, mln. ton	0.0 (0)	1.8 (1.8)	0.4 (0.4)	2.2 (2.2)

Objective	Indicator	P26.1	P26.2	P26.3	P26 Total
CREATION OF EUROPEAN VALUE ADDED					
DEVELOPMENT OF INTERNATIONAL PASSENGER TRAFFIC	(13) Share of international passenger traffic on total traffic on the project, %	32.6 (31.7)	1.4 (1.4)	11.6 (11.3)	- -
	(14) Volume of international passenger traffic on the project, mln. passengers / year	4.5 (4.4)	0.1 (0.1)	0.3 (0.3)	- -
DEVELOPMENT OF INTERNATIONAL FREIGHT TRAFFIC	(15) Share of international freight traffic on total traffic on the project, %	15.5 (13.9)	11.1 (2.1)	37.1 (34.9)	- -
	(16) Volume of international freight traffic on the project, mln. tons / year	1.0 (1)	1.0 (0.2)	1.1 (1.6)	- -
INTEROPERABILITY	(17) Reduction of passengers waiting time at borders for international traffic	N/a	N/a	N/a	-
	(18) Reduction of freight waiting time at borders for international traffic	N/a	N/a	N/a	-
	(19) Length of networks becoming interoperable because of the project	N/a	N/a	N/a	-
IMPROVEMENT OF ACCESSIBILITY					
PASSENGER ACCESSIBILITY	(20) Variation of the STAC centrality index for passenger transport, %	0.01 (0.02)	0.01 (0.02)	0.02 (0.02)	- -
FREIGHT ACCESSIBILITY	(21) Variation of the STAC centrality index for freight transport, %	0.00 (0)	0.00 (0)	0.00 (0)	- -
PERIPHERAL ACCESSIBILITY	(22) Variation of the STAC centrality index for passenger transport in regions identified as peripheral, %	0.17 (0.23)	0.02 (0.02)	0.42 (0.49)	- -
	(23) Variation of the STAC centrality index for freight transport in regions identified as peripheral, %	0.32 (0.38)	0.00 (0)	0.27 (0.44)	- -
ENVIRONMENTAL SUSTAINABILITY					
MODAL REBALANCING	(24) Volume of road freight traffic shifted to rail, IWW or sea transport, mln. t·km / year	-525 (75)	349 (426)	505 (399)	330 (900)
	(25) Volume of road and air passenger traffic shifted to rail, mln. passenger·km / year	-544 (-1021)	-375 (-79)	-132 (8)	-1051 (-1092)
LEVEL OF CONCERN :TRAFFIC TRANSFER	(26) Transfer of traffic from infrastructure lying in sensitive zones to the projected infrastructure, % of road traffic transferred from sensitive areas	4.0% (-0,8%)	-0.2% (-1,1%)	-0.6% (-1,4%)	- -
LEVEL OF CONCERN: DISTANCE	(27) Percentage of the length of the project lying in a sensitive area, % length	0.0%	9.0%	14.0%	-
LEVEL OF CONCERN: EMISSIONS	(28a) Changes of inhabitants' level of concern caused by emissions of NOx, % NOx	12.8% (-1,2%)	2.2% (0,0%)	0.5% (-0,1%)	- -
	(28b) Changes of inhabitants' level of concern caused by emissions of particulates, % particulates	12.4% (-1,0%)	1.7% (0,0%)	0.5% (-0,1%)	- -
LEVEL OF CONCERN: PROXIMITY	(29) Synthetic appreciation of the proximity of the project from specially protected areas (SPAs) or densely populated areas. Proximity of the project from SPA, km	0.0%	4.0%	15.0%	-
MATURITY AND COHERENCE OF THE PROJECT					
DEVELOPMENT OF THE PROJECT	(30) Appraisal of the project planning status	3	N/a	2	-
INSTITUTIONAL SOUNDNESS	(31) Qualitative appraisal of the project's compliance with national plans	3	3	3	-
COHERENCE OF THE PROJECT	(32) Qualitative appraisal of the project's coherence with main international traffic corridors	2 / 1	1/0	N/a	-

Comments on the main results

Impact on passenger volumes and modal shift

- Passenger transport volumes are forecasted to vary on average between 2.6 mln (P26.3, railway line Felixstowe-Nuneaton - Crewe - Holyhead) and 13.9 mln passengers per year (P26.1, road/ railway corridor linking Dublin with the North (Belfast – Larne) and South (Cork).
- Due to the dominance of the road infrastructure measures for the multi-modal priority project P26 an increase in road passenger transport of 1051 mln pkm is expected.

- The share of international volumes on a sub-section inform about the sub-section's relevance for international transport flows. For the interpretation of the performance values, the scope and the definition of the sub-sections have to be considered: A relatively short border-crossing sub-section is more likely to represent a high value than a large sub-section with a border-crossing link. Some sub-sections with a low share of international traffic volumes. P26.2 suggests the conclusion that their significance is mainly at national level, for passenger (and freight).

Impact on freight volumes and modal shift

- The average interregional freight transport volume varies between 9.2 mln ton on P26.2 and 3.0 mln ton on P26.3;
- The priority project will result in an increase in the transported rail freight tonnage in the priority project of 2.2 mln ton at the expense of (primarily) road freight transport;
- Total transport shift to rail freight is 330 mln. ton-km.

Impact on infrastructure network use

The detailed analysis carried out by the consortium has revealed the following impacts on infrastructure use:

- For freight a growth of the rail traffic flows is observed along the priority project route, in spite of the fact that road improvements have been considered simultaneously.

Impact on transport safety

There is a positive effect for sub-sections that comprise road projects and are not located in the peripheral areas of Europe. These effects can also be observed for sub-section P26.1. The improvement of the road infrastructure will result in safer roads and therefore a decrease in the number of accidents.

Impact on environmental sustainability

- The change in emissions results in an increase (around 9%) of human health risks along the Dublin sub-section, and marginal increases in the two other sub-sections.
- Transfer of road traffic away from sensitive areas is negligible.
- In two of the sub-sections parts of the project is located within potentially sensitive areas, but in no part of the sub-section with more than 14% of the project length.

Impact on emissions

The overall impact on emission is quantified from the impact at the network level and the differences between the all project scenario and the reference 2 scenario are as follows:

- CO_2: net increase with 248 thousand tonnes,
- NO_x: net decrease with 0.1 thousand tonnes,
- Particulates: not significant changes are observed.

In case of priority project P26 we can observe different effects on freight – shift towards rail, and passenger – shift towards road. Finally, the environmental impact is given by the cumulative effects of changes concerning different transport modes.

Development of the project

- P26.1: Road/railway corridor linking Dublin with the North (Belfast-Larne) and South (Cork). Concerning the corridor Dublin - North the design work and feasibility studies will extend over the next few years. The start of works is expected to be in 2004. Concerning the corridor Dublin - South the works start in 2003. Those corridors are considered by the Irish Government to be significant new investments to take place over the next 20 years. Some financial decisions have already been taken. The score assigned to this sub-section is +3.
- P26.2: Road/railway corridor Hull-Liverpool. There is not information available to assign a score to this sub-section.
- P26.3: Railway line Felixstowe-Nuneaton - Crewe – Holyhead. It involves 2 sections with different level of development. Felixstowe–Nuneaton has a score of +3, while Crewe–Holyhead rail line has a score of +1 because the first phase of installation of the ERMTS rail traffic management system is scheduled to be launched by 2005 on this route. Therefore the score for the sub-section has been carried out as an average score taking into account the single scores and the costs of the 2 sections. The assigned score is +2.

6.23 P27 "RAIL BALTICA" LINE WARSAW-KAUNAS-RIGA-TALINN

6.23.1 Description of the priority project

Priority Project	Priority Project name	Sub-sections		Sections	Sub-section start date	Sub-section end date
P27	"Rail Baltica" line Warsaw-Kaunas-Riga-Tallinn	P27.1	Warsaw-Kaunas	P27 PL Lithuanian border - Warsaw	2008	2010
		P27.2	Kaunas-Riga	P27 LT Kaunas – Joniskis- Polish border	2010	2014
		P27.3	Riga-Tallinn	P27 LV Latvian section (via Riga)	2012	2016
				P27 EE Estonian section (as far as Tallinn)	2012	2016

The infrastructure improvements involve the modernisation and partly new construction of the current rail network in Estonia, Latvia and Lithuania, amongst others aiming to make the network interoperable with Polish and German networks. The railway line will accommodate both freight and passenger trains.

One of the principal direct objectives is to increase the speed of rail transport and reduce the waiting times at borders. The railway line will also expand the present transport capacity. The projects as planned are expected to improve the links of the Baltic countries with the European Centre and therefore contribute to integration in the EU. Both with respect to passenger as with respect to freight transport the projects are expected to realise a significant modal shift towards rail transport at the expense of road transport.

Table 6.45 *Project fiche P27*

Project	Description			
P27 "Rail Baltica" line Warsaw – Kaunas – Riga – Tallinn	This project is included in the Rail Baltica project, which consists in renewing the rail network in Estonia, Latvia and Lithuania, including making it interoperable with the rest of the European network. It will help the development of the rail mode that is currently an under-used mode of transport in the 3 Baltic countries. The better traffic conditions on this corridor will help to improve the 3 Baltic countries' links with the hearth of the European continent, thus helping to integrate these outlying countries into the future enlarged Union. As far as goods are concerned, the project will help to increase the capacity of the rail network and to introduce intermodal transportation, thus boosting trade with all European countries. As far as passengers are concerned, cutting a journey times to Central Europe will bring an appreciable reduction in the volume of road traffic to Poland and Germany.			
Sections of the Project	Objectives	Description	Start date	End date
P27.1 Warsaw – Kaunas	The main objective of this project is to reduce the waiting time at the Lithuanian/ Polish border. With the increase of international traffic on the link between Poland and the Baltic States the gauge	The Warsaw – Kaunas project includes the construction of a new European Gauge (1435 mm), single - track railway line section, the length of which is approximately 100 km on the Lithuanian territory. This section would connect the Polish railway line Warsaw – Bialystok – Sokolka – Trakiszki (E75) with the Lithuanian network line Minsk – Vilnius – Kaunas – Kaliningrad, whose gauge is 1524 mm, via a	n.a.	2015

