Rhine-Alpine

Core Network Corridor Study

Final Report

December 2014

Preamble

Although both the "TEN-T Core Network Corridor Rhine-Alpine" and the "Rail Freight Corridor Rhine-Alpine (RFC1)" cover the same geographical area (namely Antwerpen/Zeebrugge/Rotterdam–Genoa), the elaboration of the TEN-T Core Network Corridor Study and the RFC1 Implementation Plan (version: Dec. 2013) are based on different European regulations (for RFC1: Regulation (EU) No 913/2010; for the TEN-T Core Network Corridor: Regulations (EU) No 1315/2013 and (EU) No 1316/2013) and thus have different methodologies. This leads to discrepancies in the rail alignment (see Annex 11) and in the allocation of rail freight nodes. Due to that fact, both documents are of limited comparability!

Abstract

In 2014, the study on the Rhine-Alpine Corridor, one of the busiest of the nine TEN-T Core Network Corridors, was carried out by a consultancy consortium on behalf of the European Commission. The main objective was the elaboration of all elements of the work plan that should serve as a guideline for the implementation of the corridor by 2030. The results of the study were continuously coordinated among the national Ministries of the concerned countries, infrastructure managers and regional authorities in Corridor Forum meetings.

This Final Report documents all findings, beginning with the alignment of the corridor and the analysis of technical parameters of the current infrastructure for all considered transport modes (rail, road, inland waterways, airports, seaports, inland ports and rail-road terminals). The data gathered by review of studies, statistics, network statements etc. were used to update the TENtec Information System of the EC. Infrastructure data has been evaluated in terms of the objectives given by TEN-T Regulation (EU) 1315/2013. A multimodal transport market study forecasted the transport situation in 2030 and analysed the respective capacity needs. As a result from the previous tasks, the implementation plan presents 145 projects to overcome identified deficits and achieve the objectives.

Samenvatting

In 2014 is de studie van de Rijn-Alpine Corridor, een van de drukste van de negen TEN-T Kernnetwerk Corridors, uitgevoerd door een consortium van consultants, in opdracht van de Europese Commissie. De hoofddoelstelling was het uitwerken van alle elementen uit het werkplan, dat als richtlijn zou moeten dienen voor de verwezenlijking van de corridor in 2030. De resultaten van de studie zijn doorlopend gecoördineerd tussen de nationale ministeries van de betrokken landen, de infrastructuurbeheerders, en regionale overheden in de Corridor Forum vergaderingen.

Dit eindrapport documenteert alle bevindingen, te beginnen bij de uitlijning van de corridor en de analyse van de technische parameters van de huidige infrastructuur voor alle onderzochte vervoerswijzen (spoor, weg, binnenvaartwegen, luchthavens, zeehavens, binnenhavens en spoor-weg terminals). De gegevens, verkregen door middel van analyse van studies, statistieken, netwerk verklaringen enz., zijn gebruikt om het TEN-tec Informatie Systeem van de EC aan te vullen. De infrastructuur gegevens zijn geëvalueerd op basis van de doelstellingen gegeven in TEN-T Verordening (EU) 1315/2013. Een multimodale transport marktstudie voorspelde de vervoerssituatie in 2030 en analyseerde de respectievelijke capaciteitsbehoeften. Als gevolg van de voorgaande taken staan in het implementatieplan 145 projecten om de geïdentificeerde tekortkomingen te overwinnen en de doelstellingen te bereiken.

Résumé

En 2014, l'étude sur le corridor Rhin-Alpes, l'un des plus fréquentés des neuf corridors prioritaires RTE-T, a été réalisée par un consortium de bureau d'études pour le compte de la Commission européenne. L'objectif principal était l'élaboration de tous les éléments du plan de travail qui devra servir de guide pour la mise en œuvre du Corridor d'ici 2030. Les résultats de l'étude ont été coordonnés lors de Forum impliquant chacun des ministères nationaux, des gestionnaires d'infrastructures et des autorités régionales des pays faisant partie du Corridor.

Ce rapport final fournit l'ensemble des résultats de l'analyse, notamment l'alignement du Corridor et l'analyse des paramètres techniques de l'infrastructure actuelle pour tous les modes de transport (rail, route, voies navigables, aéroports, ports maritimes, ports intérieurs et terminaux rail-route). Des données ont été recueillies au travers l'examen d'études existantes, de statistiques, des états du réseau,… pour mettre à jour le Système d'Information TENtec des Communautés Européennes. Les caractéristiques de l'infrastructure ont ensuite été évaluées au regard des objectifs fixés par le règlement RTE-T (UE) 1315/2013. Une étude de marché du transport multimodal au sein du Corridor a également été réalisée. Elle renseigne sur la situation des transports à l'horizon 2030 et détaille les besoins en infrastructure. Consécutivement aux étapes précédentes, un plan de mise en œuvre présente 145 projets, pour répondre aux besoins identifiés et atteindre les objectifs fixés.

Inhaltsangabe

Im Jahr 2014 wurde im Auftrag der Europäischen Kommission eine Studie über den Rhein-Alpen Korridor, einem der aufkommensstärksten der neun TEN-Kernnetz-Korridore, erstellt. Die Hauptaufgabe bestand in der Ausarbeitung eines Arbeitsplans, der als Richtschnur für die Implementierung dieses Korridors bis 2030 dienen soll. Die Ergebnisse der Studie unterlagen einer laufenden Abstimmung mit den zuständigen nationalen Ministerien, Infrastrukturbetreibern und regionalen Behörden im Korridorforum.

Der Schlussbericht dokumentiert alle Ergebnisse, beginnend mit dem Korridorverlauf und einer Analyse der technischen Parameter der bestehenden Infrastruktur (Schiene, Straße, Seehäfen, Binnenhäfen, Flughäfen und Schiene-Straße-Terminals). Mit Daten aus u.a. Studien, Statistiken, Infrastrukturübersichten wurde das TENtec-Informationssystem der Kommission ergänzt und aktualisiert. Danach hat das Auftragnehmer-Konsortium die Infrastruktur hinsichtlich der in der TEN-V-Verordnung (EU) 1315/2013 vorgegebenen Zielwerte evaluiert. In einer multimodalen Transportmarktstudie wurde die Verkehrssituation für das Jahr 2030 prognostiziert und der entsprechende Kapazitätsbedarf untersucht. Als Ergebnis der vorangegangenen Arbeiten enthält der Umsetzungsplan etwa 145 Einzelmaßnahmen oder Projekte zur Beseitigung der identifizierten Mängel und zur Zielerreichung.

Sommario

Nel 2014, lo studio sul Corridoio Reno-Alpi, uno dei più trafficati dei nove corridoi Core TEN-T, è stato realizzato da un consorzio di consulenti su mandato della Commissione Europea. La finalità principale è di elaborare tutti gli elementi necessari alla definizione del work plan di riferimento per l'implementazione del corridoio entro il 2030. I risultati dello studio sono stati condivisi con i Ministeri degli Stati interessati, i gestori delle infrastrutture e le autorità regionali in occasione dei Forum di Corridoio.

Questa relazione riporta tutte i risultati, a partire dall'allineamento del corridoio e dall'analisi degli attuali parametri tecnici delle infrastrutture per le diverse modalità di trasporto considerate (ferroviaria, stradale, fluviale, aerea, portuale marittima e fluviale e terminal ferro-gomma). L'analisi di studi, statistiche, prospetti informativi della rete hanno permesso di aggiornare il database TENtec della CE. I parametri infrastrutturali sono stati confrontati con gli standard definiti dal Regolamento TEN-T (UE)1315/2013. Lo studio di mercato del trasporto multimodale ha consentito di stimare lo scenario al 2030 e di individuare i futuri problemi di capacità. Le analisi summenzionate hanno portato alla definizione di un work plan comprendente 145 progetti che permetteranno di rispondere ai futuri problemi di capacità e di raggiungere gli obiettivi.

Management Summary

Regulations (EU) No. 1315/2013[1] and 1316/2013[2] define the legal basis for the trans-European transport network policy until 2030/50. They comprise the "Union Guidelines" which set out the policy framework and include a multimodal core network with nine Core Network Corridors, to be completed by 2030, as well as the "Connecting Europe Facility" which governs EU funding during the period 2014 – 2020.

Core Network Corridors are a new instrument at EU level, aiming to facilitate coherent infrastructure development by involving all relevant actors: Member States and a broad range of stakeholders (e.g. infrastructure managers, regional authorities etc.). The European Commission supports this corridor development, both through coordination activities and the concentration of EU financial instruments.

According to the TEN-T Guidelines, for the development of each Core Network Corridor until 2030, a work plan has to be elaborated, setting the framework for the development of an efficient transport infrastructure, which allows the smooth operation of all transport modes and seamless multimodal chains for both passenger and freight transport.

The study on the Rhine-Alpine Core Network Corridor contains all necessary analyses and working steps for the elaboration of the work plan. It identifies the necessary projects to improve the corridor until 2030, in order to support the further strengthening of the internal market and Europe's global competitiveness and to ensure economic, social and territorial cohesion as well as better accessibility across the EU.

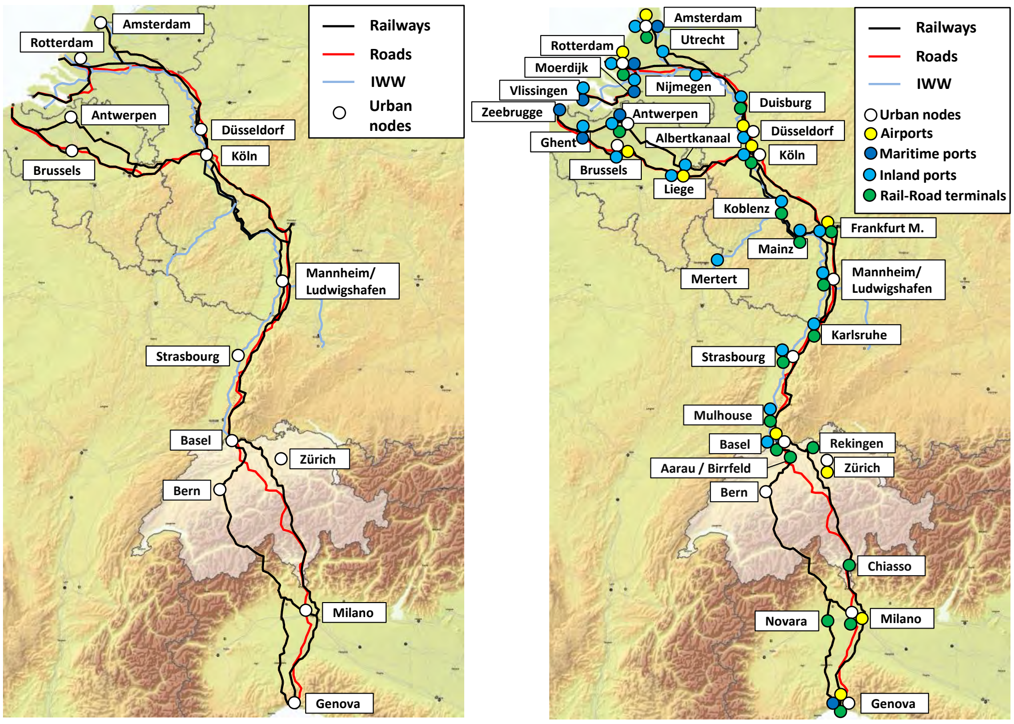
The Rhine Alpine Corridor integrates substantial acquis of the previous TEN-T and transport policy (notably Priority Projects 5 and 24, ERTMS Corridor A and Rail Freight Corridor Rhine-Alpine) and builds on important infrastructure investment already completed. It therefore seems predestined to lead the way, for the nine TEN-T Core Network Corridors, towards a "new generation of infrastructure development", inter alia strengthening multi-modality, optimising infrastructure use or promoting innovative approaches.

It is one of the busiest freight routes in Europe, connecting the most important economic and densely populated regions (more than 70 million inhabitants), and can be regarded as one of the most developed corridors in terms of the requirements set by the TEN-T Regulation. Nevertheless, investments in transport infrastructure are still needed, as this will stimulate and support the economic growth and employment and shall lead to a more environmentally friendly and sustainable multimodal transport system. Thus, it is of significant importance to raise public-awareness and acceptance of these investments. The Rhine-Alpine Corridor "connects the North Sea ports of Rotterdam and Antwerpen to the Mediterranean basin in Genoa via Switzerland and some of the major economic centres of the western EU. This multimodal corridor (including the Rhine basin) will provide connections to several east–west axes." Concerned countries are The Netherlands, Belgium, Germany, Switzerland, Northern Italy, the eastern part of France, namely the Strasbourg area, and Luxembourg (Moselle).

[1] Regulation (EU) N° 1315/2013 of the European Parliament and of the Council of 11 December 2013 on Union Guidelines for the development of the trans-European transport network

[2] Regulation (EU) N° 1316/2013 of the European Parliament and of the Council of 11 December 2013 establishing the Connecting Europe Facility

The Rhine-Alpine Corridor



Source: TEN-T Regulation 1316/2013 Annex 1, Part 1

There is a continuous core infrastructure network for railway and road, meaning an end-to-end connection (at least one) between Rotterdam/Zeebrugge and Genoa. Concerning IWW, the situation is more complex. Switzerland has only a small part of IWW, Italy no aligned inland waterway network at all, and the Belgian waterways are assigned to another corridor (namely North Sea-Mediterranean). Nonetheless they are of importance for the Rhine-Alpine Corridor, having major cross-border flows going from Belgium towards The Netherlands and Germany. Data about these transport flows are used for the analyses of the transport market study but the Belgian IWW projects will not be discussed in this report. Regarding road transport, the relevant roads are almost exclusively motorways, but with the majority of the infrastructure not always adapted to current demand levels. Rail is operating across borders with several sections that are dedicated high speed rail lines. Alternative routings are available in cases of disruptions. The airports along the corridor are of high importance for passenger service, including the hub airports in Frankfurt, Amsterdam, Zürich, Brussels and Milano.

Involvement of relevant stakeholders

The stakeholders are involved incrementally via four Corridor Fora. A Corridor Forum is a consultative body which provides a basis for discussions and coordination. Thus, the work plan will be the result of a broad consultation process, ensuring that all participants share understanding and acceptance of the need of the implementation of certain measures. More than 400 stakeholders were identified. Additionally to the Corridor Fora, two working groups were carried out in 2014.

Integration of existing studies

The analysis of available studies provided a comprehensive database highlighting important reports focused on the corridor on EU-wide, corridor-wide and national level. The relevant studies were clustered into main categories:

- Macro-region documents for the planning and development of transport;

- Study and planning documents of infrastructure projects;
- Studies of transport development, covering long-term forecasts and long-term market evolution;
- Governance studies and strategy papers.

The analysis was an important pillar to achieve a comprehensive overview on the corridor as a key element for the work plan.

Corridor characteristics

The work on the corridor characteristics was divided into two steps: At first, the core network infrastructure was compared with the requirements defined in the TEN-T regulation 1315/2013. Within this step, the technical parameters per transport mode were identified and the sections or facilities which do not fulfil these standards were highlighted as "critical issues", together with additional identified bottlenecks, such as capacity problems etc. As a successive step, all these critical issues were summarised and transferred into the corridor characteristics of the Rhine-Alpine Corridor. To solve the highlighted critical issues and bottlenecks, various projects all along the corridor were defined (cp. implementation plan). The results of this exercise were validated with the Member States and the stakeholders during the Corridor Fora.

The TEN-T compliance analysis revealed for rail that the electrification and required minimum track gauge are fully implemented on the entire corridor. Freight train speeds of more than 100km/h and 22.5t axle load are enabled on more than 92% of all rail sections. Today, the operation of 740m long trains is feasible on 87% of the corridor alignment, whereas the deployment of ERTMS (European Rail Traffic Management System) is still in its early stages with only 12.3% of sections equipped on the corridor. Further roll-out plans are considered in the ERTMS deployment plan. While the infrastructure is widely in compliance per design, other operational factors such as safety and the prevention of noise emissions have to be more considered in future projects. Rail noise is repeatedly identified as a critical issue for sections running through densely populated areas, as it is the case for the Rhine-Alpine Corridor. Throughout the corridor, several sections have been identified where demand exceeds the available capacity. Also travel times could be shortened and main rail hubs may be optimised for better accessibility and service quality.

The road infrastructure is almost fully compliant with the TEN-T requirements. Two thirds of the relevant roads are equipped with tolling systems. Nevertheless, infrastructure utilisation identified congestion hot-spots on multiple urban areas along the motorways and limited truck parking capacity. Border crossing issues are identified in and out of Switzerland. Since road transport is one of the main sources for greenhouse gas emissions, pushing clean fuel alternatives is a priority.

The IWW development shows only partial limitations of the technical requirements. The German sections along Rhine, Neckar and Moselle require draught extensions, removal of height limitations under bridges and lock capacity upgrades. The guidance via River Information Services (RIS) is seen as crucial for cross-border traffic, where further coordination is needed for a consistent implementation.

The eight seaports face bottlenecks in their accessibility. Capacity issues are a relevant future topic, when developments and higher demand also require stronger hinterland connection and better maritime access.

The main passenger hub airports are all connected to the rail network. Improvements are needed for six freight hubs and lower capacity airports where rail connections should be established by 2050.

For rail-road terminals which ensure multimodal operations along the corridor, bottlenecks are identified regarding the handling capacity of terminals and inland ports. Projects to mitigate those critical issues are related to multiple regions in order to increase capacity within terminals and the connecting infrastructure.

Based on the identified critical issues, a categorisation has been carried out in order to cluster these issues: 1. Capacity/Bottleneck; 2. Missing link; 3. Interoperability / Compliance with TEN-T standards; 4. Multimodality; 5. Last-mile connection; 6. Externalities / Sustainability / Innovation; 7. Urban areas. Cross-border compliance was analysed separately.

These clusters provide a common structure for the following working steps and the final categorisation of projects.

Transport market study

The purpose of the Transport Market Study (TMS) for the Rhine-Alpine Corridor was to analyse the current and prospective market conditions combined with the current and future utilisation levels of transport modes. A model was employed using three runs: 2010 (basis), 2030 (baseline) and 2030 (compliance). The baseline projection is based only on socioeconomic assumptions, and the compliance projection expects the full compliance by 2030 to the TEN-T standards. These scenarios were strictly defined for the corridor alignment and demonstrated the potential growth, given the relevant assumptions, on the corridor network. The TMS, finally, provides a number of suggestions for the implementation of a well-functioning multimodal corridor.

Current market characteristics[3] show that for cross-border traffic within the Rhine-Alpine Corridor rail has a share of 12%, road of 34%, and inland waterways of 54%. The volume is estimated with 371.9 million tonnes in 2010, covering 37% of the total estimated demand in the defined network area including all traffic flows (international and domestic).

With regard to the baseline run, the freight demand expects a moderate growth up to 2030 with an increase of 1.7% p.a. for road, rail and inland waterways, meaning a total growth of about 40% for each transport mode. Applying the policy interventions on the compliance scenario, these 2010-2030 growth rates change to 55%, 36% and 41% respectively. The significant growth in rail is explained with lower travel times and costs assumptions. On the other hand, road is becoming more expensive and time consuming and thus causing a shift to rail. Inland waterways will remain more or less at the same level, due to their low costs of transport and the maturity of the mode in the corridor. In terms of market, the analysis showed that imports and exports (combined) occupy the highest share (~53%), followed by transit (~26%, particularly high in Switzerland). The analysis at origin/destination level demonstrates a higher growth trend for the central part of the corridor, especially for rail in the areas close to Köln, Frankfurt and Mannheim, followed by a strong presence through Switzerland and Italy. For inland waterways, the links from Rotterdam following the Rhine to Duisburg and then to Frankfurt are the busiest ones in the network. For road, the main growth potential is demonstrated around urban areas. This capacity need by 2030 was also confirmed in the supply side analysis for the corridor, in terms of both network and terminal capacity.

The supply analysis also indicated opportunities for a well-functioning multimodal Rhine-Alpine Corridor. The development of multimodal sites, longer trains, new services and better collaboration among stakeholders was mentioned as possible service-sided improvements.

[3] based on 2010 ETIS data

Corridor objectives

General European objectives were identified, from which some specific objectives for the Rhine-Alpine Corridor were gathered. The corridor objectives can be clustered into the following subdivisions:

The global objective – "*The trans-European transport network shall strengthen the social, economic and territorial cohesion of the Union and contribute to the creation of a single European transport area*" – can be declined in four main topics:

- Territorial and structural cohesion: the Core Network must ensure accessibility and connectivity of all regions of the European Union;
- Efficiency between different networks: the removal of bottlenecks, the increase in capacity of over-utilised sections and the bridging of missing links within Member States' territories and between them must be a priority for the European network;
- Transport sustainability: all transport modes must be developed in view of addressing concerns regarding sustainability and economic efficiency;
- Increase in the benefits for the users: the European transport network must answer to the mobility and transport needs of its users.

Core network corridors should also address wider transport policy objectives and facilitate interoperability, modal integration and multimodal options"[4]. The corridors should ensure a seamless national and international transport by using all kind of transport modes, minimise environmental impacts and increase competitiveness.

Modal objectives have been defined, regarding:

- Multimodality and intermodality in the corridor: interconnection of transport modes at the nodes, real-time information in the transport chain, communication to the users at the stations, freight transhipment, etc.;
- Railway transport: ERTMS-equipped infrastructure, interoperability of national networks, full electrification, safety, multimodal nodes connected to rail, etc.;
- Road transport: reduction of congestion, interoperability on the network, safety, availability of clean fuels, reduction of emissions, etc.;
- Seaports, inland ports and inland waterways transport: minimum of CEMT class IV, adequate capacity of transport, continuous bridge clearance, good navigability, RIS, interconnection of ports and railway lines, roads, etc.;
- Air transport: at least one terminal accessible to all operators, implementation of Single European Sky, availability of clean fuels.

Specific objectives for the Rhine-Alpine Corridor are about improving cross-border sections, improving capacity and removing bottlenecks, eliminating missing links, interoperability/compliance with TEN-T standards, developing multimodality, improving last mile connection, tackling externalities/sustainability/innovation and considering impacts on urban areas.

Programme of measures

The programme of measures defines the framework for the corridor work plan. The core results of the previous working steps are summarised, consolidated and condensed. Necessary measures for the improvement of the transport infrastructure are derived by matching the results of the transport market study, stating quantitative requirements and the corridor objectives, which are defining qualitative requirements

[4] EU-Regulation 1315/2013, Article 4

from the point of view of the TEN-T policy and transport market stakeholders, compared with the current corridor characteristics.

Implementation plan

The implementation plan is based on the identification of projects, the input from stakeholders, as well as on bilateral coordination with the Member States.

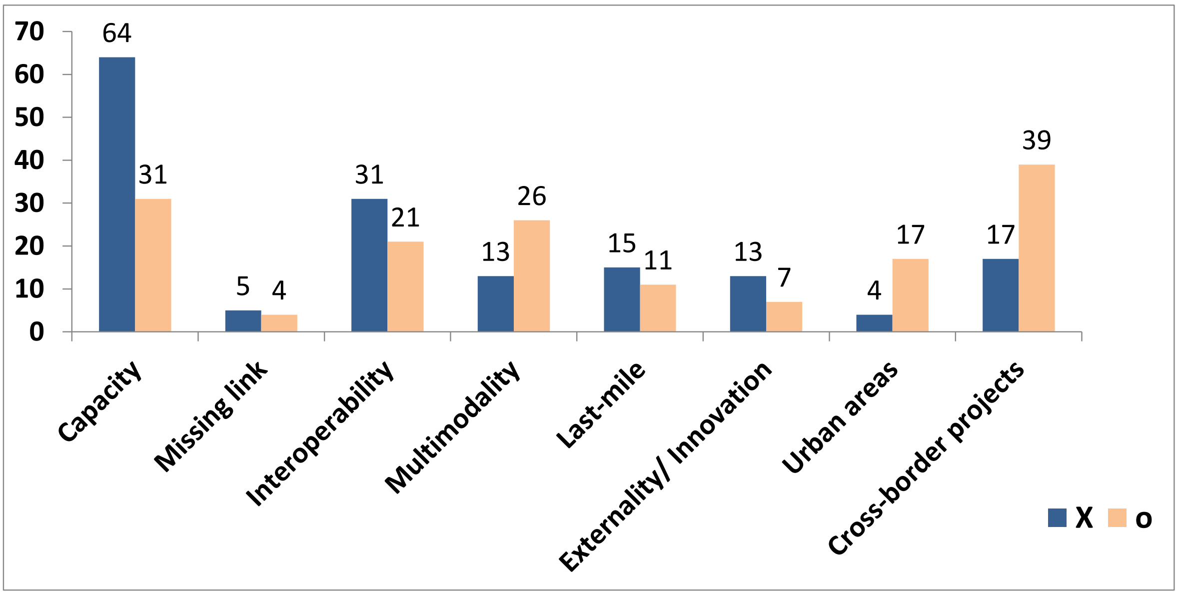
To tackle all the critical issues and bottlenecks described in the corridor characteristics, the implementation plan foresees the realisation of 175 projects on the Core Network of the Rhine-Alpine Corridor. Thereof 30 projects are assigned to Switzerland and thus were regarded separately.

Out of the remaining 145 projects, the majority (60) is assigned to rail, followed by inland waterways (28), seaports (19) and road (15). Inland ports (9), airports (7) and rail-road terminals (7) only have a small share. Regarding allocation of projects to the respective Member State it becomes obvious that most projects are taking place in Italy (57). Germany has 31 assigned projects, The Netherlands 22, Belgium 15 and France 11. Additionally, there are 9 projects involving more than one country.

In general, most projects (74) are planned to be finalised by 2020 at the latest (according their internal implementation schedule). This concerns especially inland ports, seaports and inland waterway, where 37 out of in total 56 are expected to finish before the end of 2020. For 30 projects there is no information about the year of implementation; they were regarded as "finished later than 2030". Five projects are expected to be finalised by the end of 2014.

Furthermore, all cross-border sections had to be identified. This was done, per mode, with the European Commission's input. It led to 56 cross-border relevant projects.

All the projects were clustered according to the defined categories of critical issues (X= main target of the project / o= additional target).



Source: HaCon analysis

Investment

Based on the available information, the investment analysis showed that the overall costs of the identified 145 projects amount to about €47,615 M, of which for 19 projects specific information on project costs were not available. Further analysis showed that 70 of 145 projects are at least partially defined as *"pre-identified* *sections"* and thus fall under CEF funding priorities. The expected total costs of the 70 projects accounts for €29,854 M. Additionally, further 10 projects are located on the alignment of both the Rhine-Alpine Corridor and the North Sea-Med Corridor with additional costs of about €2,158 M. In addition to the 80 (70+10) *"pre-identified projects"* mentioned above, there are 52 projects which can be associated to at least one of the funding priorities set by Regulation 1316/2013. The estimated overall costs of the additional 52 projects amounts to €10,245 M.

In total, about 132 projects and thus 90% of the 145 projects fall under the priorities of CEF funding with estimated overall costs of €42,256 M. The largest number of projects is located in Italy (52), Germany (26), and The Netherlands (19), whereas the highest costs are to be borne in Germany (€17,020 M), followed by Italy (€14,367 M).

The objective of "Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections" covers the largest number with 86 projects and total costs of €34.3 billion. The objective of "Optimising the integration and interconnection of transport modes and enhancing the interoperability of transport services, while ensuring the accessibility of transport infrastructures" presents a lower number with 36 projects and total costs of €6.7 billion. Finally, the objective of "Ensuring sustainable and efficient transport systems in the long run, as well as enabling all modes of transport to be decarbonised" is pursued by only ten projects for total costs of €1.26 billion.

It should be mentioned that this analysis is a preliminary exercise based on partial information. The project eligibility for CEF funding is under the responsibility of the European Commission (in particular INEA), which will base its decision on the evaluation of the applications submitted in the calls for proposal.

Remark: Management Summaries in Dutch, French, German and Italian language are included in Annex 13.

Table of Contents

Table of Figures

Table of Tables

List of Abbreviations

ABS	Altbaustrecke (conventional line)
AGORA	European terminal interest group
ARE	Federal Swiss Office for spatial development
BE	Belgium
BLS	Swiss railway company (former known as Lötschbergbahn AG)
BÖB	Bundesverband öffentlicher Binnenhäfen (German inland port association)
b.v.	Besloten vennootschap met beperkte aansprakelijkheid (company with limited liability)
CB	cross-border
CC	Country Code
CCNR	Central Commission for the Navigation of the Rhine
CEF	Common European Framework
CH	Switzerland
CNC	Core Network Corridor
cp.	Compare
DE	Germany
DG MOVE	European Commission – Directorate General for Mobility and Transport
e.g.	For example
EBA	Eisenbahn-Bundesamt (German Federal Railway Office)
EC	European Commission
ECMT	Classification of European Inland Waterways
EDP	European Deployment Plan
EEIG	European Economic Interest Grouping
ERTMS	European Rail Traffic Management System
ETCS	European Train Control System
ETIS	European Telecommunication Informatics Services
EU	European Union
EWIV	Europäische wirtschaftliche Interessenvereinigung (see EEIG)
FR	France
GDP	Gross Domestic Product
GSM-R	Global System for Mobile Communications-Railway
h	Hour
HC	HaCon
HGV	Heavy Goods Vehicle
HSL	High speed rail line
i.e.	Id est
IATA	International Air Transport Association
ILU	Intermodal Loading Unit
IM	Infrastructure Manager
INEA	Innovation and Networks Executive Agency
IT	Italy
ITS	Intelligent Transportation System
IWT	Inland Waterway Transport
IWW	Inland Waterways
KC	KombiConsult
km	Kilometres
KPI	Key Performance Indicator
KV	Kombinierter Verkehr (intermodal transport)
LGV	Ligne à Grande Vitesse (high speed rail line)
LNG	Liquefied Natural Gas
LSP	Logistics service provider
LU	Luxembourg

m	Metres
M	Million
ME	Measures
mm	Millimetres
MoS	Motorways of the Sea
MoT	Ministry of Transport
MS	Member State
N/A	Not available
NBS	Neubaustrecke (new line)
NL	The Netherlands
No	Number
NSTR	Nomenclature uniforme des marchandises pour les Statistiques de Transport, Revisée (break-down of commodities for all transport modes)
OBU	On-Board Unit
OMC	Open method of co-ordination
PaP	Pre-arranged path
PAX	Passenger
PP	Priority Project
PwC	PricewaterhouseCoopers
Rapp	Rapp Trans
RFC	Rail Freight Corridor
RFC1	Rail Freight Corridor Rhine-Alpine
RIS	River Information Services
RoRo	Roll-on, roll-off
RRT	Rail–Road Terminals
SBB	Schweizerische Bundesbahn (Swiss railway company)
SESAR	Single European Sky ATM Research Programme
Sqm	Square metres
SWOT	Strengths, Weaknesses, Opportunities, Threats
t	Tonnes
TBL	Transmission balise-locomotive
TEN-T	Trans-European Transport Network
TEU	Twenty-foot equivalent unit
TMS	Transport Market Study
UIC	International Union of Railways
UNECE	United Nations Economic Commission for Europe
WenZ	Waterwegen en Zeekanaal NV

1 Information on the study as such

1.1 The TEN-T Core Network Corridors

Transport infrastructures all over the European Union (EU) that are of international importance, form the trans-European transport network (TEN-T). This network aims at fostering the social, economic and territorial cohesion of the EU and should inure to the benefit of its population.