	difference between Lithuania and Poland becomes more problematic. A Memorandum of Understanding regarding the operational testing of the device was signed in 1998 by the Ministers and Railway managers from Germany, Poland, Finland and Lithuania. The pilot automatic gauge change device was installed at the Polish/ Lithuanian border station in Mockava in September 1999.	logistical centre equipped with automatic gauge changing equipment. The place of this connection is in the Southern suburb of Kaunas. On the Polish territory a second track will be added on the sections missing and the total line will be upgraded to a speed of 160 km/ h.		
P27.2 Kaunas – Riga	Objective of this project is to reduce the waiting time at the Lithuanian/ Polish border. Another objective that the project will reach it will be the integration of 4 acceding countries into European transport network as well as a better accessibility to the North – West Region of Russia.	The Kaunas – Riga project includes the construction of a new European Gauge (1435 mm), single - track railway line section, the length of which is approximately 100 km. This section would connect the Polish railway line Warsaw – Bialystok – Sokolka – Trakiszki (E75) with the Lithuanian network line Minsk – Vilnius – Kaunas – Kaliningrad, whose gauge is 1524 mm, via a logistical centre equipped with automatic gauge changing equipment. The place of this connection is in the Southern suburb of Kaunas. There are no tunnels or big bridges involved. The expected capacity will increase to 60 trains per day. The implementing of this investment project will reduce waiting time at Lithuanian/ Polish state border, for passengers trains from 40 minutes to 0 minutes and for the freight trains from 130 minutes to 0 minutes. It will reduce also the operating cost of 10%. The project will give opportunities for successful integration of 4 acceding countries – Estonia, Latvia, Lithuania and Poland – into the European transport network. It will also give a possibility to access the North-West Region of Russia (St Petersburg).	2006	2010
P27.3 Riga – Tallinn	This project will enable the interoperability with EU standards between the Estonian and the Latvian rail network, reducing journey times and waiting times at the border for both passengers and freight traffic. It will give also the opportunity to Estonia and Latvia to integrate their network with the European network.	The project includes an Estonian and a Latvian section. In Estonia a new infrastructure, double tracks, electrified, designated separately for passengers and cargo will be built. Its length will depend on the chosen corridor and could be between 170 and 250 km. The design and the interoperability standards will be EU standards with maximum speed 200 km/ h. In Latvia a new rail infrastructure with 2 tracks will be constructed. Its length will be between 220 and 250 km. The design and the interoperability standards will be EU standards with maximum speed 200 km/ h. No tunnels will be involved.	2008	2015

6.23.2 Impact on the level of traffic flows

The impact at the level of traffic flows is identified at infrastructure level as follows:

- Rail passenger flows P27, total interregional,
- Rail passenger flows P27, international,
- Rail freight flows P27, total interregional,
- Rail freight flows P27, international.

The impact at the level of traffic flows is illustrated by the figures hereunder.

Figure 6.93 *Rail passenger flows P27, total interregional*

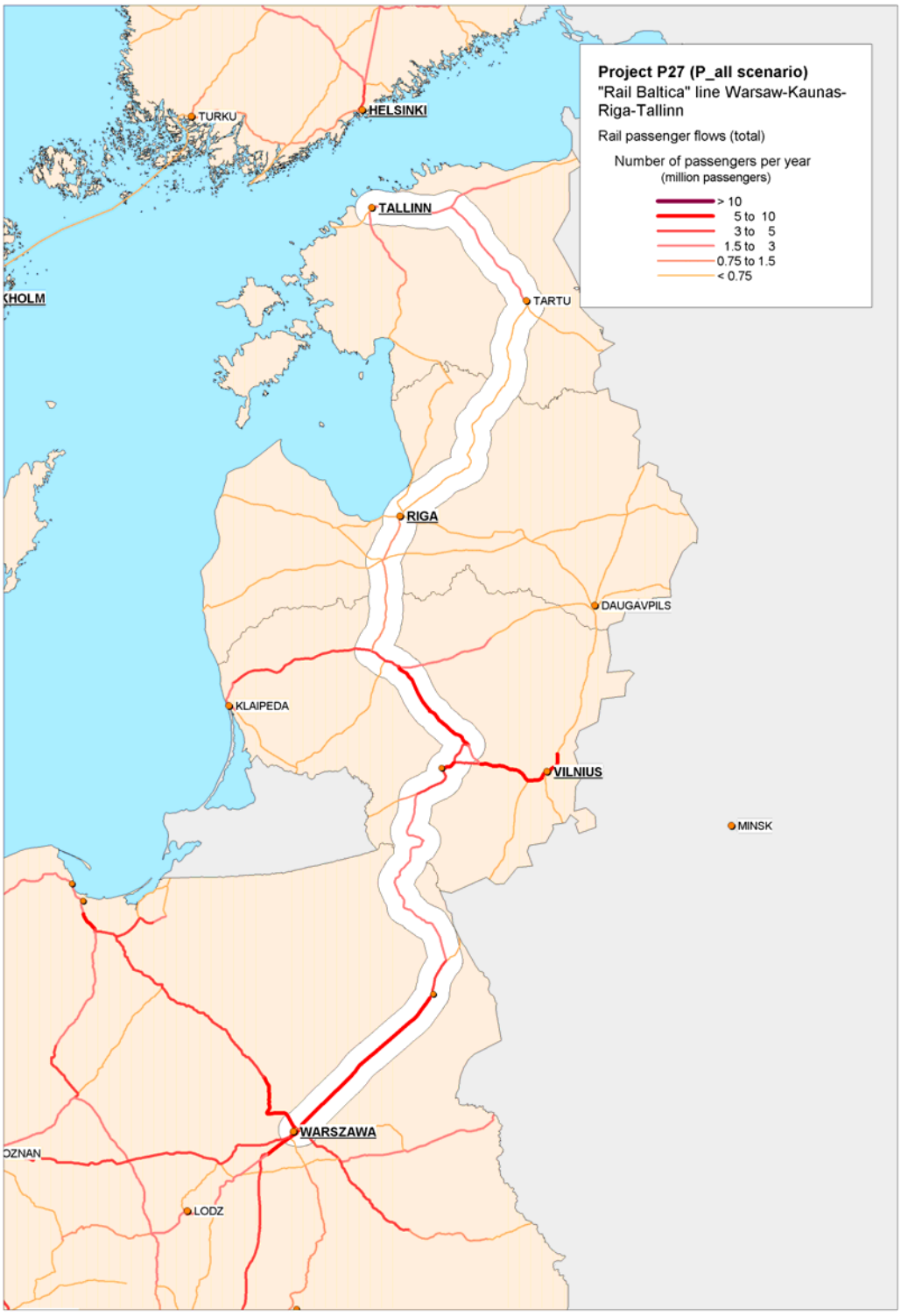


Figure 6.94 *Rail passenger flows P27, international*

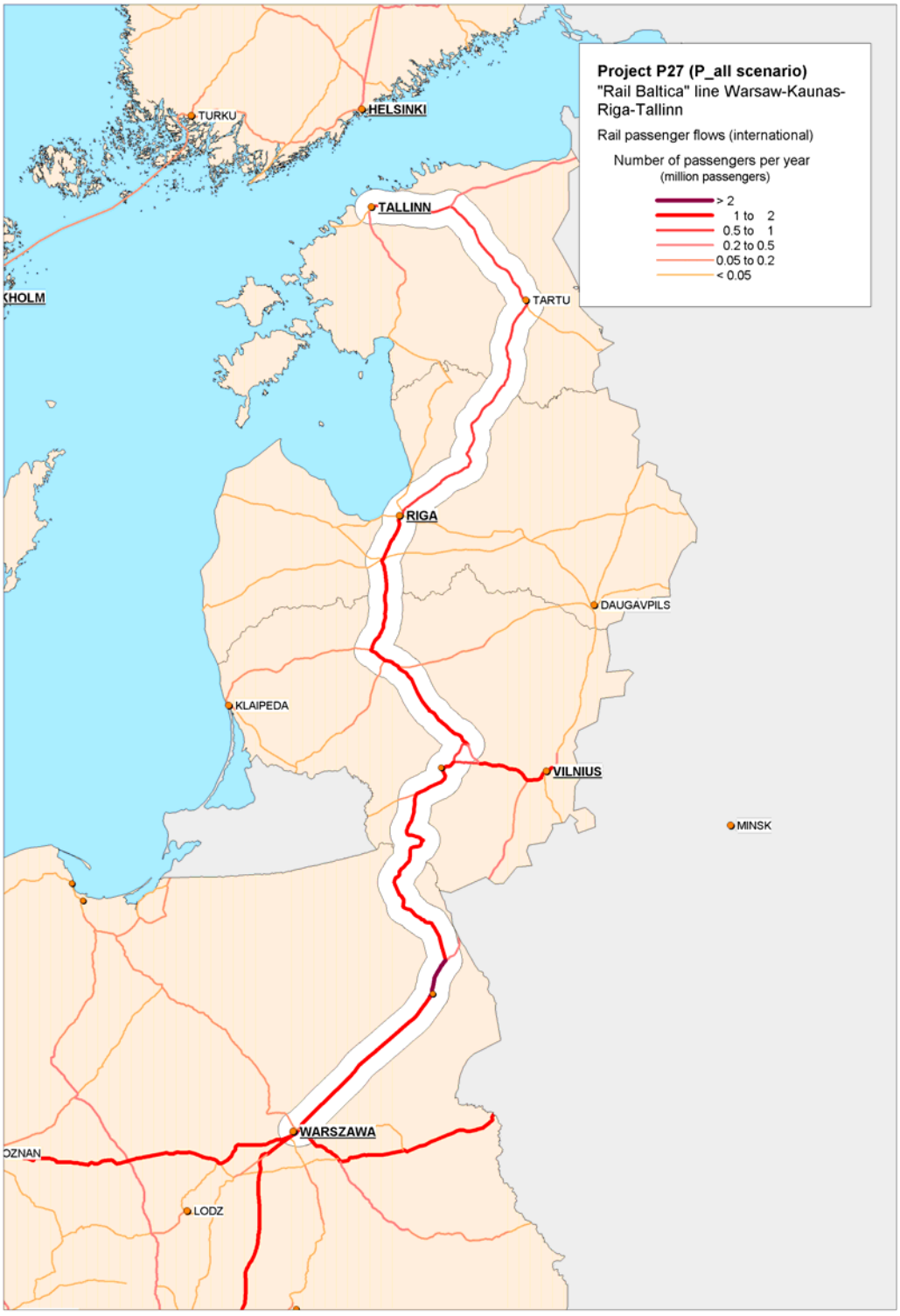


Figure 6.95 *Rail freight flows P27, total interregional*

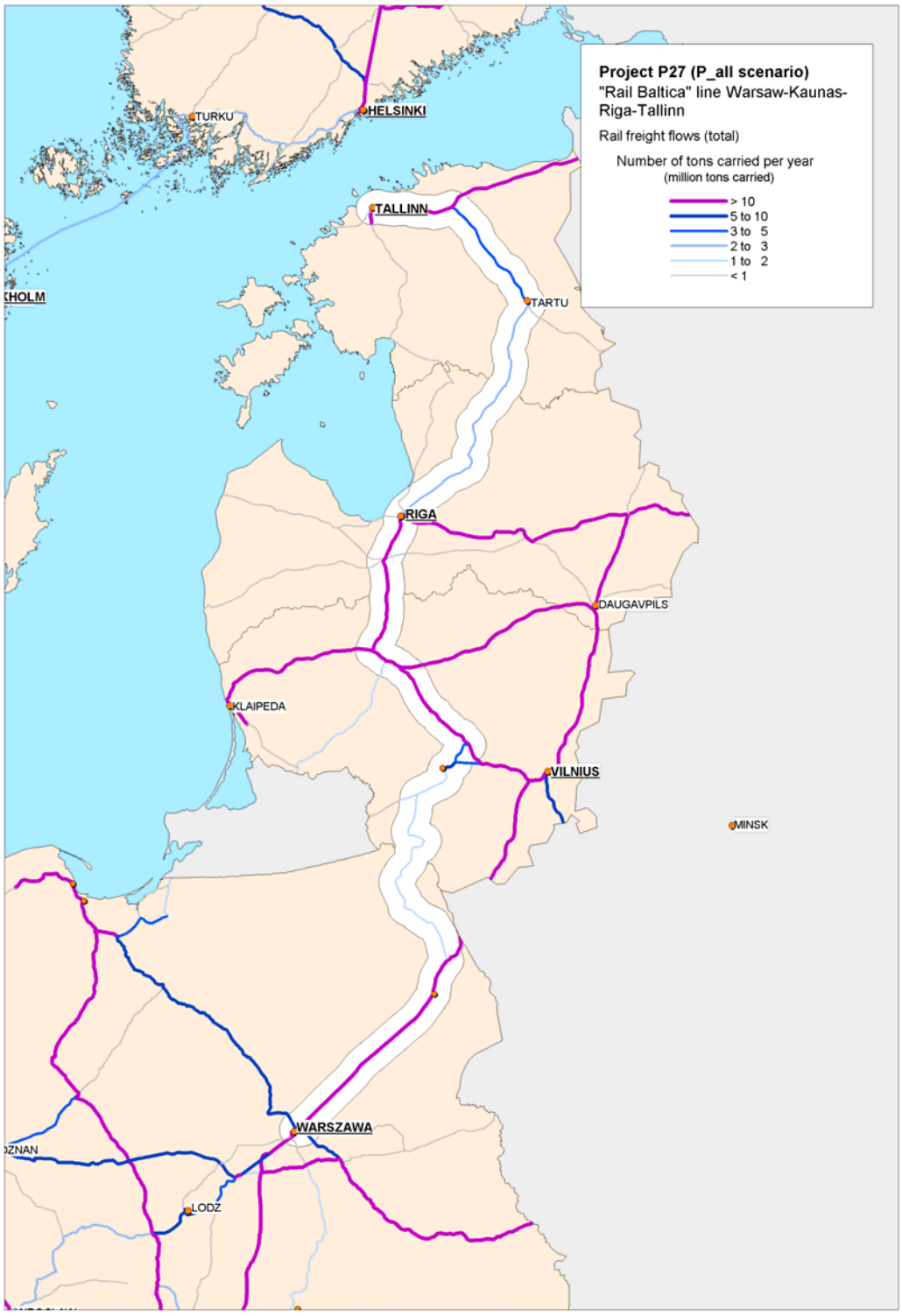
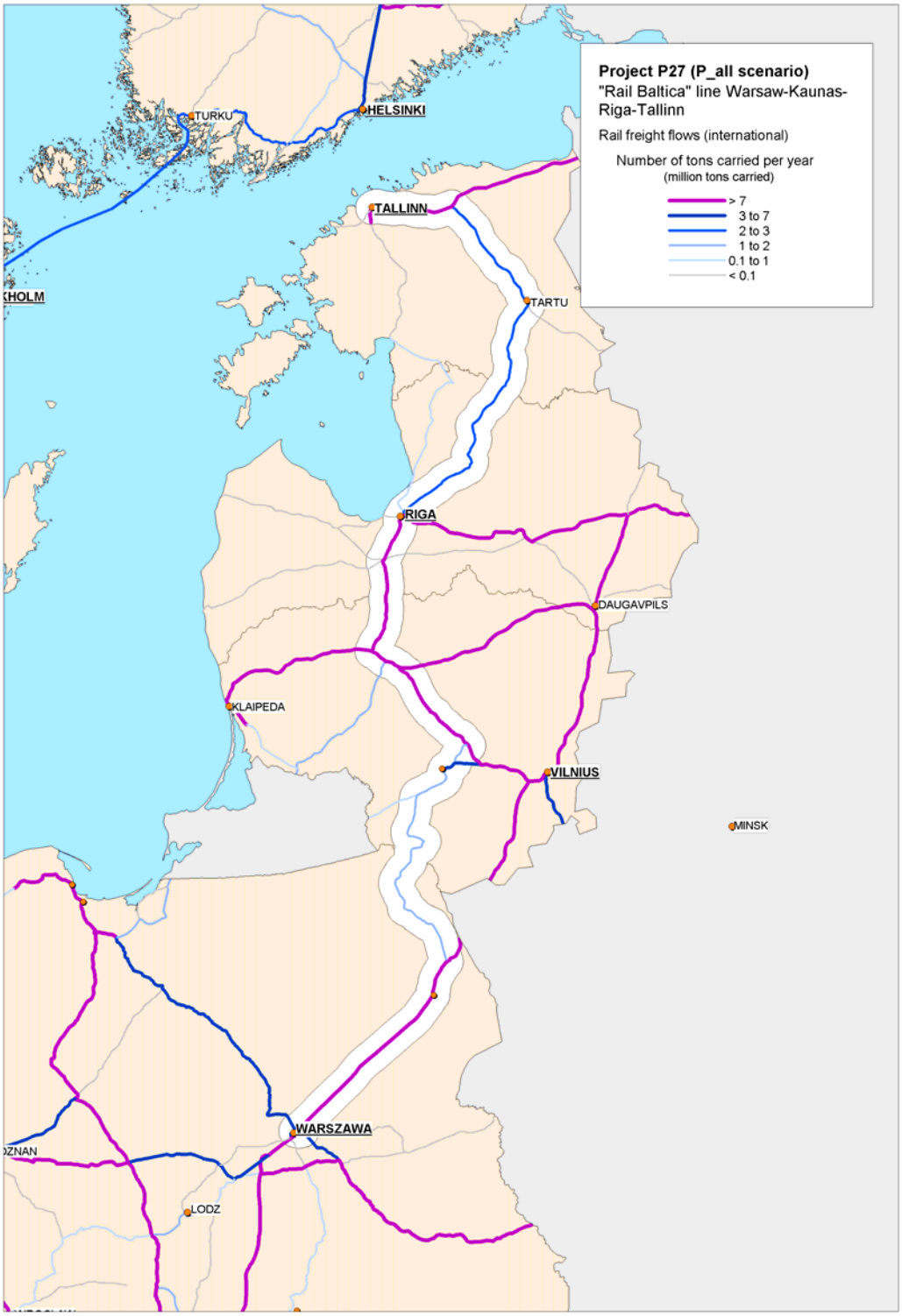


Figure 6.96 *Rail freight flows P27, international*



6.23.3 Estimated aggregated impacts of the priority project

In the following table, the impact variables for the all projects scenario are presented for all sub-sections of the priority project. Between brackets, the values of the individual project scenarios are given. The methodology of the impact variables is described in D6, Chapter 3.6.

Table 6.46 *Impact variables P27: "Rail Baltica" line Warsaw-Kaunas-Riga-Tallinn*

Objective	Indicator	P27.1	P27.2	P27.3	P27 Total
ECONOMIC IMPACTS IN THE TRANSPORT SECTOR					
IMPROVEMENT OF ROAD LEVEL SERVICE	(1) Changes in time costs caused by road congestion, mln. € / year	-0.9 (0)	-0.5 (0)	0.0 (0)	-1.5 (0)
REDUCTION OF TRAVEL TIME	(2a) Changes in monetary value of the reduction of passenger travel time, mln. € / year	-22.9 (-22.2)	-96.6 (-91.2)	-11.0 (-10.2)	-130.5 (-123.6)
	(2b) Changes in passenger travel time, mln hour / year	-3.0 (-3.1)	-12.2 (-12.2)	-1.4 (-1.3)	-16.6 (-16.6)
	(3) Changes in monetary value of the reduction of freight travel time, mln. € / year	-15.6 (-16.9)	-18.2 (-20.2)	-3.5 (-3.2)	-37.3 (-40.3)
ENVIRONMENTAL SUSTAINABILITY					
GLOBAL WARMING	(4a) Change (in monetary value) of the transport contribution to global warming, mln. € / year	2.829 (-0.288)	2.784 (-0.249)	-4.755 (0.003)	0.858 (-0.534)
	(4b) Change of the transport contribution to global warming, 1000 kg CO2 / year	120398 (-12243)	118464 (-10613)	-202327 (129)	36535 (-22727)
ATMOSPHERIC POLLUTION	(5a) Change (in monetary value) of the NOX transport emission, mln. € / year	1.319 (1.299)	3.831 (1.291)	-2.260 (0.016)	2.890 (2.606)
	(5b) Change of the NOX transport emission, 1000 kg NOx / year	672 (588)	1782 (583)	-1085 (8)	1369 (1179)
	(6a) Change (in monetary value) of particulates' emissions of transport, mln. € / year	0.272 (0.259)	0.713 (0.258)	-0.385 (0.005)	0.600 (0.522)
	(6b) Change of particulates' emissions of transport, 1000 kg particulates / year	38 (35)	98 (35)	-56 (1)	81 (71)
TRANSPORT SAFETY	(7) Variation on monetary value of accidents, mln. € / year	-46.1 (-12.4)	-12.9 (-15.3)	-3.2 (-3.8)	-62.2 (-31.5)
INVESTMENT COST					
INVESTMENT COST	(8) Total project costs, mln. €	N/a	230	1000	1230
GENERAL TRANSPORT RELEVANCE					
TOTAL TRAFFIC VOLUME ON THE PROJECT	(10) Total passenger traffic on the project section, mln. passengers / year	3.6 (3.5)	3.3 (3.3)	1.2 (1.2)	- -
	(11a) Maximum freight traffic on the project section, mln. ton / year	33.5 (25.5)	91.9 (91.9)	36.6 (36.6)	91.9 (91.9)
	(11b) Average freight traffic on the project section, mln. ton / year	16.3 (12.4)	22.7 (22.7)	8.3 (8.3)	- -
	(11c) Total freight traffic on the project section, mln. ton km /year	7203 (5505)	6663 (6663)	3535 (3534)	17401 (15701)
INTERMODALITY	(12) Quantitative appraisal of the project's contribution for an intermodal transport system, mln. ton	3.4 (6)	3.3 (3.4)	0.6 (0.7)	7.3 (10.1)
CREATION OF EUROPEAN VALUE ADDED					
DEVELOPMENT OF INTERNATIONAL PASSENGER TRAFFIC	(13) Share of international passenger traffic on total traffic on the project, %	45.8 (45)	36.3 (35.5)	47.3 (46.2)	- -
	(14) Volume of international passenger traffic on the project, mln. passengers / year	1.7 (1.6)	1.2 (1.2)	0.6 (0.6)	- -
DEVELOPMENT OF INTERNATIONAL FREIGHT TRAFFIC	(15) Share of international freight traffic on total traffic on the project, %	93.5 (93.2)	91.4 (91.4)	92.7 (92.7)	- -
	(16) Volume of international freight traffic on the project, mln. tons / year	15.2 (11.6)	20.8 (20.8)	7.7 (7.7)	- -
INTEROPERABILITY	(17) Reduction of passengers waiting time at borders for international traffic	N/a	N/a	N/a	-
	(18) Reduction of freight waiting time at borders for international traffic	N/a	N/a	N/a	-
	(19) Length of networks becoming interoperable because of the project	N/a	N/a	N/a	-