TEN-T consists of two layers. The basis is built by the comprehensive network; a subset thereof is called Core Network. In general, the objectives for these two layers are the same, only the time horizon reflects a prioritisation: Whereas the Core Network has to be implemented by the year 2030, the comprehensive network should be realised until 2050.

Within the Core Network, special attention is given to nine corridors, the so-called Core Network Corridors (CNC) which are the new implementation tool of the TEN-T guidelines (EU-Regulations No 1315/2013 and 1316/2013)[5]. Core Network Corridors shall enable Member States to achieve a coordinated and synchronised approach with regard to investment in infrastructure in order to manage capacities in the most efficient way. For an overview on the TEN-T Corridors see the Figure 1 below. The Rhine-Alpine Corridor marked in orange.

Figure 1: The TEN-T Corridors

Source: European Commission

A main pillar for the corridor implementation is the elaboration of a work plan analysing the development of the corridor applying objectives and priorities set out in the EU Regulation No 1315/2013.

[5] Regulation (EU) No 1315/2013 of the European Parliament and of the Council of 11 December 2013 on Union guidelines for the development of the trans-European transport network (EU) No 1316/2013 of the European Parliament and of the Council of 11 December 2013 establishing the Connecting Europe Facility.

1.2 General Methodology and involved parties

In order to facilitate the implementation of the Core Network Corridors, each corridor is headed by European Coordinators. In the case of the Rhine-Alpine Corridor, the appointed coordinator is Ana Palacio. The work of the European Coordinator is assisted by a consultative Corridor Forum which was established in agreement with the Member States concerned.

By 22 December 2014 each European Coordinator shall submit the work plan to the concerned Member States. After this plan has been approved by the Member States it shall be submitted for information to the European Parliament, the Council and the Commission.

The European Coordinator and the Member States in the Corridor Forum are supported by a consortium of consultancy companies contracted by the European Commission.

The consultancy consortium partners have been selected in order to provide a complete coverage of the corridor. Members of this consortium for the Rhine-Alpine Corridor are:

- HaCon Ingenieurgesellschaft mbH (Hannover, Germany) (lead partner);
- KombiConsult GmbH (Frankfurt am Main, Germany);
- Panteia B.V. (Zoetermeer, The Netherlands);
- PricewaterhouseCoopers Advisory SpA– PwC (Roma, Italy);
- Rapp Trans (Basel, Switzerland);
- Stratec (Brussels, Belgium).

Their main tasks are:

- Fact finding: identifying stakeholders, gathering and reviewing existing studies and material, introducing infrastructure parameters in the TENtec system[6];
- Support for the meetings of the Corridor Fora;
- Preparation of the work plan analysing the development of the Rhine-Alpine Corridor.

The allocation of task and main responsibilities (task leader) of the contractors are displayed in the following Table 1.

[6] TENtec is the information system of the European Commission to coordinate and support the TEN-T Core Network Corridor development. TENtec is storing and administrating technical and financial data on the corridor as a basis for the analysis, management and the support of the political decision making process of the TEN-T programme.

Table 1: Allocation of contractors' responsibilities for the Core Network Corridor study

Tasks/work packages	HaCon	KC	Panteia	PwC	Rapp	Stratec
Stakeholder identification	X	**X**	X	X	X	X
Study review	X	X	**X**	X	X	X
TENtec data collection/update	X	X	**X**	X	X	X
Implementation plan	**X**	X	X	X	X	X
Corridor characteristics	X	X	X	X	**X**	X
Transport market study	**X**	X	**X**	X	X	X
Corridor objectives		X				**X**
Programme of measures		**X**				
Investment plan	X	X	X	**X**	X	X
Corridor Fora	X	X	**X**	X	X	x
***X**: leading and responsible partner / X: partner involved*						

Source: HaCon

In particular for the fact finding, under the lead of the respective task and work package leaders, each partner was responsible for their respective country:

- HaCon and KombiConsult for Germany;
- Panteia for The Netherlands;
- PwC for Italy;
- Rapp Trans for Switzerland;
- Stratec for Belgium and France.

According to this division, the partners have coordinated their contributions for:

- stakeholder identification with KombiConsult, who elaborated the stakeholder lists and the invitation lists to the Corridor Fora;
- study review with Panteia, who summarized results of the study analysis;
- data collection for the update of the TENtec system with Panteia, who also was responsible for the upload of the data.

All partners also coordinated their inputs for the elaboration of the study on the TEN-T Core Network Corridor with the representatives (MoT, infrastructure managers) of their respective countries (Member States and Switzerland). This in particular includes the identification of current and planned projects and measures for the development of the Core Network.

The development of the Core Network Corridor Study includes a stakeholder approach within the European Commission, with the Member States (and Switzerland), infrastructure managers, local and regional authorities, users of transport infrastructure, operators and civil society. As a consequence, the elaboration process of the work plan for the Core Network Corridor was accompanied by a Corridor Forum in which the stakeholders were gradually involved. Member States had to agree on the participation of Stakeholders.

Altogether, four Corridor Fora were performed in 2014

- First Corridor Forum in April with Member States representatives;
- Second Corridor Forum in June with Member States, infrastructure manager rail and IWW;
- Third Corridor Forum in October with Member States, infrastructure manager rail, IWW, road, airports and regions;
- Fourth forum in November which invited the attendees of the Third Forum meeting.

The role of the Corridor Fora is to actively contribute to establish the corridor work plan by:

- providing opinions on the work as well as experiences for their respective transport modes, nodes, etc.;
- giving feedbacks and opinions on the working progress of the study;
- providing advanced information and data sources (e.g. studies, data, relevant projects).

The work of the Corridor Fora was supplemented by working groups. The first meeting in October involved ports and inland waterways experts, the second working group meeting will integrate the concerned regions. The creation of the working groups was approved with the Member States in the respective Corridor Forum meetings.

The consultation of civil society, user organisations and representative organisations, has been done by the Coordinators outside the Corridor Forum meetings (e.g. when being on mission in the different Member States and/or through other events along the corridor.

This Final Report documents the current work status and the respective results by 05 December 2014 for the study on the Rhine-Alpine Corridor in particular considering:

- The content of the "working document" handed over to the consultants on 26 February by Mr Herald Ruijters (Head of Unit TEN-T, DG MOVE);
- Bilateral coordination between the contractors and the European Commission as well as coordination between the contractors and Member States representatives;
- The first Progress Report (internal comprehensive report and summary March 2014), second Progress Report (May 2014), third Progress Report (September 2014) and finally the Fourth Progress Report (November 2014);
- The results of the Corridor Fora (in April, June, October and November 2014) in Brussels;
- Comments and remarks of the Corridor Forum participants on the respective Progress Reports;
- E-mail "Guidance towards the final draft report" sent by the European Commission on 21 October 2014;
- The report is based on the fourth Progress Report (version: 12 November 2014) considering "the common structure for the third Progress Report" given by the European Commission and confirmed in the E-mail "Guidance towards the final draft report" (see above).

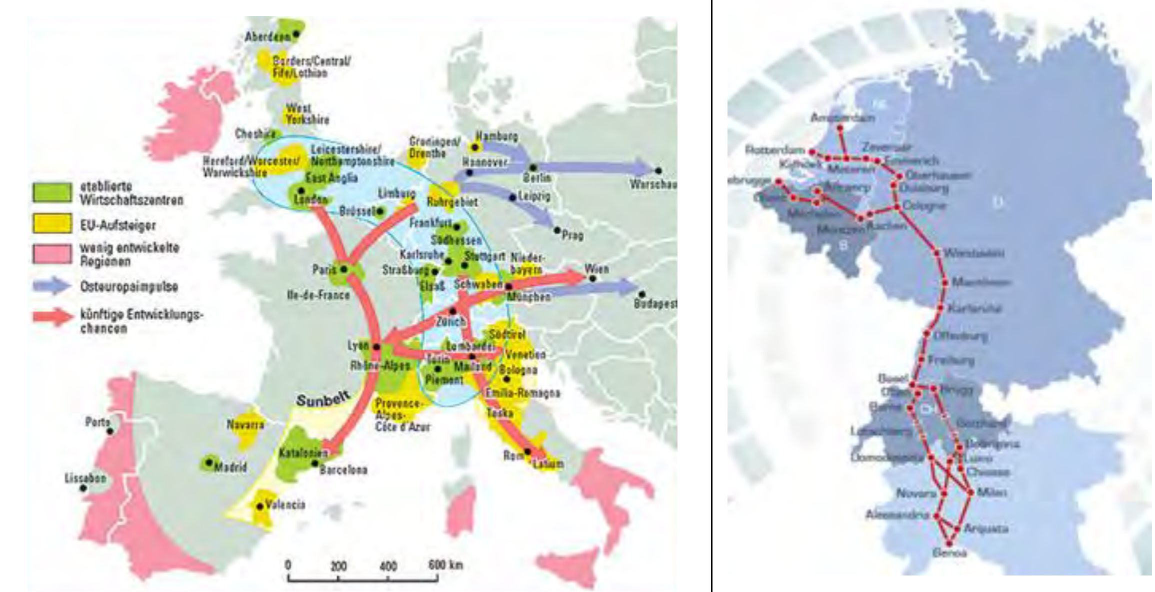
The ERTMS deployment plan of the Core Network Corridor Rhine-Alpine has been checked and coordinated by the Member States and the respective rail infrastructure managers. However, the ERTMS implementation plan of the Rail Freight Corridor Rotterdam Genoa is currently under revision. The new version of this ERTMS implementation plan is expected to be published in December 2014 earliest. Hence, there might be new information concerning the planned ERTMS deployment and the respective implementation dates for the Rhine-Alpine Corridor.

1.3 The Rhine-Alpine Corridor

The Rhine-Alpine Corridor stretches from the northern seaports in The Netherlands and Belgium to the Mediterranean basin in Genoa right through most of the important and economically strong urban regions of Europe. Countries directly involved are: The Netherlands, Belgium, Germany, Switzerland, Northern Italy and the eastern part of France, namely the Strasbourg area and Luxembourg (Moselle).

Altogether, more than 70 million people are living, working and consuming in the catchment area of the Rhine-Alpine Corridor. Lading manufacturing and trading companies are located along the corridor with production plants and distribution centres. Important industries are e.g. the steel industry, chemical and petroleum industry, car producers as well as power plants. The corridor is inside the shape of the so-called "Blue banana" which includes economic centres of the European Union, starting in London, touching the Brussels and Antwerpen region in Belgium, the Randstad region in The Netherlands, the German Rhine-Ruhr and Rhine-Neckar region, the Basel and Zürich region in Switzerland, and the Milan-region in Northern Italy (cp. Figure 2).

Figure 2: Blue Banana and Rail Freight Corridor Rhine-Alpine



Source: www2.klett.de | *Source: www.corridor-rhine-alpine.eu*

Based on the economic importance and geographical position, the Rhine-Alpine Corridor carries the highest transport volumes in Europe. Therefore, efficient transport infrastructure and multimodal nodes have a key role for a sustainable future development. Today, the corridor has already a well-developed internationally-based transportation infrastructure for road, rail and inland waterways.

The river Rhine is an important route for the containers and the transport of bulk commodities especially between the North Sea ports and Germany, France and Switzerland. Therefore the securing of navigation reliability on the Rhine is a very important topic. This also applies for the barge services to the inland ports along the Moselle, Main and Neckar.

The international rail has also a very important role on the corridor. For international passenger transport, predominately connections between agglomerations in neighbouring countries are important. For rail freight, transport flows along the entire corridor have an important role in particular for intermodal transport volumes from and to the seaports and the transit via Switzerland. Against this background, the Rail Freight Corridor Rhine-Alpine (RFC1) was belonging to the first European rail freight corridors set operational already in November 2013 as required in the by the Regulation 913/2010. Existing missing links are bottlenecks in Germany and Italy, where capacity upgrades are required, and a better interconnection between the Belgian and Dutch networks with the German one, particularly between Emmerich and Oberhausen. In addition, the access routes to the Swiss tunnels on EU territory need improvements, as the Gotthard tunnel in 2016 and Monte Ceneri tunnel in 2019 will create a flat trajectory for rail freight through the Alps.

Since all transport modes are represented on the corridor, multimodality for both passenger and freight transport already has an outstanding role. Important multimodal nodes are (listing is not comprehensive):

- The ports of Antwerpen and Rotterdam, which belong to the group of world's leading seaports, especially for container transhipment, together with the ports of Amsterdam, Zeebrugge, Ghent and Genoa benefit of international maritime connections, inland waterway transport services (only in the North Sea ports), rail freight and road transport.
- For the execution of maritime and continental intermodal transport, a net of rail-road terminals (RRT) is located along the corridor. Beside the seaports, main locations are Duisburg, Köln, Mannheim/Ludwigshafen, Basel, Novara, Genoa and Milano. Today, intermodal transports from and to Italy are mainly continental, but with the improved connection of the Port of Genoa to the hinterland also the volumes to Switzerland and Southern Germany are expected to grow slightly.
- The airports of Amsterdam and Frankfurt are very important hubs for passenger and freight transport. Further airports with considerable traffic flows on the Rhine-Alpine Corridor are Brussels (passenger), Liège (freight), Düsseldorf (passenger), Köln (freight) and Milano (passenger).
- The cities of Amsterdam, Rotterdam, Brussels, Liège, Köln, Frankfurt, Basel, Milano and Genoa are part of European rail high speed net.