Objective	Indicator	P27.1	P27.2	P27.3	P27 Total
IMPROVEMENT OF ACCESSIBILITY					
PASSENGER ACCESSIBILITY	(20) Variation of the STAC centrality index for passenger transport, %	0.19 (0.21)	0.00 (0.07)	0.00 (0)	- -
FREIGHT ACCESSIBILITY	(21) Variation of the STAC centrality index for freight transport, %	0.20 (0.21)	0.00 (0.07)	0.00 (0)	- -
PERIPHERAL ACCESSIBILITY	(22) Variation of the STAC centrality index for passenger transport in regions identified as peripheral, %	0.22 (0.26)	0.00 (0.07)	0.00 (0)	- -
	(23) Variation of the STAC centrality index for freight transport in regions identified as peripheral, %	0.15 (0.13)	0.00 (0.06)	0.00 (0)	- -
ENVIRONMENTAL SUSTAINABILITY					
MODAL REBALANCING	(24) Volume of road freight traffic shifted to rail, IWW or sea transport, mln. t·km / year	2150 (385)	2242 (1554)	696 (223)	5088 (2161)
	(25) Volume of road and air passenger traffic shifted to rail, mln. passenger·km / year	-422 (414)	-110 (310)	55 (116)	-477 (840)
LEVEL OF CONCERN :TRAFFIC TRANSFER	(26) Transfer of traffic from infrastructure lying in sensitive zones to the projected infrastructure, % of road traffic transferred from sensitive areas	48.2% (-0,3%)	4.8% (-0,9%)	6.0% (-3,2%)	- -
LEVEL OF CONCERN: DISTANCE	(27) Percentage of the length of the project lying in a sensitive area, % length	20.0%	0.0%	20.0%	-
LEVEL OF CONCERN: EMISSIONS	(28a) Changes of inhabitants' level of concern caused by emissions of NOx, % NOx	0.5% (-0,4%)	-2.7% (-1,5%)	-3.4% (-2,0%)	- -
	(28b) Changes of inhabitants' level of concern caused by emissions of particulates, % particulates	-0.6% (-0,3%)	-3.5% (-1,4%)	-4.5% (-1,8%)	- -
LEVEL OF CONCERN: PROXIMITY	(29) Synthetic appreciation of the proximity of the project from specially protected areas (SPAs) or densely populated areas. Proximity of the project from SPA, km	19.0%	0.0%	19.0%	-
MATURITY AND COHERENCE OF THE PROJECT					
DEVELOPMENT OF THE PROJECT	(30) Appraisal of the project planning status	N/a	1	0	-
INSTITUTIONAL SOUNDNESS	(31) Qualitative appraisal of the project's compliance with national plans	2	1	1	-
COHERENCE OF THE PROJECT	(32) Qualitative appraisal of the project's coherence with main international traffic corridors	1	1	2	-

Comments on the main results

Impact on passenger volumes and modal shift

- Passenger transport volumes vary between 1.2 mln. passengers per year in case of P27.3 (Riga-Tallinn) and 3.6 mln. passengers in case of P27.1 (Warsaw-Kaunas).
- The change in road passenger transport performance identified on the priority project OD's, shows an increase of road by 477 mln pkm. When interpreting this value the methodology applied for the generation of the performance value has to be kept in mind: The calculation of this value starts with the identification of selected O/Ds on the sub-sections of P27 in the loaded network for the all projects scenario. Then these selected sub-section-specific O/Ds are re-traced for the other modes for the all projects scenario and for all modes in the Reference 2 scenario. Since a relatively high share of the selected O/Ds of P27 benefits from the infrastructure assumptions in the all projects scenario, especially from the road project P25, the value shows an increase in passenger road transport performance.

Impact on freight volumes and modal shift

- The average interregional freight transport volumes vary between 8.3 and 22.7 mln ton, more than 90% of which is international freight transport;
- The group of sub-sections under the title "Rail Baltica" achieve a shift to rail freight transport of 7.3 mln ton per year in 2020 and reduces correspondingly road freight transport volumes.
- Total shift towards rail is 5.1 bill. ton-km.

Impact on infrastructure network use

The detailed analysis carried out by the consortium has revealed the following impacts on infrastructure use:

- The passenger rail traffic flows are expected to grow all along the project route between Warsaw and Tallin and on the feeding links Poznan – Warszawa and Ostrova – Katowice – Warszawa.
- The rail freight traffic flows are growing quite strong along the priority project, especially in the Baltics, and on the extension of the Southern branch up to Budapest and Ljubljana.

Impact on environmental sustainability

- The change in emissions results in a decrease (between 1% and 7%) of human health risks along the corridor.
- In the Warsaw-Kaunas sub-sections traffic will to a large degree be transferred away from sensitive areas and in the other sub-sections the impact is negligible.
- In two of the sub-sections parts of the project is located within potentially sensitive areas, in both cases it amounts to 20% of the project length.

Impact on emissions

The overall impact on emission is quantified from the impact at the network level and the differences between the all project scenario and the reference 2 scenario are as follows:

- CO_2: net increase with 36.5 thousand tonnes,
- NO_x: net increase with 1.4 thousand tonnes,
- Particulates: increase with 81 tons.

The use of diesel locomotives makes this slight increase in emissions possible.

Development of the project

- P27.1: Warsaw-Kaunas. There is not information available to assign a score to this sub-section.
- P27.2: Kaunas-Riga. The planning and funding status is still at the beginning. Therefore the assigned score is +1.
- P27.3: Riga-Tallinn. It includes 2 sections and both of them have the same score, 0, because still no decisions on funding and no design studies have been undertaken.

6.24 P28 "EUROCAPRAIL" ON THE BRUSSELS-LUXEMBOURG-STRASBOURG RAILWAY LINE

6.24.1 Description of the priority project

Priority Project	Priority Project name	Sub-sections		Sections	Sub-section start date	Sub-section end date
P28	"Eurocaprail" on the Brussels-Luxembourg-Strasbourg railway line	P28.1	Brussels-Luxembourg-Strasbourg	P28 B-F-LUX Rail axis Bruxelles-Luxembourg-Strasbourg	2007	2012

The proposed improvements in this priority project are described elaborately in Table 6.47.

Table 6.47 *Project fiche P28*

Project	Description			
P28 "Eurocaprail" on the Brussels – Luxembourg – Strasbourg railway line	This projects aims to establish a high qualitative rail connection between the three important regions of the European Union: Brussels, Luxemburg and Strasbourg. "Eurocaprail" stands for the rail line between these three "capitals" of the Union.			
Sections of the Project	Objectives	Description	Start date	End date
P28.1 Brussels – Luxembourg – Strasbourg	The objective of this project is (as mentioned in the overall project description) a high qualitative rail connection between the three important regions of the European Union: Brussels, Luxemburg and Strasbourg. Besides this it aims to improve the local and regional accessibility of these regions and ·in connection of the reconsideration of the community orientation to the Transeuropean transport network.	In the Wallonian part of the project the rail way line will have the following characteristics: -4 tracks between Brussels and Ottignies -The section Ottignies-Namur will have 200 km/h. -The existing section between Namur and Luxembourg will be modernised and permits a speed up to 160 km/h or 200 km/h depending on the restriction of the terrain and on the location route. -Between Ciney and Libramont will be a new line with 300 km/ h. The journey time between the international connection Brussels-Luxembourg can be reduced to 1h30min (2h42min today).	2007	2012

6.24.2 Impact on the level of traffic flows

The impact at the level of traffic flows is identified at infrastructure level as follows:

- Road passenger flows P28, total interregional,
- Road passenger flows P28, international,
- Road freight flows P28, total interregional,
- Road freight flows P28, international.

The impact at the level of traffic flows is illustrated by the figures hereunder.

Figure 6.97 *Rail passenger flows P28, total interregional*

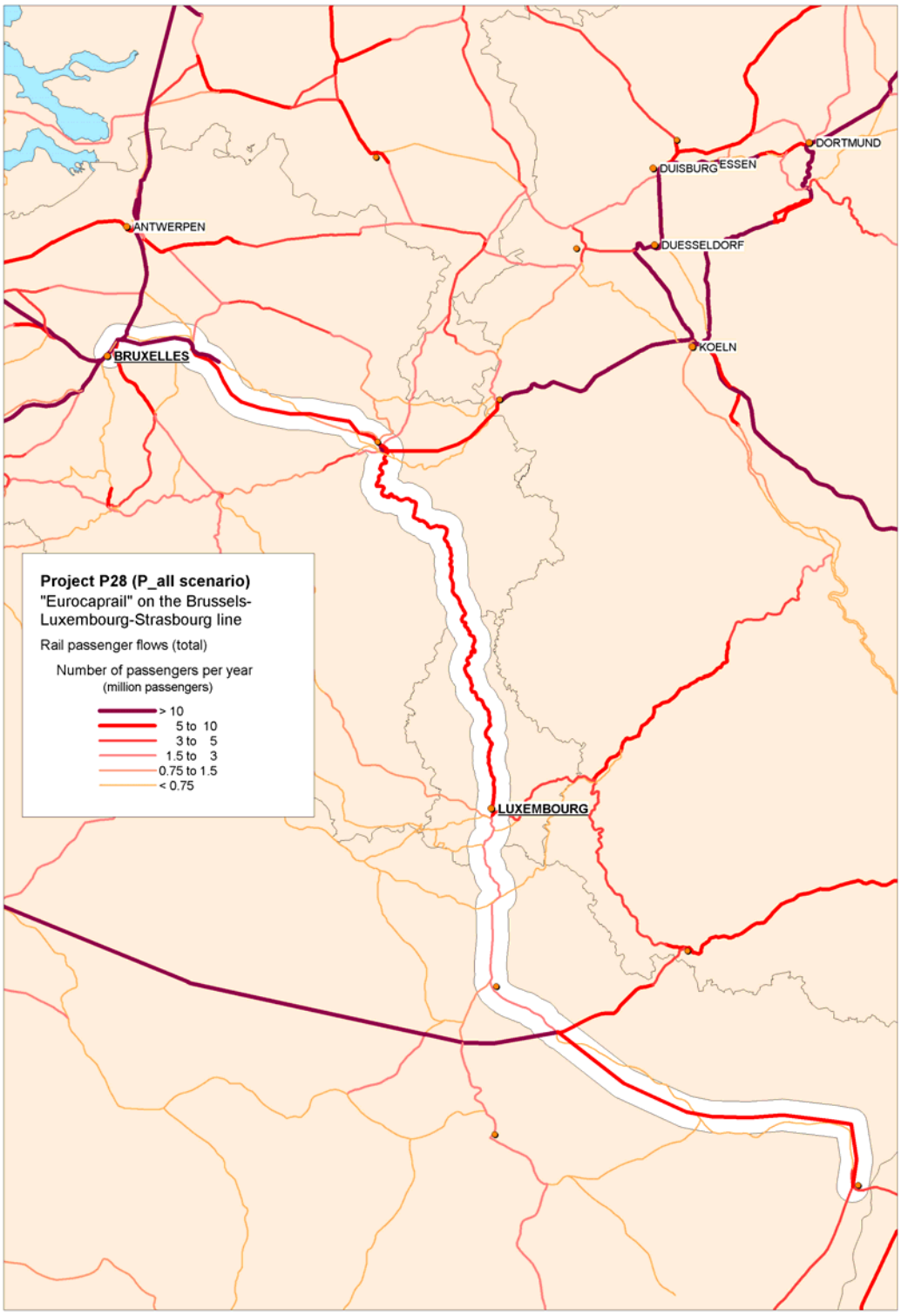


Figure 6.98 *Rail passenger flows P28, international*

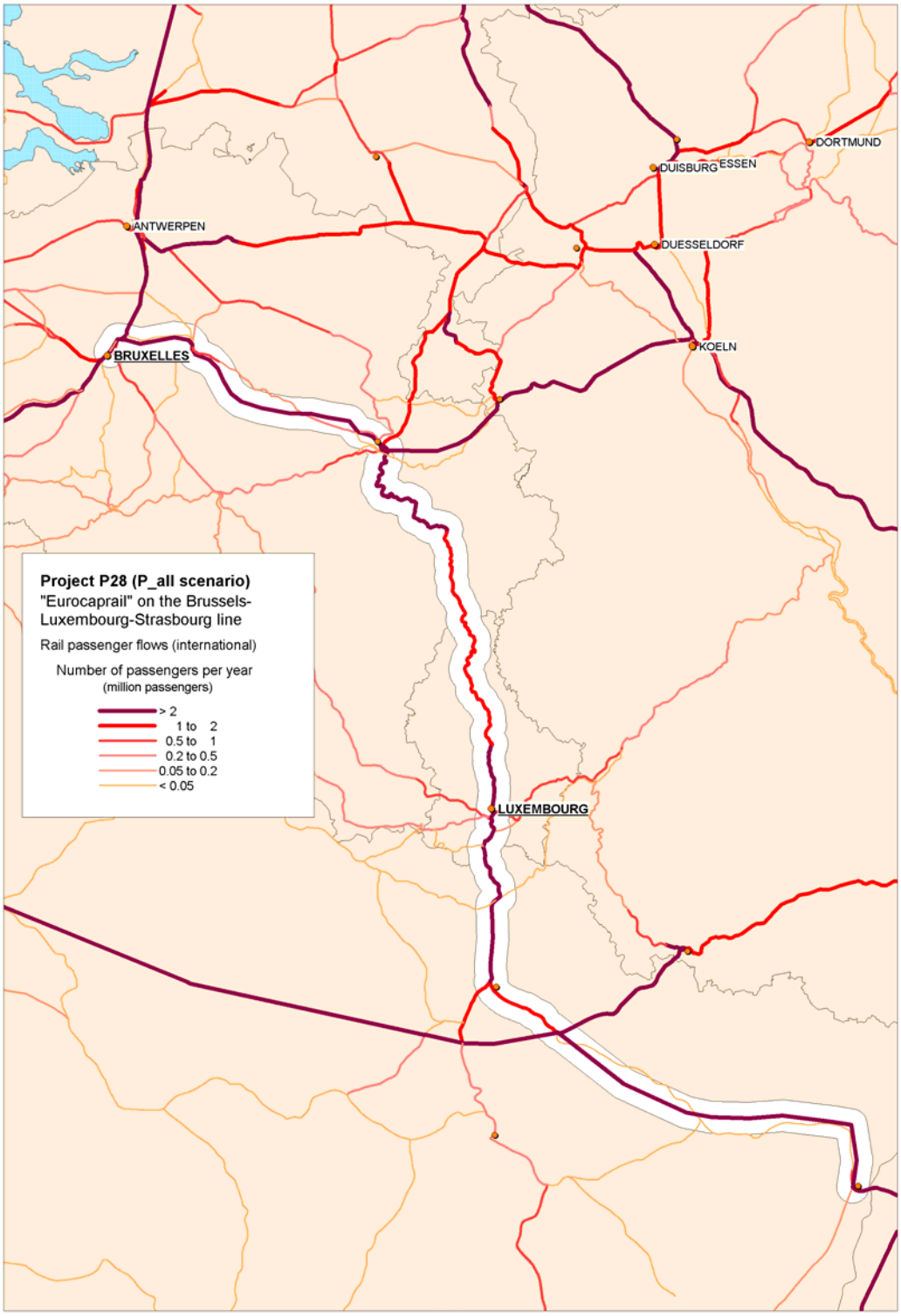


Figure 6.99 *Rail freight flows P28, total interregional*

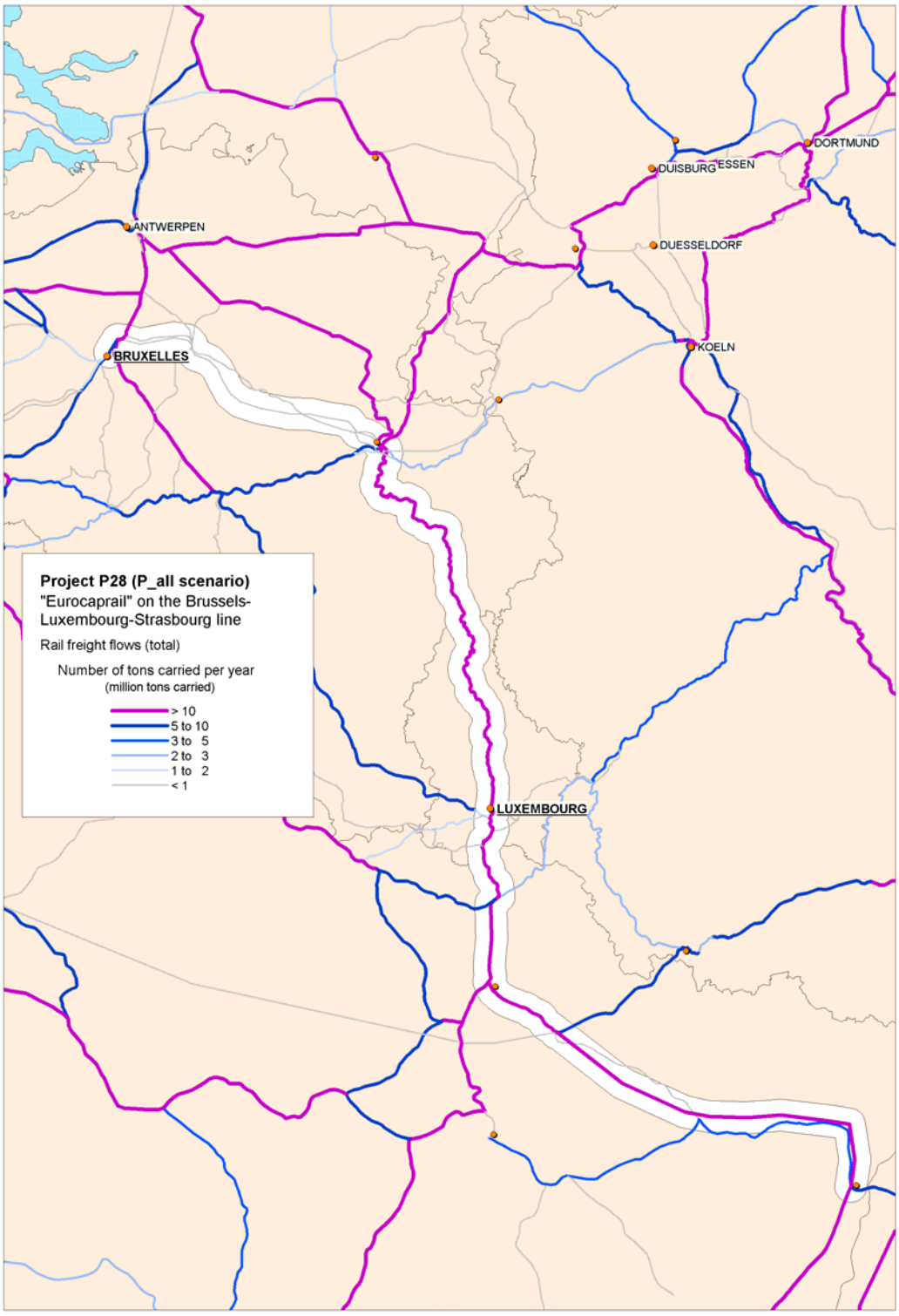
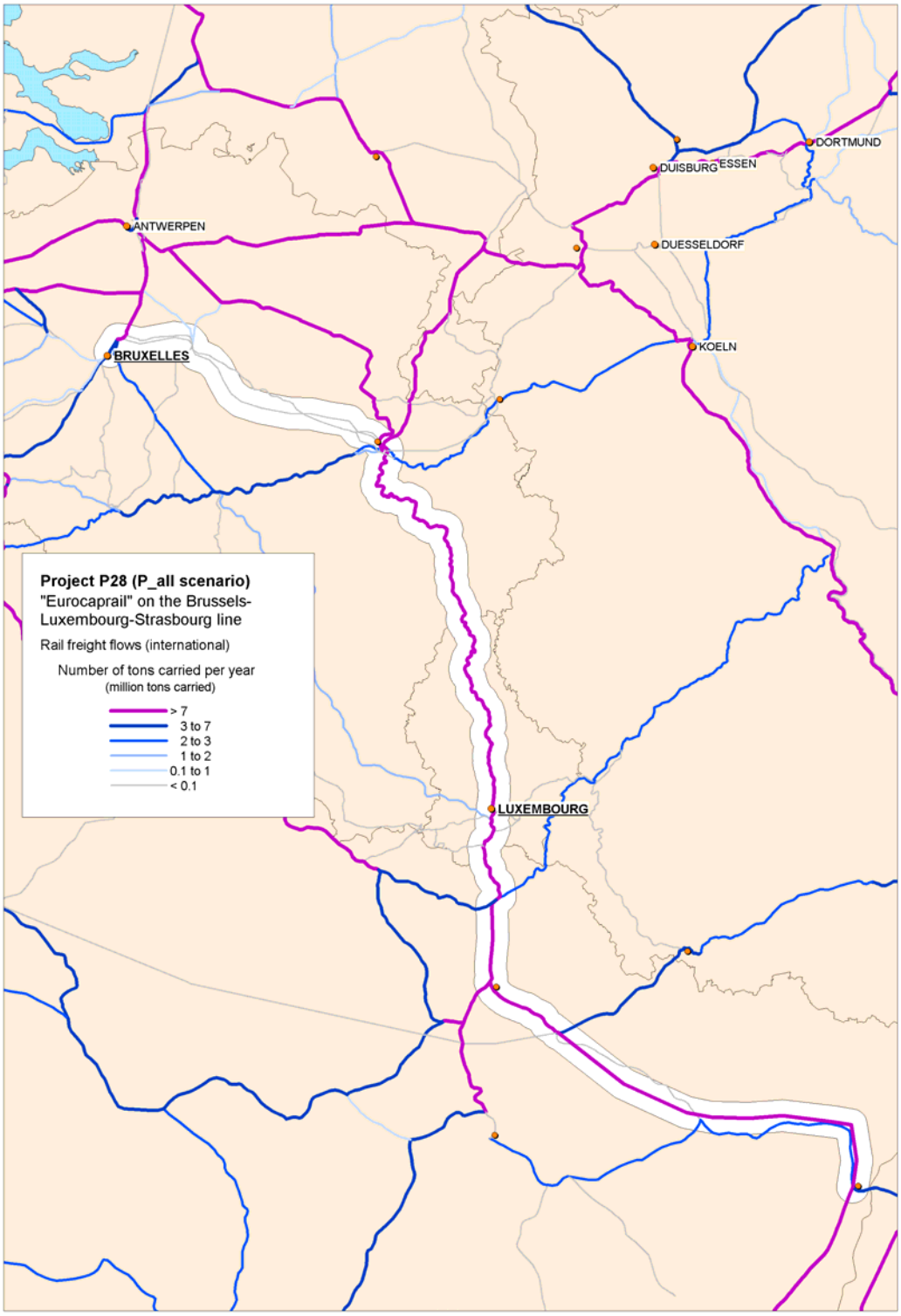


Figure 6.100 *Rail freight flows P28, international*



6.24.3 Estimated aggregated impacts of the priority project

In the following table, the impact variables for the all projects scenario are presented for all sub-sections of the priority project. Between brackets, the values of the individual project scenarios are given. The methodology of the impact variables is described in D6, Chapter 3.6.

Table 6.48 *Impact variables P28: "Eurocaprail" on the Brussels-Luxembourg-Strasbourg railway line*

Objective	Indicator	P28.1	P28 Total
ECONOMIC IMPACTS IN THE TRANSPORT SECTOR			
IMPROVEMENT OF ROAD LEVEL SERVICE	(1) Changes in time costs caused by road congestion, mln. € / year	-3.1 (-4.8)	-3.1 (-4.8)
REDUCTION OF TRAVEL TIME	(2a) Changes in monetary value of the reduction of passenger travel time, mln. € / year	-72.7 (-70.4)	-72.7 (-70.4)
	(2b) Changes in passenger travel time, mln hour / year	-5.4 (-5)	-5.4 (-5)
	(3) Changes in monetary value of the reduction of freight travel time, mln. € / year	-18.0 (-18.2)	-18.0 (-18.2)
ENVIRONMENTAL SUSTAINABILITY			
GLOBAL WARMING	(4a) Change (in monetary value) of the transport contribution to global warming, mln. € / year	-4.389 (-3.51)	-4.389 (-3.51)
	(4b) Change of the transport contribution to global warming, 1000 kg CO2 / year	-186761 (-149360)	-186761 (-149360)
ATMOSPHERIC POLLUTION	(5a) Change (in monetary value) of the NOX transport emission, mln. € / year	-0.503 (-0.969)	-0.503 (-0.969)
	(5b) Change of the NOX transport emission, 1000 kg NOx / year	-39 (-147)	-39 (-147)
	(6a) Change (in monetary value) of particulates' emissions of transport, mln. € / year	0.037 (-0.023)	0.037 (-0.023)
	(6b) Change of particulates' emissions of transport, 1000 kg particulates / year	3 (-1)	3 (-1)
TRANSPORT SAFETY	(7) Variation on monetary value of accidents, mln. € / year	-7.1 (-5.3)	-7.1 (-5.3)
INVESTMENT COST			
INVESTMENT COST	(8) Total project costs, mln. €	750	750
GENERAL TRANSPORT RELEVANCE			
TOTAL TRAFFIC VOLUME ON THE PROJECT	(10) Total passenger traffic on the project section, mln. passengers / year	6.3 (6.2)	- -
	(11a) Maximum freight traffic on the project section, mln. ton / year	22.8 (22.3)	22.8 (22.3)
	(11b) Average freight traffic on the project section, mln. ton / year	19.6 (12.8)	- -
	(11c) Total freight traffic on the project section, mln. ton km /year	3058 (2000)	3058 (2000)
INTERMODALITY	(12) Quantitative appraisal of the project's contribution for an intermodal transport system, mln. ton	1.5 (1.7)	1.5 (1.7)
CREATION OF EUROPEAN VALUE ADDED			