1.3.1 Alignment and infrastructure belonging to the corridor

A first description of the outline of the Rhine-Alpine Corridor was given in the Tender Specifications[7]: *"This north–south corridor, based on ERTMS Corridor A and Priority Projects 5 and 24 and the Rail Freight Corridor Rhine-Alpine (RFC1), is made of one of the busiest freight routes of Europe. It connects the North Sea ports of Rotterdam and Antwerpen to the Mediterranean basin in Genoa, via Switzerland and some of the major economic centres of the western EU. This multimodal corridor (including the Rhine basin) will provide connections to several east–west axes."*

It has been agreed at the request of the Commission[8] to integrate the rivers Moselle and Neckar in Germany as well as the French inland ports on the Rhine Strasbourg and Mulhouse for the further analysis (data collection, Transport Market Study). Inland waterways in Belgium are not included in the Rhine-Alpine Corridor, but are of importance in its strategy and development. Therefore information on these inland

[7] Call for tenders MOVE/B1/2012-573 of the European Commission (Directorate-General for Mobility and Transport) of 16 July 2013

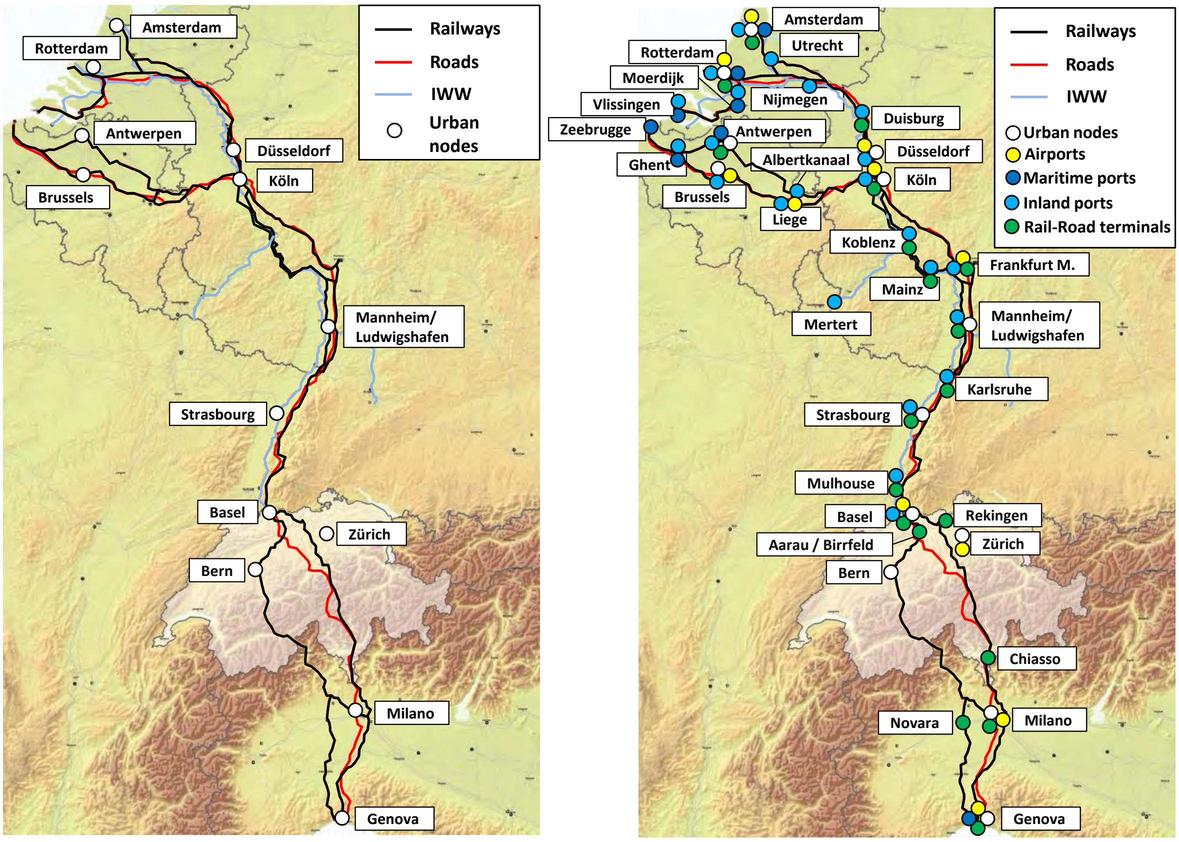
[8] Internal Kick-off meeting in Brussels on the 6 January 2014

waterways was used for the transport market study analysis. However, all Belgian inland waterways projects that could enhance the Rhine-Alpine Corridor such as the Seine Scheldt project[9] will be taken into account in the North-Sea Mediterranean Corridor. The analysis of the existing information was mainly based on the information provided by the TEN-T Regulation 1315/2013 and 1316/2013. Concerning the definition of the corridor, these regulations describe the general alignment, the urban nodes and the logistics nodes (airport, maritime ports/seaports, rail-road terminals). For the elaboration of the corridor alignment, this information was supplemented by the analysis of the available TENtec data.

The main branches of the Rhine-Alpine Corridor are:

- Genova – Milano – Lugano – Basel (480km);
- Genova – Novara – Brig – Bern – Basel – Karlsruhe – Mannheim – Mainz – Koblenz – Köln (965km);
- Köln – Düsseldorf – Duisburg – Nijmegen/Arnhem – Utrecht – Amsterdam (270km);
- Nijmegen – Rotterdam – Vlissingen (200km);
- Köln – Liège – Brussels – Ghent (285km);
- Liège – Antwerpen – Ghent – Zeebrugge (230km).

Figure 3: Outline of the Rhine-Alpine Corridor



Source: Regulation 1316/2013 Annex 1, Part 1 / HaCon

[9] Seine Scheldt is a transnational project whose purpose is to connect and improve the connection between the Rhine, Scheldt and Maas basins with the Seine basin.

In altogether seven sections of the Rhine-Alpine Corridor are overlapping with one of the other Core Network Corridors (Table 2). Concerning the nodes and the respective traffic flows the destination varies, but on certain sections the traffic volumes are congesting the same infrastructure and have to be taken into account for each of the respective corridors.

Table 2: Overview of corridor overlap per section

Section	Corridor	Overlapping with corridor
Amsterdam – Utrecht	Rhine-Alpine	North Sea-Baltic North Sea-Med
Utrecht – Betuweline	Rhine-Alpine	North Sea-Baltic
Köln – Liège – Bruxelles/Brussel	Rhine-Alpine	North Sea-Baltic
Köln – Aarschot	Rhine-Alpine	North Sea-Baltic
Antwerpen – Aarschot	Rhine-Alpine	North Sea-Med. North Sea-Baltic
Liège – Antwerpen	Rhine-Alpine	North Sea-Baltic
Basel – Strasbourg – Karlsruhe – Mannheim – Mainz	Rhine-Alpine	Rhine-Danube

Source: HaCon based on TENtec analysis

Table 3 shows the mode and country specific distances of the Rhine-Alpine Corridor (IWW with Moselle and Neckar, but without the Moselle in Luxembourg and France). With about 3,225km (respectively 49% on the total core corridor network), rail is the backbone of the corridor (highest share in Germany). Road has a share of 26%, inland waterway (IWW) has a share of 25% of the total relevant network. Germany has the highest share (49%) on all modes on the Rhine-Alpine Corridor. The respective shares of Belgium, The Netherlands, Italy and Switzerland vary between 9% and 17% for all transport modes.

Table 3: Mode specific distances along the Rhine-Alpine Corridor by countries

Mode	NL		BE		DE		CH		IT		Total
	[km]	share of total	[km]	share of total	[km]	share of total	[km]	share of total	[km]	share of total	[km]
Rail	435	13%	499	16%	1,322	41%	560	17%	409	13%	**3,225**
Road	260	15%	275	16%	708	41%	286	17%	192	11%	**1,721**
IWW	424	27%	-[10]	0%	1,155	72%	21	1%	-	0%	**1,600**
Total	**1,119**	**17%**	**774**	**12%**	**3,185**	**49%**	**867**	**13%**	**601**	**9%**	**6,546**

Source: HaCon based on TENtec analysis

[10] Belgian IWW is not part of the alignment, but analysed in the corridor characteristics and in the transport market study

1.3.2 Nodes belonging to the Rhine-Alpine Corridor

The methodology for the identification of the nodes on the Rhine-Alpine Corridor resembles the approach of the alignment definition: the TEN-T Regulation 1315/2013 have been checked for nodes belonging to the Core Network and which are located on the identified corridor infrastructure.

These locations represent urban nodes (regions with a high density of population and a strong local/regional economy) on one side and important consolidation nodes for passenger and freight traffic (airports, maritime ports, inland ports, rail-road terminals) on the other side. For Switzerland, these nodes have been proposed by the contractors and are already integrated in this report (not yet finally confirmed by Switzerland and the Commission). In total, 74 nodes along the corridor have been identified (Table 4).

Table 4: Overview of corridor nodes

Country	Urban nodes	Airports	Seaports	Inland ports	Rail-Road Terminals	Total
NL	2	2	4	6	2	**16**
BE	2	2	3	5	1	**13**
DE	3	3	-	8	8	**22**
FR	1	-	-	2	2	**5**
CH	3	2	-	1	4	**10**
IT	2	2	1	-	3	**8**
Total	**13**	**11**	**8**	**22**	**20**	**74**

Source: HaCon based on TENtec analysis

A more detailed compilation of the identified nodes per country based on their location is shown in the following Table 5. The listing considers the updated information on nodes belonging to the corridors[11] and the respective adjustments.

Table 5: Corridor nodes per country and location

Country	Node	Urban	Air	Maritime port	Inland Port	RRT	Shared with Corridor
BE	Albertkanaal				X		NS-Baltic, NS-Med.
	Antwerpen	X		X	X	X	NS-Med., NS-Baltic.
	Brussels	X	X		X		NS-Baltic., NS-Med.
	Ghent			X	X		NS-Med.
	Liege		X		X		NS-Baltic, NS-Med.
	Zeebrugge			X			NS-Med.

[11] *Mail sent by the TENtec team (Mr Mohammadi Laazzouzi – MOVE-EXT) to the contractors on 15 April 2014*

Country	Node	Urban	Air	Maritime port	Inland Port	RRT	Shared with Corridor
NL	Amsterdam	X	X	X	X	X	NS-Baltic., NS-Med.
	Moerdijk			X	X		NS-Med.
	Nijmegen				X		NS-Baltic.
	Rotterdam	X	X	X	X	X	NS-Baltic., NS-Med.
	Terneuzen/Vlissingen			X	X		NS-Med.
	Utrecht				X		NS-Baltic.
DE	Duisburg				X	X	NS-Baltic.
	Düsseldorf (Neuss)	X	X		X	X	
	Frankfurt am Main		X		X	X	Rh.-Dan.
	Karlsruhe				X	X	Rh.-Dan.
	Koblenz				X	X	
	Köln	X	X		X	X	NS-Baltic.
	Mainz				X	X	Rh.-Dan.
	Mannheim, Ludwigshafen	X			X	X	Atlantic, Rh.-Dan.
LU	Mertert				X		NS-Med.
FR	Strasbourg	X			X	X	Atlantic, NS-Med., Rh.-Dan.
	Mulhouse				X	X	NS-Med.
CH	Basel	X	X		X	X	
	Bern	X					
	Zürich	X	X				
	Aarau					X	
	Rekingen					X	
	Chiasso					X	
IT	Genova	X	X	X		X	
	Milano	X	X			X	Medit.
	Novara					X	Medit.
Key:	NS-Baltic: North Sea-Baltic Corridor Medit.: Mediterranean Corridor Atlantic: Atlantic Corridor			NS-Med.: North Sea-Mediterranean Corridor Rh.-Dan.: Rhine-Danube Corridor			

Source: HaCon based on TENtec analysis

For the further identification of the exact infrastructure, it has to be considered that particularly nodes representing inland ports, rail-road terminals and airports can have more than one facility per specific location (e.g. rail-road terminals in Duisburg).

For terminals with road-rail transhipment, a compilation of all existent terminals in the respective nodes, defined in the TEN-T Regulation 1315/2013 Annex II, has been carried out (Table 6).Official data about the rail and road connections (number of tracks/lanes) of the terminals with the hinterland are not published. For this reason, the respective data were individually requested by terminal operators or captured by examination of satellite images and counting the number of tracks and number of lanes connecting the terminals to their hinterland network.

TENtec data have been gathered for all recommended nodes with rail/road transhipment according chapter 1.3.2. Another problem in data gathering concerns the freight traffic flows.

Existing information on rail/road volumes in intermodal terminals are usually provided in intermodal Loading Units (ILU) or in TEU, but not in tonnes. For this reason, the Loading Units and TEU were converted into tonnes. The conversion factor was selected according to the UIC 2012 Report on Combined Transport in Europe (10 tonnes per TEU, 15 tonnes per loading unit).

Table 6: Terminals with rail-road transhipment in the Core Network nodes

Country	Node	Terminal	Terminal type
BE	**Antwerpen**	Antwerpen ATO	Tri-modal
		Antwerpen Cirkeldyk	Rail-Road
		Antwerpen Combinant	Rail-Road
		Antwerpen Quai 468	Rail-Road
		Antwerpen Zomerweg	Rail-Road
NL	**Rotterdam**	Rotterdam RSC Waalhaven	Rail-road
		Rotterdam ECT Delta Terminal	Rail-road
		Rotterdam Pernis Combi Terminal	Trimodal
	Amsterdam	Amsterdam USA	Trimodal
		Amsterdam VCK	Trimodal
		Amsterdam-ACT	Trimodal
DE	**Duisburg**	Duisburg Ruhrort Hafen (PKV)	Rail-road
		Duisburg DeCeTe	Tri-modal
		Duisburg Intermodal Terminal (DIT)	Tri-modal
		Duisburg Tri-modal Terminal (D3T)	Tri-modal
		Duisburg Rhein-Ruhr Terminal (RRT)	Tri-modal
		Duisburg DKT	Rail-road
		Interbulk Duisburg Terminal	Rail-road
		Logport II (Gateway-West-Terminal)	Tri-modal
		Logport III (Hohenbudberg)	Rail-road
	Düsseldorf/Neuss	Düsseldorf Hafen DCH	Tri-modal
		Neuss-Trimodal	Tri-modal
		Neuss Contargo	Tri-modal
		Wuppertal-Langerfeld	Rail-road
	Frankfurt	Frankfurt Ost	Rail-road

Country	Node	Terminal	Terminal type
		Frankfurt Osthafen	Tri-modal
		Frankfurt West (FIT)	Tri-modal
	Karlsruhe	Karlsruhe DUSS	Rail-road
		Karlsruhe Rheinhafen	Tri-modal
	Koblenz	Koblenz	Tri-modal
	Köln	Köln Eifeltor	Rail-road
		Köln-Niehl Hafen Stapelkai I, II	Tri-modal
		Köln-Niel Hafen Westkai	Tri-modal
	Mainz	Mainz CT	Tri-modal
	Mannheim, Ludwigshafen	Ludwigshafen Kaiserwörthhafen	Tri-modal
		Ludwigshafen KTL	Rail-road
		Mannheim-Mühlauhafen	Tri-modal
		Mannheim-Handelshafen	Rail-road
		Mannheim MCT	Tri-modal
FR	**Strasbourg**	Strasbourg CT Nord	Tri-modal
		Strasbourg CT Sud	Tri-modal
	Mulhouse	Ottmarsheim	Tri-modal
CH	**Basel**	Basel / Weil am Rhein (DUSS terminal)	Rail-road
		Basel-Kleinhüningen (Nord)	Tri-modal
		Basel-Kleinhüningen (Süd)	Tri-modal
		Basel Swissterminal Birsfelden	Rail-road
		Basel-Wolf (HUPAC)	Rail-road
	Aarau	Aarau	Rail-road
		Birrfeld	Rail-road
	Rekingen	Rekingen	Rail-road
	Chiasso	Chiasso (HUPAC)	Rail-road
IT	**Genova**	Vado	Rail-road
	Milano	Milano-Smistamento	Rail-road
		Certosa	Rail-road
		Busto Arsizio	Rail-road
		Segrate	Rail-road
	Novara	Novara Eurogateway CIM	Rail-road
		Novara Eurogateway Boschetto	Rail-road
		Novara (RoLa)	Rail-road

Source: KombiConsult

Concerning the Rail Freight Corridor Rhine-Alpine (RFC1), the number of terminals is not consistent with the table above. For the comprehensive terminal listing (according the Rail Freight Corridor Rhine-Alpine) see Annex 10.