DEVELOPMENT OF INTERNATIONAL PASSENGER TRAFFIC	(13) Share of international passenger traffic on total traffic on the project, %	34.6 (40.1)	- -
	(14) Volume of international passenger traffic on the project, mln. passengers / year	2.2 (2.5)	- -
DEVELOPMENT OF INTERNATIONAL FREIGHT TRAFFIC	(15) Share of international freight traffic on total traffic on the project, %	88.6 (82.5)	- -
	(16) Volume of international freight traffic on the project, mln. tons / year	17.4 (10.6)	- -
INTEROPERABILITY	(17) Reduction of passengers waiting time at borders for international traffic	N/a	-
	(18) Reduction of freight waiting time at borders for international traffic	N/a	-
	(19) Length of networks becoming interoperable because of the project	N/a	-

Objective	Indicator	P28.1	P28 Total
IMPROVEMENT OF ACCESSIBILITY			
PASSENGER ACCESSIBILITY	(20) Variation of the STAC centrality index for passenger transport, %	0.00 (0.03)	0.00 (0.03)
FREIGHT ACCESSIBILITY	(21) Variation of the STAC centrality index for freight transport, %	0.00 (0)	0.00 (0)
PERIPHERAL ACCESSIBILITY	(22) Variation of the STAC centrality index for passenger transport in regions identified as peripheral, %	0.01 (0.05)	0.01 (0.05)
	(23) Variation of the STAC centrality index for freight transport in regions identified as peripheral, %	0.00 (0)	0.00 (0)
ENVIRONMENTAL SUSTAINABILITY			
MODAL REBALANCING	(24) Volume of road freight traffic shifted to rail, IWW or sea transport, mln. t·km / year	2268 (1392)	2268 (1392)
	(25) Volume of road and air passenger traffic shifted to rail, mln. passenger·km / year	153 (332)	153 (332)
LEVEL OF CONCERN :TRAFFIC TRANSFER	(26) Transfer of traffic from infrastructure lying in sensitive zones to the projected infrastructure, % of road traffic transferred from sensitive areas	-2.1% (-0,4%)	- -
LEVEL OF CONCERN: DISTANCE	(27) Percentage of the length of the project lying in a sensitive area, % length	26.0%	-
LEVEL OF CONCERN: EMISSIONS	(28a) Changes of inhabitants' level of concern caused by emissions of NOx, % NOx	-1.3% (-0,5%)	- -
	(28b) Changes of inhabitants' level of concern caused by emissions of particulates, % particulates	-1.2% (-0,4%)	- -
LEVEL OF CONCERN: PROXIMITY	(29) Synthetic appreciation of the proximity of the project from specially protected areas (SPAs) or densely populated areas. Proximity of the project from SPA, km	3.0%	-
MATURITY AND COHERENCE OF THE PROJECT			
DEVELOPMENT OF THE PROJECT	(30) Appraisal of the project planning status	N/a	-
INSTITUTIONAL SOUNDNESS	(31) Qualitative appraisal of the project's compliance with national plans	4	-
COHERENCE OF THE PROJECT	(32) Qualitative appraisal of the project's coherence with main international traffic corridors	2	-

Comments on the main results

Impact on passenger volumes and modal shift

- The expected average passenger transport volume amounts to 6.3 mln passengers per year.
- The priority project is forecasted to result in a decrease of road passenger transport performance by 153 mln pkm.