Concerning air transport, in total 13 airports have been identified on the Rhine-Alpine Corridor (including Switzerland). Of these airports, four are in Italy and three in Germany. Two are located in Belgium, two in The Netherlands and one is located in Switzerland. The international airport Basel-Mulhouse is located 6km from Basel but on French territory. It has a bi-national status as French and Swiss airport. While considered as a comprehensive airport node for France, it is of high importance for Germany, France and Switzerland and thus listed together with Zürich as a Swiss core airport along the corridor. The airports are compiled in Table 7.

Table 7: Airports belonging to the Core Network nodes

Country	Node	Airport
BE	Brussels	Brussels National/Nationaal
	Liege	Liege Airport
NL	Amsterdam	Airport Schiphol
	Rotterdam	Airport Rotterdam The Hague
DE	Düsseldorf (Neuss)	Düsseldorf Airport
	Frankfurt am Main	Airport Rhein-Main Airport
	Köln	Airport Köln-Bonn
CH	Zürich	Airport Zürich
	Basel	EuroAirport Basel-Mulhouse-Freiburg
IT	Milano	Airport Linate
		Airport Malpensa
		Airport Bergamo (Orio al Serio)
	Genoa	Airport Genoa -Sestri

Source: HaCon based on TENtec analysis

The airports of Rotterdam, Liège, Milano Linate, Milano Bergamo and Genoa are not connected to rail.

2 Identification of stakeholders

The new TEN-T Guidelines aim at meeting not only the requirements of transport but also the societal development of the next decades. This opens up new challenges – both in terms of innovative technological solutions and governance approaches, involving a wide range of players. Article 50 of the TEN-T Guidelines sets the frame for the engagement with public and private stakeholders and names the entities which relate to projects of common interest.

As a consequence, the elaboration process of the Work Plan for the Core Network Corridor pursued a stakeholder approach, which seeks to involve stakeholders incremental via four Corridor Fora. The Corridor Forum is a consultative body, adding specific geographic or thematic inputs to the TEN-T Core Network Corridor Study which is provided as a basis for discussion. Thus the work plan will be the result of a broad consultation process, ensuring the acceptance and implementation of measures. In general, Member States have to agree on the participation of stakeholders.

Stakeholders that have been identified

The first identification of relevant stakeholders was done by the companies of the consortium representing the respective country in which they are located: Panteia for The Netherlands, Stratec for Belgium and France, HaCon and KombiConsult for Germany, Rapp Trans for Switzerland, and PWC for Italy. Eventually, based on the framework conditions and the consultants' experiences and corridor knowledge, the consortium identified a total of 412 stakeholders including all countries, transport modes and different levels of players that are relevant for the corridor. Related to the completed and envisaged Corridor Forums and Working Group, the list was continuously extended and updated. The current version of the comprehensive list of stakeholders is attached in Annex 2.

Incremental involvement of stakeholders

At the first Corridor Forum (April 2014), only representatives from the Member States Ministries (The Netherlands, Belgium, Germany, Italy and France) participated.

For the second Corridor Forum (June 2014), representatives from Switzerland and infrastructure managers for IWW, ports and rail, including the Rail Freight Corridor Rhine-Alpine (RFC1), were invited.

In order to keep the Corridor Forum manageable, it was agreed in the third Corridor Forum, that additional working group meetings will take place around the third and the fourth Corridor Forum meetings. The first working group meeting in October involved stakeholders from ports and inland waterways, while the second shall assemble the respective regions. Member States, that have been asked to approve on the formation of working groups, approved this procedure.

As regards the consultation of civil society, user organisations and representative organisations, this will be done by the corridor Coordinators outside the Corridor Forum Meetings, e.g. when being on mission in the different Member States and/or through other events along the corridor.

The following tables show the structure of the clusters and stakeholders for the respective Corridor Forum:

Second Corridor Forum

For the second Corridor Forum, in addition to the representatives of the Member States and Switzerland altogether 24 infrastructure mangers of Inland waterways, ports and rail have been identified and agreed with the respective Member States.

Table 8: Clusters and numbers of stakeholders for the Rhine-Alpine Corridor to be invited for the second Corridor Forum

Cluster \ Country	BE	CH	DE	FR	IT	LU	NL	EU	Total
Inland waterway and ports	3		3	5		1	3	-	15
Rail infrastructure	1	3	2	-	2	-	-	-	8
Rail freight corridor	-	-	-	-	-	-	-	1	1
Total	**4**	**3**	**5**	**5**	**2**	**1**	**3**	**1**	**24**

Source: KombiConsult

Third and fourth Corridor Forum

With regards to the stakeholders to be potentially invited to the third Corridor Forum (1 October 2014) and the corresponding working group (30 September 2014; ports and IWW stakeholders), the Commission determined stakeholders representing the following groups:

- Airports;
- Inland Waterway and ports (inland ports, seaports);
- Rail infrastructure
- Rail freight corridor
- Regional authority (selected spokesman)
- Road infrastructure.

Thereof, the Consortium identified 118 stakeholders. The selection then was addressed and clarified with the Member States during and after the second Corridor Forum via bilateral consultation between the Commission and the respective Member States, and turned out in a list of 59 stakeholders to be potentially invited, as can be seen in the following table.

Table 9: Clusters and numbers of stakeholders for the Rhine-Alpine Corridor to be potentially invited for the third Corridor Forum

Cluster \ Country	BE	CH	DE	FR	IT	LU	NL	EU	Total
Airport	2	-	1	-	7	-	1	-	11
Inland waterway and Ports	6	2	5	6	1	1	3	-	24
Rail infrastructure	1	6	2	2	2	-	2	-	15
Rail freight corridor	-	-	-	-	-	-	-	2	2
Regional authority	2	-	4	1	2	-	1	-	10
Road infrastructure	3	-	-	-	3	-	-	-	6
Total	**14**	**8**	**12**	**9**	**15**	**1**	**7**	**2**	**68**

Source: KombiConsult

The detailed list of the identified stakeholders to be invited to the third Corridor Forum can be found in Annex 2.

As concerns the workshop for inland waterway and ports, the consultation between the Consortium and the respective Member States resulted in a list of 35 stakeholders to be potentially invited.

The fourth Corridor Forum meeting took place at the 19 November 2014. It invited the same stakeholders that attended for the third Corridor Forum.

3 Review of studies

The review of studies is a supportive task for the rest of the report and it is mainly carried out by Panteia.

The review of the studies is conducted in two consecutive steps: a general studies review (attached in Annex 4) and a technical-specific studies review (attached in the Annexes 5 and 6, respectively).

The studies overview was a continuous process. Member States, rail, IWW and port stakeholders have provided input on additional studies and what studies they consider as relevant. The fact, that a study is summarized in the sections below indicates the consortium considered these studies as important and the outcomes relevant. The studies' selection is different per subject; the annexes and the description of critical issues offer guidance on the identification of "the most important subjects". This section is to summarize to some degree, but also to raise new questions and introduce subjects further. For national studies, a lot of examples are given for ports, transport modes or for countries. To combine the different regional, national and EU wide documents, the following categorisation is used.

- Macro-region documents for the planning and development of transport;
- Study and planning documents of infrastructure projects;
- Studies of transport development and future scenarios in selected topics and or areas;
- Governance studies and strategy papers.

Here it should be further noted that a transport market study as the Rail Freight Corridor Rhine-Alpine covers all elements below. Important studies are highlighted in the text below. The annexes of this report contain the general study list. There are also technical annexes which provide detailed information on studies on infrastructure projects and bottlenecks.

A critical analysis of the more than 200 existing studies was also preparatory work for the Transport Market Study (TMS) for the Rhine-Alpine Corridor.

3.1 Responsibilities and organisation of work

All the consortium partners are involved in the literature review process by (1) identifying the original list of studies related to the corridor and (2) further analysing the studies related to the technical aspects of the corridor. This work was led by Panteia.

In order to meet the prerequisites for each review, two separate templates were devised. The first template covers the studies' general attributes (e.g. publishing year and funding organisation), the corridor-related attributes such as the countries, sections and modes involved, as well as whether specific features are described in the respective study. Following this process, each study has been provided with specific keywords. These keywords were then used in the second step to filter the studies related to the technical details of the corridor.

More specifically, the general studies overview template consists of:

- The study specific information (title, funding organisation, author(s), publication date, confidentiality status);
- The time period covered by the study;
- The corridor specific information (countries and links involved, core nodes coverage, mode, passenger/freight transport related, type of terminal involved);
- A series of questions regarding the reasons for analysing the study's content (does it contain technical data on current infrastructure? Does it describe bottlenecks, missing links? Does it contain plans, feasibility of new infrastructure projects? Does it show technical specifications for planned infrastructure? Does it include transport cost data or analysis? Does it include project costs, and information about financing? Does it contain data on current or historical traffic/demand levels? Does it contain demand forecasts? Does it cover electronic traffic management systems? Does it include environmental assessments, or other externalities?);
- Their relevance to corridor study activities (stakeholder identification, data collection, market study, implementation plan and investment strategy).

3.2 Macro-region documents for the planning and development of transport

The geographical area of the Rhine-Alpine Corridor has a multitude of rail, IWT and seaport studies. The rail implementation documents are EU-wide and amongst others directly contribute to the development of the ERTMS technical specifications.

Implementation plan Rail Freight Corridor Rhine-Alpine (RFC 1)

The implementation plan covers a similar geographical area as the Rhine-Alpine Corridor for rail. The transport market study of the implementation plan also covers rail, road and IWT freight, the document describes the measures foreseen for the further development of rail. Measures are supported by cooperation of Ministries, infrastructure managers and allocation bodies on the basis of national decisions and deployment plans.

The document elaborates infrastructure works, investment plans, inauguration of a one-stop-shop and authorised applicants, traffic management, performance measurements and monitoring. ERTMS is a binding element for the sections belonging to the ERTMS Corridor A. As mentioned, this study contains important information on macro-region documents for the planning and development of transport, study and planning documents of infrastructure projects, studies of transport development, future scenarios in selected topics and/or areas, governance studies and strategy papers.

ERTMS development and consolidation (2006-EU-93001-S)

The European Rail Traffic Management System (ERTMS) is composed of a unique European Train Control System (ETCS) and the radio system GSM-R. This project focusses on the prerequisites for gradually harmonising national systems throughout Europe. More specifically, the project's main objective is to update and upgrade the test specification to the baseline version 2.3.0 and 2.3.0d of the System Requirements Specifications and validate its outcomes -regarding specifications and products- with a test campaign. This will ensure that when an on-board ETCS completes its entire test sequences, it will be able to run on all ETCS lines equipped with version 2.3.0d. The project helped lay the technical foundation for bigger ERTMS initiatives.

PLATINA II information packages I and II

PLATINA II develops knowledge and cooperation networks in the IWT sector. Platina is an action aimed at supporting the implementation of the NAIADES II policy set. Specifically, an IWT information study was developed by Platina and two information packages were distributed. The first package contains information relevant for IWT in Europe and references to existing studies. Infrastructure parameters for IWT and inland ports, bottlenecks, cross border issues and interoperability are subjects that are treated and used in the report. The second information package focuses on the preparation of the work plans and more on less mature markets outside the Rhine-Alpine Corridor. Advice on corridor objectives and project lists for the Rhine-Alpine Corridor are covered in the second package. The document stresses that vessels are an important part of IWT, not only infrastructure. Expected actions on innovating vessels are presented. Studies from the information package return in numerous chapters of this report.

RIS enabled IWT corridor management 2012-EU-70004-S

Similar to ERTMS for rail, are River Information Services (RIS) for inland waterways. Waterway transport has to be planned further in advance than transport by road. RIS aims amongst others at harmonising the transport reporting in order to reduce the administrative burden and to provide all stakeholders with the right information at the right time.

The ability to plan timely and efficiently based on the right information is a major success factor for handling the expected growth in container transport in a sustainable manner. In this context, the Action aims at developing the definition and implementation of a RIS corridor approach and consequently strengthening the position of inland navigation within the transport chain. The Action will facilitate a structured dialogue between public and private stakeholders across national borders. Finally, the study will investigate how to foster different interoperability and compatibility solutions. The project's activities in this context shall focus on the deployment of intelligent infrastructure so as to enable the efficient RIS implementation at corridor level.

Seaport documents

Seaport connectivity is a strategic subject and very relevant for the Rhine-Alpine Corridor. Throughput of the Genoa, Zeebrugge, Antwerpen and Amsterdam ports combined amount to more than 370 million tonnes per year. Adding Rotterdam to this would result to a total of more than 800 million tonnes. Ports need to balance the port capacity with inland transport of the at hinterland connections. Not all port plans are presented here. The study review annexes (Annex 4-6) provide a full overview.

Rotterdam port vision 2030

The Rotterdam port vision is created by the Port of Rotterdam to elaborate on strategic goals in 2030. At the highest level of abstraction, the port vision focuses on logistics and industry. A set of strategic actions have been defined in this vision. The most crucial actions can be summarised in five themes:

- Europe's Industrial Cluster, potential of port industry and integration of companies in Rotterdam itself and cooperation with the Port of Antwerpen.
- Global Hub, trough efficiency in logistics chains. The port envisions that IT systems like Portbase can help this goal.
- Accessibility, through the better use of existing inland infrastructure and expanding capacity for the future.
- The improvement of the quality of life, reduction of emissions from industry and transport and reduction of nuisance created by port activities for nearby residents.
- Innovation. The document describes that knowledge promises to be the competitive factor of the future of The Netherlands and Europe in general. Innovations need to be applied large-scale and need speedy implementation without lengthy procedures.

The Progress Report of 2013 identifies steps made by the players in the port. It concludes most elements on track, including the modal shift goals for 2015. In the report, a large number of relevant infrastructure projects are described. Important results of the documents are the identified projects and the port objectives for modal shift that provide information for the TMS.

Amsterdam port vision 2030

Amsterdam has updated its vision for 2030. The worldwide economy has changed and new challenges are ahead. Amsterdam focuses on developing:

- General cargo and logistics & Energy, further developing the international freight hub.
- Food "Agribulk, minerals & recycling", strengthening the existing industrial hotspot.
- Cruise, Maritime services and real estate to improve the metropolitan Amsterdam.

The vision also aims at strengthening both the individual sectors above and creating synergy through the combination of sectors. Future demand scenarios are presented, providing material for the transport market study. A new sea lock is considered as important. The port aims at reaching energy transition, sustainable bio based activities and circular economy. The goal of the circular economy is to regain resources and energy from waste. Other points of attention are innovation in safety and monitoring. The port is envisioned as a development area for new concepts and technologies.

Genoa Port Vision

Port of Genoa has recently defined its vision for strategic goals in 2030[12]. The new masterplan will take into account the evolution of worldwide economy and shipping market during recent years as well as changes occurred in economic policy of the macro-region where the port operates.

Main strategic actions can be summarised as follows:

- Integration with the international transport and logistics networks;
- Investments in new technologies aimed at enhancing port and logistics operation;
- Improvement of capacity through rationalization of port layout, enhancement of rail and road connection to the port and enhancement of maritime access;
- Interventions aimed at environmental sustainability.

Bottlenecks for Flemish seaports - input CNC analyses

The ports of Antwerp, Zeebrugge and Ghent have consulted the relevant Belgian and Flemish authorities and infrastructure managers to present a description of international port bottlenecks. These bottlenecks are not within routine influence of the port authorities. The study elaborates hinterland bottlenecks and rail bottlenecks described in the corridor characteristics. Further it stresses the importance of sea accessibility. The documents are for all three corridors crossing Belgium; the North Sea-Baltic, the Rhine-Alpine and the North Sea–Mediterranean Corridor.

Airport documents

Airports generally have a global scope that is beyond the Rhine-Alpine Corridor. There are multiple documents on strengthening airport hinterland connections and where necessary expanding the capacity at the node itself.

[12] Guidelines aimed at supporting the design of the new masterplan for the seaport and surrounding area, 2013

Study for development of Liège airport

It is a study led by SOWAER that researches the capacity at the node. The increase of 360 acres of logistics activities in Liège airport area will generate traffic. Additionally the study shows there is a future need for additional capacity and connectivity to road.

Genoa Airport / TEN-T railway corridor link 2012-IT-91009-S

Genoa Airport has a strategic position, at the junction of Genoa - Rotterdam corridor and the "South West Mediterranean" Motorway of the sea, which makes it a potential "gateway" for European "inbound" traffic. 2012-IT-91009-S is an action with an objective to start the upgrading process of territorial and intermodal connections of Genoa airport, as foreseen by the airport and local planning instruments.

Priority Projects 2010 – A Detailed Analysis, Priority Projects 2011 and The Core Network Corridors brochure 2013

All documents are published by the European Commission. The Progress Reports inform in detail on the state of play of projects that eliminate bottlenecks on a European level and funds and policy to do so. The 2013 brochure gives a short update on current projects that were implemented, or are underway. The document provides an overview of the selected important EU projects and illustrates how cross-border projects are being tackled highlighting the added value for the EU.

3.3 Study and planning documents of infrastructure projects

Identified studies concerning infrastructure and eliminating bottlenecks are:

MXPT2LINK-UP

A study on the airport of Milano (Malpensa), aimed at completing rail services to the airport. Since 2010, a high speed railway line has been established, but an efficient connection within the airport is missing. To connect Intercontinental Airport Terminal 1 with the Airport Terminal 2 will allow Malpensa airport to cope with the forecast increase of traffic (9.9 million passengers are expected in 2015), contribute to lower operations and maintenance costs. Finally, the improvement of the rail connection will increase the Malpensa catchment area into Northern Italy and the neighbouring Switzerland cantons and reduce the share of less "environmentally friendly" transport modes.

"Investitionsrahmenplan 2011 – 2015 für die Verkehrsinfrastruktur des Bundes (IRP)"Investitionsrahmenplan

This is the German framework investment plan. It identifies the funds allocated to federal transport infrastructure and comprises maintenance, upgrading and new construction. The plan is made by Federal Ministry of Transport, Building and Urban Development. The plan period amounts to five years, however funds are also allocated to projects in the more distant future.

"Programma infrastrutture Strategiche 2014" (Italian Programme for Strategic Plan Infrastructures – 2014 edition)

The programme, developed by the Ministry of Economy and Finances in collaboration with the Ministry of Infrastructures and Transports, identifies the strategic infrastructure policy priorities for the country to be achieved by 2017. The report examines the state-of-the-art of the country's core and comprehensive network infrastructure projects to be developed along each Corridor, including the initial financial commitment and the resources required for the completion of the works. A detailed overview of the non-core/non-comprehensive projects and other small-scale is also provided.

Belgian railway multi-annual invest plan 2013-2025 / Infrabel Project plan

This programme includes a vast collection of Rail upgrades on the Belgian section of the Rhine-Alpine Corridor, produced by the Infrastructure manager in collaboration with the Ministry of Transport. The future vision of Belgian railways describes increasing rail demand and a need for maintaining or improving safety and punctuality. Financial details are fully described until the planning period of 2025.

High speed passenger section between Frankfurt and Mannheim (2007-DE-24030-S)

Part of the Priority Project 24, the project aims at preparing for the construction of a double tracks high speed rail section of 300 km/h between Frankfurt and Mannheim, with connections to the railway stations of Darmstadt and Mannheim and pooling it to the existing motorway. The study encompasses the following activities: (1) preparing the requirements of the land use planning procedure and updating the preliminary design study of 2003, including the assessment of the different alignment variants and their environmental impact (2) drafting the design study for launching the procedure of approval of the plans (3) carrying out the procedure for approval of the plans, including public consultation and (4) completion of the detailed design study for approval by the German Federal Railway Office (EBA).

Works for the construction and upgrade of the railway section between Karlsruhe and Basel (2007-DE-24060-P)

Part of the Priority Project 24, the project goal is to create additional capacity on the railway section between Karlsruhe and Basel. With the upgrade and partial new construction of this section, its rail efficiency will be improved in time and capacity. 182 km of existing tracks will be upgraded to a maximum speed of 200 km/h and, in addition, two tracks will be built with a maximum speed of 250 km/h. This includes four tunnels with a total length of 17 km.

The third railway track between Zevenaar – Oberhausen (2010-NL-92226-S)

This programme is identified as necessary for both passenger and freight traffic growth. On the Dutch side of the border, the third track will start from the connection of the Betuweline to the existing double track line in Zevenaar and then continue up to the German border. The main objective of the studies is to develop and provide a reliable draft design for the third track on the Dutch section. This will include:

- Selection of the most suitable location for the third track between Zevenaar and the German border based on the Environmental Impact Assessment findings;
- Draft design of the third railway track, including adjustments to existing bridges, switches and connection to the German third track;
- Draft design of the 25kV overhead line, including its energy supply system. Construction will be finished by 2022. During this period, capacity is reduced due to work. The temporary capacity subject is under study by the MoT and railway partners.

MIRT project book 2014 / Port Compass 2030 status update (Caland Railway Bridge)

Rotterdam port faces a more long term issue with the nearby Caland railway bridge that has a technical life span until 2020. Transport capacity is expected to experience a bottleneck in the period 2015-2025. Additionally, railway traffic currently causes noise pollution on the bridge. Solutions under study are: extend the bridge's life span by 5 years, construct a new bridge or divert the existing route.

The Swiss Gotthard base tunnel

The Gotthard base tunnel is under construction and will enable rail operators to use an entirely flat line between Basel and the northern Italian border. This Priority Project will increase capacity with longer trains and higher speed.

Level crossings 2008-2015

Belgium's strategic plan aims at improving railway safety. Level crossing railways create fatal accidents and the plan goal is to upgrade a number of level crossings to bridges or tunnels for road users. There were 1.857 level crossings in Belgium of which 17 level crossings were removed in 2012. The remaining level crossings will undergo regular maintenance actions and improvements where possible. The crossings also produce false alarms which affects train punctuality. For this, a detection system is implemented. Finally, the action produces a number of public safety awareness campaigns.

Landelijk verbeter programma spoorwegen

This programme is a Dutch action similar to Belgium's removal of level crossings. The Ministry of Transport has an objective to improve safety and efficiency at level crossings in a cost-effective manner. Project planning will start in 2014.

Belgian Masterplan ETCS

The ETCS Masterplan lists and describes the planning and works to be done for the full deployment of ETCS in 2022. As ETCS is a European standard, this also allows trains from other European countries to run safely on the network, without having to install a Belgian system first. The ETCS Master Plan aims to implement the 3 distinct levels of the ETCS system gradually. From the TBL1+ system, the Belgian equivalent to ETCS level 1 and on to ETCS level 2, the most advanced ETCS which uses GSM-R functionality. The master plan has four successive phases:

- Phase 1 - current situation: Expediting implementation of TBL1+ and ETCS;
- Phase 2 - 2015-2022: End of the TBL1+ programme (2015) and realisation of ETCS (2022);
- Phase 3 - 2025: Making ETCS the technical standard for all operators travelling on the Belgian network;
- Phase 4 - 2030-2035: Convergence towards a homogeneous version of ETCS – level 2 (this step is to be confirmed by all involved parties).

3.4 Studies of transport development and future scenarios

Forecasts are present in both international and national infrastructure documents. The transport market study elaborates these documents more in detail for specific forecasts.

BE, forecast of transport demand in Belgium by 2030

This is the main national forecast study for Belgium. The study is performed by the FOD (Federale Overheidsdienst) Mobiliteit en Vervoer together with the Federaal Planbureau. The study centers on the national transport model and the macro-economic parameters, transport costs and policy sets that are used as input. Outputs are transport volumes and the effect these have on the economy. Passenger and Freight and all modes are considered. Modal split is researched as Belgium is facing some heavy road congestion in a number of locations. Base year is 2008 due to data availability of all needed sources. The document states that the effects of the economic crisis are taken into account.

NL, Vier vergezichten op Nederland

The CPB is the Dutch national forecasting entity that performed the work. The study describes different scenarios in socioeconomic terms. The study and the scenarios provide a starting point to develop future national policy. Four scenarios are developed: Strong Europe, Global Economy, Transatlantic Market and Regional Communities. The results should be cautiously interpreted as the programme was performed before the recession period. Due to the large range of potential growth, the scenarios are still valid and used in official forecasts. The two elements that differentiate the scenarios are international economic cooperation and the degree of privatisation of former government tasks. International developments influence the Dutch economy heavily and the scenarios unfold in high or low international cooperation. The study states that European countries will face further aging population and individualization in the future. Also wage-inequalities are expected to grow further. The results of the four scenarios foresee an increase in freight transport, especially in the international scenarios. Moreover, passenger car transport will increase its share on the expense of public transport. The assumption of a declining population leads to a decreased transport demand and the expected future infrastructure investments up to 2040. The study is old with data from 2002 and an update is under development. Still the existing 4 scenarios do provide a complete picture and the Global Economy and Regional Communities are still consistent with the current socio-economic situation.

NL, MIRT 2014

The MIRT 2014 was mentioned earlier for its infrastructure projects. This study covers forecasts for specific infrastructure sections or locations, for example the future lock capacities or the throughput of a bridge or a train station. Additionally an informative road congestion top-50 is presented. The goal of the document is however not to present a unified measure or complete picture of the future infrastructure in the Netherlands.

DE, Prognose der deutschlandweiten Verkehrsverflechtungen 2025, Grundkonzeption für den Bundesverkehrswegeplan 2015

This is a study on long-term forecasts to be used as basis for infrastructure planning. The study is commissioned by the Federal Ministry for Transport, Building and Urban Development and performed by a research consortium led by Intraplan Consult. The 2025 traffic forecast extends the existing forecast of the Federal Transport Infrastructure Plan (Bundesverkehrswegeplan). The socio-economic trends from 2004 are forecasted until the year 2025. An integrated transport network for the road, rail and waterway transport was created with the involvement of ports and airports as linkage points, this therefore allows the mapping of multimodal transport, including aviation and maritime-forecast (published in 2007). The forecasted results of freight and passenger data serve as a framework and main data basis for the further development of transport planning in federal and state governments. The data is used to verify the current and future plans of the Federal Transport Infrastructure Planning for road, rail and waterway. The information is essential for control of investments in transport infrastructure and for targeted development of transport policies and programmes.

CH, Perspektiven des Schweizerischen Personenverkehrs bis 2030

The expert report on the outlook for Swiss passenger traffic up to 2030 is commissioned by the Federal Office for Spatial Development (ARE). The study is accompanied by the freight perspectives up to 2030. The goal of the study is to combine a number of contemporary fundamental studies on passenger transport. This is the quantitative basis for transport decisions to keep up with the changing nature of mobility demand, structure and policy environment. Existing studies provide more insight in the behaviour of transalpine traffic and urban transport, the forecast adds new socio-economic determinants and spatial planning policy scenarios. The new passenger perspectives are developed in the form of a base and three alternative scenarios. The base scenario continues the trends from the past. The "cities network and growth scenario", has the most economic growth and counts on effective policy to create a strong network between urban regions. The third "Dispersion and stagnation" scenario is the opposite: weak networks and weak economic growth. The final scenario assumes energy resource scarcity and therefore a policy to decrease transport to more local regional levels. The results of the work is that the use of public transportation, in particular, is expected to expand most rapidly and could raise its share of the modal split by up to almost seven percentage points, depending on the scenario. That being said, road transport will continue to dominate the transport picture in the future.

CH, perspektiven des Schweizerischen Güterverkehrs bis 2030

This programme is a forecast study for freight performed by Progtrans and Infras. The study provides data on traffic nature (domestic, import, export and transit), goods type for road and rail from 1998 up to 2030. The Swiss Federal Office for Spatial Planning drew up scenarios. The baseline continues the existing trends. The first scenario assumes economic growth, internationalization and stimulation of rail, also by other countries. The stagnation and weak rail is the second scenario. The road capacity will be expanded selectively where it is particularly necessary, instead. In the scenario, the total volume of freight traffic on Switzerland's roads and railways could rise from today's 24 billion tonne-kilometres a year to between 31 and 42 billion tonne-kilometres (+32% to +78%) by 2030. Rail, in particular, will experience extremely dynamic growth in the future and will be able to expand its market share appreciably in the wake of a trend turnaround. Meanwhile, transit freight traffic will continue to gain importance.

IT, Piano Nazionale della Logistica 2012-2020 (National Plan for Logistics 2012-2020)

This Plan, developed by the Ministry of Infrastructures and Transports, outlines the policy reforms and infrastructural interventions to be carried out in various transport sectors (e.g. rail freight transport, road to sea transport, ports, air freight transport, logistic platforms etc.) to foster the productivity and competitiveness of the country's logistic system by 2020. In particular, the Plan in structured along 10 strategic guidelines and 51 priority actions whose implementation is expected to achieve the greatest results with the minimum financial commitment.