Impact on freight volumes and modal shift

- The total interregional transport volume in this priority project is 19.6 mln ton, 89% of which is international freight transport;
- The "Eurocaprail" projects will shift 1.5 mln ton to rail freight transport, partly coming from road freight and partly also from inland waterways transport.
- Total shift towards rail freight of the P28 scenario is 2.3 bill. ton-km.

Impact on infrastructure network use

The detailed analysis carried out by the consortium has revealed the following impacts on infrastructure use:

- The passenger rail traffic is expected to increase along the priority project route and, furthermore, on the feeding branches Bruxelles – Antwerpes – Rotterdam – Amsterdam as well as Strasbourg – Mulhouse – Basel – Gotthard – Milano. A decrease of passenger volumes is expected for Liège – Aachen – Köln – Frankfurt and Mannheim – Karlsruhe – Basel, as well as along Lille – Paris – Lyon – Mont Cenis – Torino – Milano.

- The rail freight traffic flows are increasing all along the priority project route and further up to Lyon and even Barcelona in the South and Trieste in the North of Adriatic basin.

Impact on environmental sustainability

- The reduction in emissions results in a marginal decrease (up till 1%) of human health risks along the corridor.
- Transfer of road traffic away from sensitive areas is negligible.
- In the priority project 26% of the priority project is located within potentially sensitive areas.

Impact on emissions

The overall impact on emission is quantified from the impact at the network level and the differences between the all project scenario and the reference 2 scenario are as follows:

- CO_2: net decrease with 187 thousand tonnes,
- NO_x: net decrease with 39 tonnes,
- Particulates: no significant change.

6.25 P29 RAILWAY LINE OF THE IONIAN/ADRIATIC INTERMODAL

6.25.1 Description of the priority project

Priority Project	Priority Project name	Sub-sections		Sections	Sub-section start date	Sub-section end date
P29	Railway line of the Ionian/Adriatic intermodal corridor	P29.1	Railway line of the Ionian/Adriatic corridor	P29 Kozani-Kalambaka-Igoumenitsa	2006	2012
				P29 EL Ioannina-Antirrio-Rio-Kalamata	2009	2014

Table 6.49 *Project fiche P29*

Project	Description			
P29 Railway line of the IoniaN/ adriatic intermodal corridor	The IoniaN/adriatic intermodal corridor completes the Hellenic railway network and improves connectivity of the western part of Greece, which currently is served by only road transport. The completion of the Hellenic railway network to the west is expected to have a major impact on the increase of the market segment of the railways for domestic, international and transit transport of Greece. The project has been planned to create an efficient intermodal transport "Gate" in South-East Europe, which will facilitate the accessibility of the Central and North European markets from East and far East countries. The project includes the construction of an intermodal terminal at the port of Igoumenitsa and a Ra-Ra connection for passing the Rio-Antirio sea stretch of 1.7 km.			
Sections of the Project	Objectives	Description	Start date	End date
P29.1 Railway line of the IoniaN/ adriatic corridor	**Igoumenitsa-Ioannina-Kalambaka-Kozani** – To construct the missing railway link "Kozani-Kalambaka", which will connect the northern part of Greece with the main north-south railway corridor, and will transform the linear railway line into a network. – To construct the west-east railway corridor from Ionion sea to the Aegean sea (ports of Igoumenitsa and Volos) – To provide a western intermodal gate in Greece and shift road traffic onto the railways. **Ioannina – Rio:** – To create a direct connection of the "Athens-Patras" railway axis (which is now being upgraded to normal gauge and high-speed) with the main economic center of Ioannina and the port of Igoumenitsa – To connect the two main western ports of Greece, Patras and Igoumenitsa	**Kozani-Kalambaka:** Single track Length: 113 km Minimum curve radius: 1200 m Design speed: 160 km/ h Maximum gradient (open track): 14‰ **Kalambaka-Igoumenitsa:** Single track Length: 153 km Minimum curve radius: 700 m Design speed: 120 km/ h Maximum gradient (open track): 20 ‰ **Ioannina – Rio:** Single track - electrified Length: 187 km Minimum curve radius: 300 - 700 m Design speed: 90 - 110 km/ h Maximum gradient (open track): 2 ‰ **Rio-Patras-Kalamata:** Single track - electrified Length: 265 km Minimum curve radius: 700 m, with few exceptions Design speed: 140 km/ h Maximum gradient (open track): 14 ‰, with few exceptions	2006	2014

	Rio-Patras-Kalamata: – To upgrade the existing railway network of Peloponnesos (metric gauge and low standards) – To complete the rail connection of all Adriatic-Ionian ports by connecting Kalamata, a major southern Peloponnesian city and port with the other ports of the Adriatic-Ionian Sea. – To create the potential for a future sea-motorway connections between Europe and Africa via the port of Kalamata			

6.25.2 Impact on the level of traffic flows

For P29 only the effects on passenger transport have been considered, as far as for Greece the freight flows information is not available at regional level and also the expected effects from the project on the freight flows is seen as limited, because the project itinerary is in competition with the short sea local routes on the western coast of Greece.

The impact at the level of traffic flows is identified at infrastructure level as follows:
- Rail passenger flows P29, total interregional,
- Rail passenger flows P29, international.

The impact at the level of traffic flows is illustrated by the figures hereunder.

Figure 6.101 *Rail passenger flows P29, total interregional*

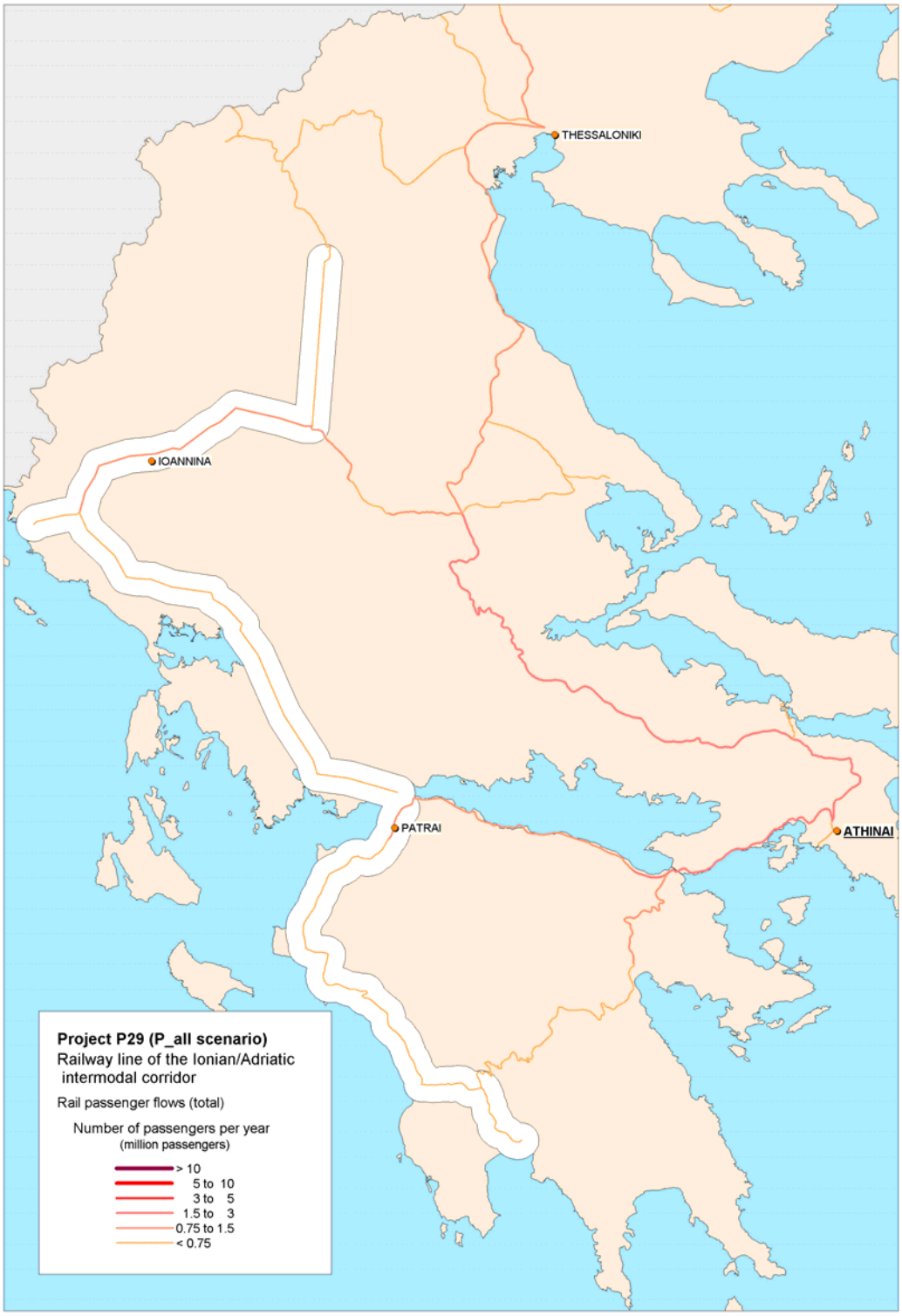
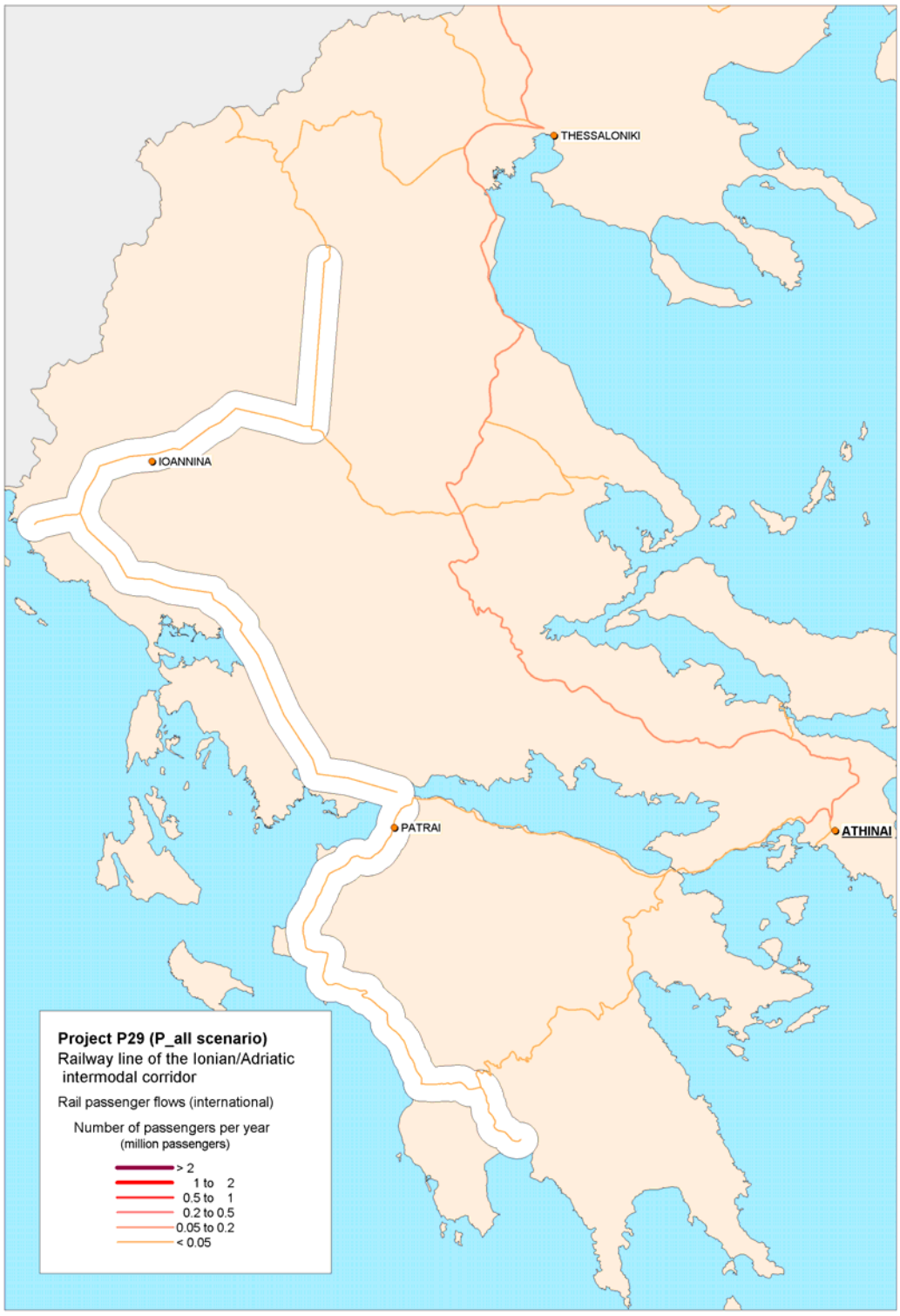