BE, Masterplan for inland waterway transport on Flemish waterways - horizon 2020

Produced in 2014 by the infrastructure managers NV De Scheepvaart and Waterwegen & Zeekanaal NV, the master plan focuses on freight transport of Inland Waterways in the north of Belgium (Flanders). The plan comprises that investments and initiatives up to 2020 (with a look ahead to 2030) that the two agencies believe are necessary if the Flemish inland waterways network is to offer solutions to future challenges in the areas of logistics and transport, the environment and efficient use of space. The investments are described and their costs are planned. Flanders maintains a network of more than 100km of waterways that is linked to the Flemish seaports, to the waterways of the other regions of Belgium and to the inland waterway networks of The Netherlands and France. After achieving strong growth figures between 1999 and 2008, inland waterway transport went through a consolidation in Flanders due to the economic difficulties in the years that followed.

EU, Energy, Transport and GHG Emissions Trends to 2050, Reference scenario 2013

This study is important for a Europe-wide overview describing the national macroeconomic assumptions, market and commodity trends as well as transport- and environment- related trends and the national forecasts for the energy and transport sectors. The forecasts are available for passenger and freight per country and mode. Between 2010 and 2030, it is foreseen that the transport sector will grow significantly, demonstrating positive trends for passenger and more significantly freight demand. The study, an update of 2003, uses as basis 2010 data and therefore takes into consideration the 2008 recession effects.

KIM 2012 Multimodale achterlandknooppunten in Nederland

These studies evaluate national container capacities. Container terminal capacity in The Netherlands is described in the study as sufficient for 2008. In future with modal shift (from road to IWT and rail) and higher transport volumes in general there is a shortage in the highest scenario. A number of regions in The Netherlands were identified as having limited access to existing terminals. Plans were executed to improve access so that The Netherlands has a large network of container terminals.

Entwicklungskonzept Kombinierter Verkehr 2025 in Deutschland

A development concept for combined transport in Germany is established with a time horizon of 2025 by the Federal Ministry for Transport, Building and Urban Development. The report provides rail and road the licensing authorities (Federal Railway Authority, Waterways and Shipping Directorate West) as a decision support for future applications. The existing terminal network is mapped and catchment areas are defined on the basis of the existing network of terminals and transport development. In addition to traffic and terminal handling capacity analyses, the forecasted figures for the 2025 spatial demand are determined for rail as well as the water transhipment capacity.

Grossterminalstudie (Switzerland)

This terminal study is commissioned by the Swiss Federal Office of Transport. Intermodal transport is important for Swiss rail volume growth. The study identifies future terminal needs by analysing the current situation and the future development, in order to deduce the need for additional terminals. The focus is on the cross-border traffic and its distribution in Switzerland. Future demand scenarios of the study show an increase of transport between 2010 and 2030. The study proposes to establish 2 large road/rail Gateway terminals for transhipment import/export traffic from the seaports Gateway terminal Limmattal and Basel-North. Governance issues are discussed on ownership and responsibilities. Actual discussion state is that the Limmattal terminal has only secondary priority compared to Basel North. The finalization is expected to be delayed.

Terminal Study on the Freight Corridor (Panteia, HaCon, Rapp Trans, Gruppo Clas)

The terminal study of 2008 first identifies the relevant terminals on the freight corridor Rotterdam-Genoa (before the inclusion of Belgium). Then the current utilization is calculated for each country. Due to the large expected growth in 2008 a future capacity bottleneck was identified.

The existing projects for further intermodal success are: new hub in Basel, replacing Basel Wolf; various planned measures in Germany (mainly the extension of existing important terminals) plus the "new Duisburg hub"; new inland terminal in The Netherlands. A terminal platform with an admission for all stakeholders is recommended. The stakeholders are Terminal Operators, Intermodal Operators, Railway Undertakings and Infrastructure Managers.

3.5 Governance studies and strategy papers

Rail Freight Corridor Rhine-Alpine (RFC1; supported by 2012-DE-94085-S)

Rail Freight Corridor Rhine-Alpine (RFC1) has a multi-stakeholder governance structure. Transport ministries of the countries on the corridor make up the Executive Board. Infrastructure managers form the Management Board and Working Groups with divided responsibilities that bring all stakeholders in the decision making process. A corridor-wide one-stop-shop eases the communication. The action 2012-DE-94085-S helped set up this structure. Additionally the action helped in developing a Corridor Information Management Tool and preparation in setting up a one-stop shop for rail international freight capacity. Rail freight operations needed improvements to create a modal shift from road to rail. A final element of the study is focussed on improvements in rail operations.

Consolidation and strengthening of the corridor Upper Rhine as a central hub for the TEN-T network (2011-EU-95029-S)

The geographical area of the upper Rhine is tri-national with France, Switzerland and Germany. Coordination between ports is difficult, but cross-border cooperation is even more challenging. The project's aim is to produce a more coherent and more efficient transport policy in the region. The final goal is to obtain a joint investment plan and to develop a long-term governance structure. To enable this, a study review, a market study and existing projects are evaluated. The methods of governance for the implementation of the master plan and the mode of funding the investment plans will be defined at the end of the action.

LNG Masterplan for Rhine-Main-Danube (2012-EU-18067-S)

The Action's overall objective is to prepare and launch the full-scale deployment of LNG as environmental friendly and efficient fuel in the inland navigation sector within the Priority Project 18 Rhine/Meuse-Main-Danube axis. It is a combined effort from sea and inland ports, authorities and barge and terminal operators, as well as logistic service providers, which will remove market barriers and take the first steps in realising a new LNG supply chain with IWT as pioneer market enabling LNG to reach other pioneer markets like the public (transport) sector and the heavy duty transport industry (buses, garbage collection trucks, city logistics) and the energy industry.

Impulse to Dynamic Inland Waterway transport (IDVV)

The Dutch government set up a programme called Impulse to Dynamic Inland Waterway transport to increase the use of inland waterways. The waterways are already used intensively in The Netherlands, yet there is superfluous technical capacity. Waterways must be navigable and safe with high volumes of traffic. Policy is directed at high quality waterways management & maintenance, construction and traffic management and focuses on container transport. Traffic management (information systems) will be between shippers and carriers. Other elements of IDVV are developed Hub-Hop concepts in IWT. These provide an example of how to operationally deal with fragmented container terminals at one transport node.

3.6 Conclusions of the study review

The study review highlights important studies on the corridor after careful analysis. EU-wide studies are reviewed, as well as corridor wide and national studies. Other noteworthy studies are in the annex. The studies provided valuable support on: identification of stakeholders, characteristics of the corridor, bottlenecks / critical issues, the multimodal transport market study and projects of the implantation plan. However these sections have had more input than studies alone and the relevant conclusion can be found in the respective sections.

The highlighted studies are clustered in four categories (1) Macro-region documents for the planning and development of transport, (2) Study and planning documents of infrastructure projects, (3) Studies of transport development and (4) future scenarios in selected topics and or areas and the last category of Governance studies and strategy papers.

During the review, it was pointed out that studies are multi-themed, i.e. their content is not limited to only one theme. For example, there are studies containing technical information as well as traffic data, financing information et cetera. Moreover, the high number of studies pointed out that the Rhine-Alpine multimodal corridor is not a new concept and there is ample and also public material available.

Most of the studies described more than one mode of transport and some of them also included multimodal logistics. Overall, for the countries, most studies are identified for rail and inland waterways. Road is not identified often as a separate entity. Only for the national infrastructure projects there is road and road is often taken into account combined with other modes of transport. The coverage of the other modes is very sufficient. In addition, there is a strong focus on freight transport. Most countries on the corridor have a similar thematic variety; forecasting, planning and investment plans are a common subject. The German (2003) and Dutch forecasts are soon outdated, new forecasts are in preparation. Others do take the economic downturn of the recent few years into account.

The national transport plans and the rail freight corridor transport market study provide the most information combined in one source. All documents are fragmented in information; this explains the long list of studies. To exhaustively cover all geographical areas, all transport modes and all relevant transport themes of the corridor, more than 230 relevant studies were identified.

What was found missing during the study review was the cross-border element. This type of study was found in minority compared to national or local subjects. The highlighted port studies of Amsterdam, Rotterdam, Genoa and the Belgian maritime ports set an example for cross border studies.

Also a general overview, corridor wide on externalities are missing in the current available set of public studies. The issue of public involvement is only relevant on local level and therefore there are no cross-border studies available. Environmental externalities are treated in individual rail freight and IWT studies, yet both modes of transport claim to some degree the same modal shift potential which is conflicting. Improving either the scope cross-border or any form of externalities would be beneficial for the corridor.

4 Elements of the work plan

The elements of the work plan are defined in the TEN-T Regulation[13], Article 47. The work plan includes the following elements:

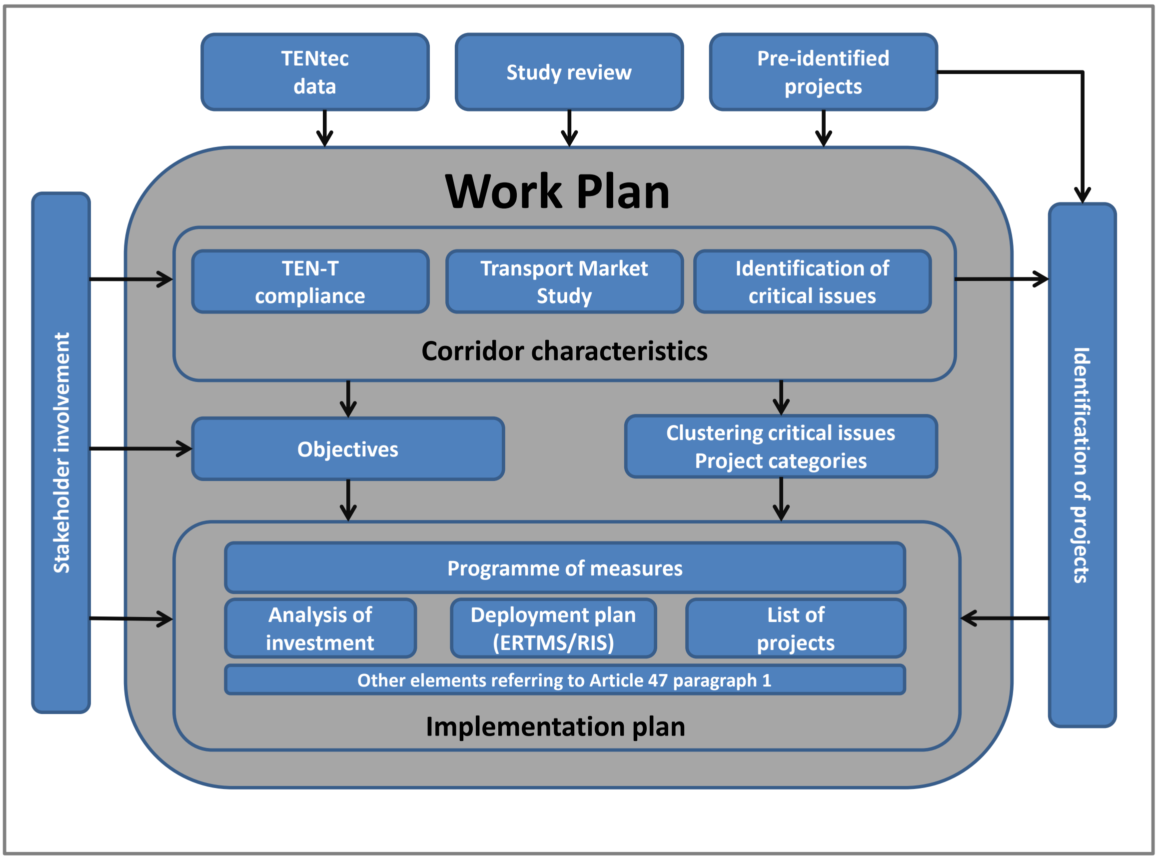
- Characteristics of the corridor:
    - description of technical infrastructure parameters for each transport mode (cp. chapter 4.2);
    - identification of critical issues on the corridor: e.g. cross border sections, bottlenecks, interoperability, intermodality, operational and administrative barriers (cp. chapter 4.2);
    - transport market study (cp. chapter 4.3);
- Objectives of the corridor which are in line with the objectives and priorities of the TEN-T Regulation and measurable KPIs (cp. chapter 4.4);
- Implementation plan with:
    - programme of measures: plan for the removal of physical, technical, operational and administrative barriers between and within transport modes and for the enhancement of efficient multimodal transport and services (cp. chapter 4.5.1);
    - a list of projects for the for the extension, renewal or redeployment of transport infrastructure with investment required and envisaged finance sources (cp. chapter 4.5.2);
    - a deployment plan for traffic management systems (cp. chapters 4.5.3 and 4.5.4);
    - additional elements such as measures to improve impacts of climate change and measures to mitigate negative environmental impacts (e.g. greenhouse gases emissions, noise).

The work plan should also include public consultations which support its development and implementation.

In the context of this report, the elaboration of the work plan follows the methodology described in Figure 4.

[13] *TEN-T Regulation 1315/2013*

Figure 4: Structure of the Work Plan



Source: HaCon

According the settings defined in Article 47, the work plan was elaborated based the preceding working steps (data gathering for the TENtec system, study review and the analysis of pre-identified projects, stakeholder involvement and an ongoing identification of projects).

The stakeholder involvement is a continuous process during the entire corridor study consisting of both the discussion and results of the four Corridor Fora and the working groups "inland waterway and ports" and "regions" as well as multiple bilateral co-ordination processes between consultants and stakeholders (in particular Member States representatives and infrastructure managers). The stakeholder's involvement has a strong influence on all elements of the work plan. The identification of projects is based both on the pre-identified projects (Tender specifications and TEN-T Regulation 1316/2013) and the critical issues described in the corridor characteristics.

In a first step, the corridor characteristics, consisting of a TEN-T compliance analysis, a Transport Market Study and the identification of critical issues, were defined. The corridor characteristics are key elements for the derivation of the corridor objectives the clustering of the identified critical issues as well as the respective project categories, and finally, for the identification of projects.

Considering the general European TEN-T policy, the corridor objectives were derived from the results of the TEN-T compliance analysis, the main findings of the Transport Market Study and the identified critical issues. In a next step, important critical issues have been conveyed into measurable key performance indicators (KPI).

Due to their extensive number, the critical issues were grouped into main clusters which are also used for the categorisation of the projects in the implementation plan.

Using the before mentioned corridor objectives and the projects categories, in the final step, the implementation plan was developed. The implementation plan consists of a programme of measures (plan for the removal of physical, technical, operational and administrative barriers).

Following this programme of measures, respective projects were identified for the development of the Core Network Corridor until 2030. For traffic management systems (ERTMS and RIS), specific deployment plans were prepared.

If available for the identified projects, information on investments and the financing sources are described. Additionally, elements such as measures to improve impacts of climate change and measures to mitigate negative environmental impacts (e.g. greenhouse gases emissions, noise) are integrated into the implementation plan.

4.1 Summary of the work plan

This summary describes the main results of the elaboration of the work plan for the Core Network of the Rhine-Alpine Corridor until 2030.