Figure 6.102 *Rail passenger flows P29, international*



6.25.3 Estimated aggregated impacts of the priority project

In the following table, the impact variables for the all projects scenario are presented for all sub-sections of the priority project. Between brackets, the values of the individual project scenarios are given. The methodology of the impact variables is described in D6, Chapter 3.6.

Table 6.50 *Impact variables P29: Railway line of the IoniaN/adriatic intermodal corridor*

Objective	Indicator	P29.1	P29 Total
ECONOMIC IMPACTS IN THE TRANSPORT SECTOR			
IMPROVEMENT OF ROAD LEVEL SERVICE	(1) Changes in time costs caused by road congestion, mln. € / year	-1.8 (0)	-1.8 (0)
REDUCTION OF TRAVEL TIME	(2a) Changes in monetary value of the reduction of passenger travel time, mln. € / year	-5.1 (-4.8)	-5.1 (-4.8)
	(2b) Changes in passenger travel time, mln hour / year	-0.7 (-0.7)	-0.7 (-0.7)
	(3) Changes in monetary value of the reduction of freight travel time, mln. € / year	0.0 (0)	0.0 (0)
ENVIRONMENTAL SUSTAINABILITY			
GLOBAL WARMING	(4a) Change (in monetary value) of the transport contribution to global warming, mln. € / year	-0.056 (0.105)	-0.056 (0.105)
	(4b) Change of the transport contribution to global warming, 1000 kg CO2 / year	-2392 (4459)	-2392 (4459)
ATMOSPHERIC POLLUTION	(5a) Change (in monetary value) of the NOX transport emission, mln. € / year	-0.105 (0.149)	-0.105 (0.149)
	(5b) Change of the NOX transport emission, 1000 kg NOx / year	-18 (19)	-18 (19)
	(6a) Change (in monetary value) of particulates' emissions of transport, mln. € / year	0.018 (0.01)	0.018 (0.01)
	(6b) Change of particulates' emissions of transport, 1000 kg particulates / year	2 (1)	2 (1)
TRANSPORT SAFETY	(7) Variation on monetary value of accidents, mln. € / year	-0.5 (-0.3)	-0.5 (-0.3)
INVESTMENT COST			
INVESTMENT COST	(8) Total project costs, mln. €	2469	2469
GENERAL TRANSPORT RELEVANCE			
TOTAL TRAFFIC VOLUME ON THE PROJECT	(10) Total passenger traffic on the project section, mln. passengers / year	0.4 (0.3)	- -
	(11a) Maximum freight traffic on the project section, mln. ton / year	0.5 (N/a)	0.5 (N/a)
	(11b) Average freight traffic on the project section, mln. ton / year	0.1 (N/a)	- -
	(11c) Total freight traffic on the project section, mln. ton km /year	19 (N/a)	19 (N/a)
INTERMODALITY	(12) Quantitative appraisal of the project's contribution for an intermodal transport system, mln. ton	N/a (N/a)	N/a (N/a)
CREATION OF EUROPEAN VALUE ADDED			
DEVELOPMENT OF INTERNATIONAL PASSENGER TRAFFIC	(13) Share of international passenger traffic on total traffic on the project, %	2.7 (3)	- -
	(14) Volume of international passenger traffic on the project, mln. passengers / year	0.0 (0)	- -
DEVELOPMENT OF INTERNATIONAL FREIGHT TRAFFIC	(15) Share of international freight traffic on total traffic on the project, %	100.0 (N/a)	- -
	(16) Volume of international freight traffic on the project, mln. tons / year	0.1 (N/a)	- -
INTEROPERABILITY	(17) Reduction of passengers waiting time at borders for international traffic	N/a	-
	(18) Reduction of freight waiting time at borders for international traffic	N/a	-
	(19) Length of networks becoming interoperable because of the project	N/a	-

Objective	Indicator	P29.1	P29 Total
IMPROVEMENT OF ACCESSIBILITY			
PASSENGER ACCESSIBILITY	(20) Variation of the STAC centrality index for passenger transport, %	0.01 (0.02)	0.01 (0.02)
FREIGHT ACCESSIBILITY	(21) Variation of the STAC centrality index for freight transport, %	0.04 (0.04)	0.04 (0.04)
PERIPHERAL ACCESSIBILITY	(22) Variation of the STAC centrality index for passenger transport in regions identified as peripheral, %	0.02 (0.02)	0.02 (0.02)
	(23) Variation of the STAC centrality index for freight transport in regions identified as peripheral, %	0.06 (0.06)	0.06 (0.06)
ENVIRONMENTAL SUSTAINABILITY			
MODAL REBALANCING	(24) Volume of road freight traffic shifted to rail, IWW or sea transport, mln. t·km / year	0 (N/a)	0 (N/a)
	(25) Volume of road and air passenger traffic shifted to rail, mln. passenger·km / year	54 (N/a)	54 (N/a)
LEVEL OF CONCERN :TRAFFIC TRANSFER	(26) Transfer of traffic from infrastructure lying in sensitive zones to the projected infrastructure, % of road traffic transferred from sensitive areas	-0.1% (-0,2%)	- -
LEVEL OF CONCERN: DISTANCE	(27) Percentage of the length of the project lying in a sensitive area, % length	0.0%	-
LEVEL OF CONCERN: EMISSIONS	(28a) Changes of inhabitants' level of concern caused by emissions of NOx, % NOx	0.1% (0,2%)	- -
	(28b) Changes of inhabitants' level of concern caused by emissions of particulates, % particulates	-0.2% (0,1%)	- -
LEVEL OF CONCERN: PROXIMITY	(29) Synthetic appreciation of the proximity of the project from specially protected areas (SPAs) or densely populated areas. Proximity of the project from SPA, km	0.0%	-
MATURITY AND COHERENCE OF THE PROJECT			
DEVELOPMENT OF THE PROJECT	(30) Appraisal of the project planning status	2	-
INSTITUTIONAL SOUNDNESS	(31) Qualitative appraisal of the project's compliance with national plans	3	-
COHERENCE OF THE PROJECT	(32) Qualitative appraisal of the project's coherence with main international traffic corridors	0	-

Comments on the main results

Impact on passenger volumes and modal shift

- The forecasted average passenger transport volume on P29 amounts to 0.4 mln. passengers per year.
- The priority project is expected to result in a decrease of rail passenger with 67 mln pkm.
- Reasons for relatively low transport volumes in P29.1 are the low demand levels.
- The share of international volumes on a sub-section inform about the sub-section's relevance for international transport flows. For the interpretation of the performance values, the scope and the definition of the sub-sections have to be considered: A relatively short border-crossing sub-section is more likely to represent a high value than a large sub-section with a border-crossing link. Some sub-sections with a low share of international traffic volumes. P29.1 suggests the conclusion that their significance is mainly at national level, for passenger.

Impact on infrastructure network use

The detailed analysis carried out by the consortium has revealed the following impacts on infrastructure use:

- A slight increase in interregional rail traffic flows is observed on the priority project route.

Impact on environmental sustainability

- The reduction in emissions results has no significant impact on human health risks along the corridor.
- Transfer of road traffic away from sensitive areas is negligible.
- No part of the priority project is located within potentially sensitive areas.

Impact on emissions

The overall impact on emission is quantified from the impact at the network level and the differences between the all project scenario and the reference 2 scenario are as follows:

- CO_2: net decrease with 2.4 thousand tonnes,
- NO_x: net decrease with 18 tonnes,
- Particulate: not significant changes are observed.

Development of the project

- Two sections form the sub-section. Both of them are at the same level of development and they have the same score. Design studies achieved but no decisions on funding have been taken. The score assigned is +2.

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