Corridor alignment

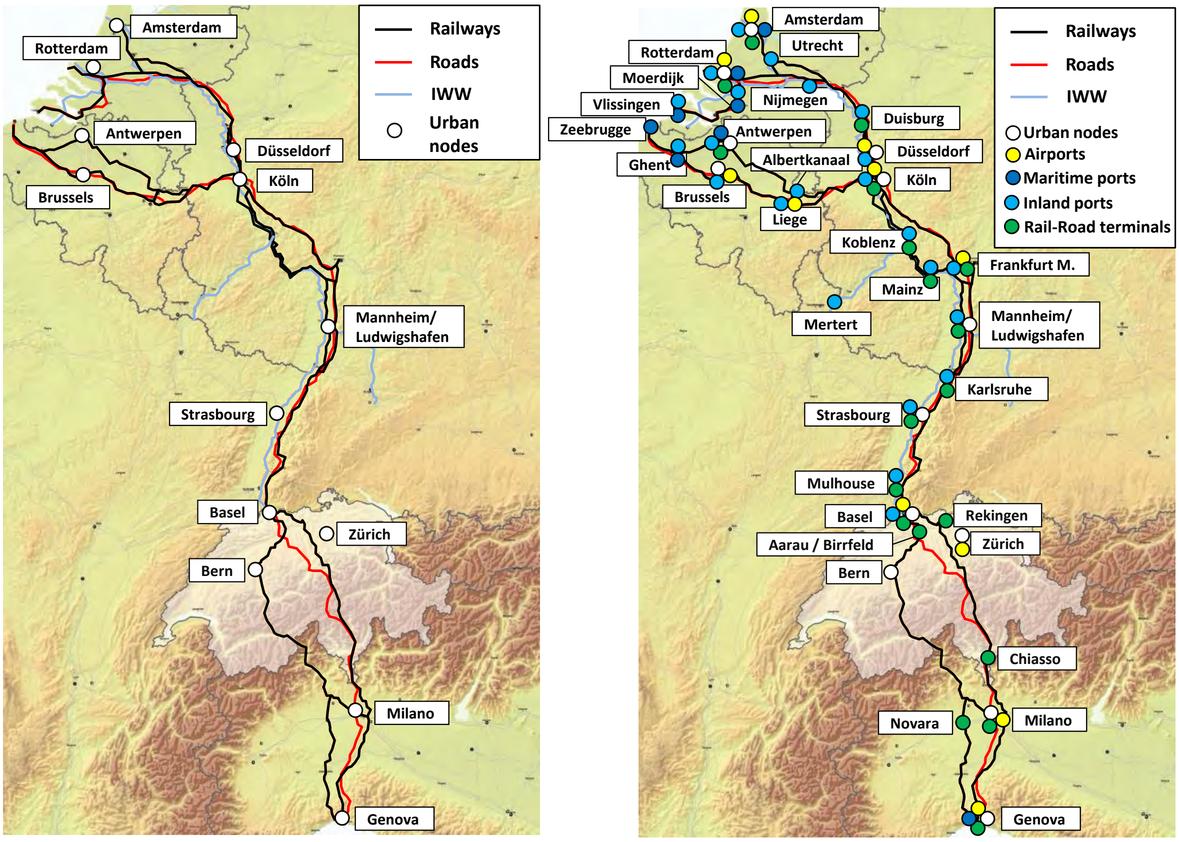
A global description of the Rhine-Alpine Corridor outline was given in the Tender Specifications[14] to this corridor study: "*It [the Rhine-Alpine Corridor] connects the North Sea ports of Rotterdam and Antwerpen to the Mediterranean basin in Genoa, via Switzerland and some of the major economic centres of the western EU. This multimodal corridor (including the Rhine basin) will provide connections to several east–west axes.*" Concerned countries are: The Netherlands, Belgium, Germany, Switzerland, Northern Italy and the eastern part of France, namely the Strasbourg area, and Luxembourg (Moselle).

The outline of the Rhine-Alpine Corridor is provided in Annex 1 of the TEN-T Regulation 1316/2013. Main parts of the corridor are:

- Genova – Milano – Lugano – Basel;
- Genova – Novara – Brig – Bern – Basel – Karlsruhe – Mannheim – Mainz – Koblenz – Köln;
- Köln – Düsseldorf – Duisburg – Nijmegen/Arnhem – Utrecht – Amsterdam;
- Nijmegen – Rotterdam – Vlissingen;
- Köln – Liège – Bruxelles/Brussel – Ghent;
- Liège – Antwerpen – Ghent – Zeebrugge.

[14] Call for tenders MOVE/B1/2012-573 of the European Commission (Directorate-General for Mobility and Transport) of 16 July 2013

Figure 5: Alignment of the Rhine-Alpine Corridor (all modes) and nodes



Source: Regulation 1316/2013 Annex 1, Part 1

As the figure above shows, there is a continuous core infrastructure network for railway and road, meaning (at least one) end-to-end connection between Rotterdam/Zeebrugge – Genoa. For IWW, the situation is more complex; while Switzerland only has a small part of IWW (21km in the Basel area) and Italy no aligned inland waterway network at all, the Belgian waterways are assigned to another corridor (namely North Sea-Mediterranean). Nonetheless they are of importance for the Rhine-Alpine Corridor as many of its flows are important and large cross-border flows, going from Belgium towards The Netherlands and Germany. Data about these transport flows are used for the analyses of the transport market study but the Belgian IWW projects will not be discussed in this report. For passenger transport, the relevant roads are almost exclusively motorways, but with a high level of maturity of the infrastructure not always adapted to current demand levels. The rail passenger services are operating across borders. Several sections are dedicated high speed rail lines. Alternative routings are available for cases of disruptions. The airports along the corridor are of high important for passenger service, including the hub airports in Frankfurt, Amsterdam, Zürich, Brussels and Milano.

Stakeholder consultation

The elaboration process of the work plan pursued a stakeholder approach, which seeks to involve stakeholders incrementally via four Corridor Fora. The Corridor Forum is a consultative body, adding specific geographic or thematic inputs, which is provided as a basis of discussion. Thus, the work plan will be the result of a broad consultation process, ensuring the acceptance and implementation of measures. In general, Member States had to agree on the participation of stakeholders in the forum.

Based on the framework conditions and the consultants' experiences and corridor knowledge, the consortium identified a total of 412 stakeholders including all countries, transport modes and different levels of players who are relevant for the corridor. Related to the completed and envisaged Corridor Fora and working groups, the list was continuously extended and updated.

- At the first Corridor Forum, only representatives from the Member States' Ministries (The Netherlands, Belgium, Germany, Italy and France) participated.
- For the second Corridor Forum, also representatives from Switzerland and infrastructure managers for IWW, ports and rail, including the Rail Freight Corridor Rhine-Alpine were invited.
- For the third Corridor Forum, also regional authorities and stakeholders from airport and road infrastructure were invited.
- The participants of the third Corridor Forum were also invited for the fourth Corridor Forum.

In order to keep the Corridor Fora manageable, it was agreed that working group meetings will take place around the third and the fourth Corridor Forum. The first working group meeting involved stakeholders from ports and inland waterways, while the second working group integrated the concerned regions.

The consultation of civil society, user organisations and representative organisations will be done by the corridor Coordinators outside the Corridor Forum meetings, e.g. when being on mission in the respective Member States and/or through other events along the corridor.

Study review

Main task of the study review was the set-up of a comprehensive database to provide information about:

- Characteristics of the corridor
- Compliance with requirements as defined in the Regulation 1315/2013 1316/2013
- Identification of additional bottlenecks and missing links
- Highlights already finalised, ongoing and planned measures to improve the corridor according to TEN-T standards and for the elimination of bottlenecks and missing links

Additional input for the study review was provided by the participants of the respective Corridor Fora. The results of the study analysis are important pillars for the further tasks, namely the corridor characteristics, the Transport Market Study and the corridor objectives.

The study review highlights important reports analysing the corridor on EU-wide, corridor-wide and national level (for an exhaustive study list see Annex 4). The relevant studies are clustered in four categories:

- Macro-region documents for the planning and development of transport, covering the development of the transport modes and multimodality along the corridor, in particular rail with ERTMS, inland waterway with RIS deployment and the development of the northern seaports;
- Study and planning documents of infrastructure projects, focusing on measures and studies on a national level to tackle micro-regional bottlenecks;

- Studies of transport development, covering long-term forecasts and long-term market evolution for all relevant modes and corridor countries for both passenger and freight transport;
- Governance studies and strategy papers.

Corridor characteristics and critical issues

The work on the corridor characteristics was divided into two steps. At first, the entire core infrastructure was checked against the requirements for the corridor infrastructure in the TEN-T Regulation. In this step, the technical parameters of the infrastructure per transport mode were identified and the sections or facilities which do not fulfil these standards were highlighted. The resulting critical issues were, in a second working step, analysed as well as bottlenecks and missing links based on the study review, discussions with Member States and stakeholders at the Corridor Fora as well as the expert consortium.

The corridor characteristics summarise the technical parameters of the infrastructure for each transport mode. The TEN-T compliance analysis revealed for rail that the electrification and required minimum track gauge are fully implemented on the entire corridor. Freight train speeds of more than 100km/h and a 22.5t axle load are enabled on more than 92% of all rail sections. Today, the operation of 740m long trains is feasible on 87% of the section, while in Belgium and Germany timetable limitations apply, in Italy the maximum train length is at 600m. Also the deployment of ERTMS is still in its early stages with only 12.3% of sections equipped on the corridor. Further roll-out plans are considered in the ERTMS deployment plan (cp. chapter 4.5.3). While the infrastructure is widely in compliance per design, other operational factors such as safety and the prevention of noise emissions have to be considered in new projects. Rail noise is repeatedly identified as a critical issue for sections running through densely populated areas. Throughout the corridor, several sections have been identified where demand exceeds the available capacity. On the network, the travel times could be shortened and main rail hubs could be optimised for better accessibility and service quality.

The road infrastructure is almost fully compliant with the TEN-T requirements. Two thirds of the relevant roads are equipped with tolling systems. Nevertheless, infrastructure utilisation shows identified congestion hot-spots along the multiple urban areas along the motorways and limited truck parking capacity. Border crossing issues are identified in and out of Switzerland. Since road transport is one of the main sources for greenhouse gas emissions, clean fuel alternatives are of priority. Currently about 84% of sections have access to a station in the required range, the real challenge is to stimulate the demand for clean fuelled vehicles, the sufficient supply is a prerequisite. The main passenger hub airports are all connected to the rail network. Improvements are needed for six freight hubs and lower capacity airports where rail connections should be established by 2050.

The IWW development shows only partial limitations of the technical requirements; the German sections along Rhine, Neckar and Moselle require draught extensions, removal of height limitations under bridges and lock capacity upgrades. The guidance via River Information Services is seen as crucial for cross-border traffic; further coordination is needed for a consistent implementation. As IWW serves as an important hinterland connection for maritime transports, the accessibility in the seaport areas and larger urban areas along the river network needs to be secured. Also the dissemination of clean fuel alternatives can be regarded as a critical issue. In the light of ambitious greenhouse gas emission targets, this can be an important factor. In the coming years, efforts have to be made to supply ports with sufficient alternative clean fuels.

The eight seaports face bottlenecks in their accessibility. Capacity issues are a relevant future topic, when developments and higher demand also require a stronger hinterland connection and better maritime access.

For rail-road terminals and the multimodality operations along the corridor, bottlenecks are identified regarding the capacity of terminals and inland ports. Projects to mitigate critical issues are related to multiple regions in order to increase capacity within terminals and the connecting infrastructure. Of importance is also to strengthen the communication across borders, the interoperability and accessibility for all modes.

Based on the identified critical issues, a categorisation has been carried out in order to cluster these issues. This process was closely coordinated with the corridor Advisor for the Rhine-Alpine Corridor.

- Capacity/Bottleneck: network capacity issues, e.g. road congestion in urban nodes, IWW lock capacity, rail capacity;
- Missing link: e.g. in highway systems and rail high speed network;
- Interoperability/Compliance with TEN-T standards: technical compatibility of infrastructure, vehicles and systems, e.g. missing ERTMS, RIS, ITS deployment;
- Multimodality: issues facilitating multimodal transport services for freight and passenger transport e.g. terminal capacity issues (expansion/upgrade/construction);
- Last-mile connection: issues regarding last-mile connection, e.g. lack of rail connections to airports, inland ports and seaports;
- Externalities/Sustainability/Innovation: issues regarding negative transport externalities, e.g. noise, pollution, accidents, low transport quality; innovation issues tackled by e.g. pilot projects (LNG deployment, e-freight, tracking and tracing);
- Urban areas: issues in and around urban areas calling for actions on implementing/facilitating TEN-T transport infrastructure according TEN-T Regulation 1315/2013, Annex II, part 1;
- Cross-border: issues addressing cross-border sections according TEN-T Regulation 1315/2013 Article 3 and Annex II, part 1.

These clusters provide a common structure for the following working steps and the final categorisation of projects.

Transport market study

The Transport Market Study (TMS) for the Rhine-Alpine Corridor analyses the current and prospective market conditions combined to the –current and future- utilisation levels of modes. To this end, the TMS looks into the current and future socioeconomic framework in the corridor area, the current and future – freight demand-related - market characteristics as well as the capacity utilisation and additional supply features which could impact the performance of modes in the corridor. The TMS, finally, provides a number of suggestions for the implementation of a well-functioning multimodal corridor.

Current market characteristics[15]

The cross-border traffic within the Rhine-Alpine Corridor is multimodal: 12% rail, 34% road and 54% inland waterways ; it is estimated at 371.9 million tonnes covering 37% of the total estimated demand in the defined network area including all flows (international and domestic). The relatively sovereign position of inland waterways - 202 million tonnes - is due to the strong transport flows between The Netherlands, Belgium and Germany (178 million tonnes). Inland waterway is also the dominant mode of transport from France to Belgium and The Netherlands whereas for the other corridor destinations, the demand is transported mainly by road. The rest of the flows represent 17% of the international demand. The transport flows from/to Switzerland account for more than 27 million tonnes (or 7.6% of the total corridor activity) and from/to Italy for almost 25 million tonnes (or 6.7% of the total corridor activity). Finally, the international freight flows for France (Strasbourg/Mulhouse region) are estimated at 19 million tonnes (or 5.3% of the total corridor activity). The main cross-border commodities are machinery and transport equipment, fuel products (liquid and dry bulk), building material and ores, highlighting the strong presence of containerised transport in the corridor. The favoured mode of transport for these commodities (hinterland transport) is inland waterways followed by road.

The study also focussed its analysis on the various seaports and inland ports. The corridor brings together eight major seaports with more than 700 million tonnes throughput. In its territory, the Rhine-Alpine Corridor is linked to almost 75% of the port activities in the Hamburg – Le Havre range, involving ports, such as Antwerp, Rotterdam and Amsterdam with distinct inland waterway hinterland connections. This reinforces the position of inland waterways and explains their competitive edge compared to rail. Overall, whereas the recession had a strong impact –as expected- on the freight demand, the volumes from recent port reports demonstrate a positive growth in demand for the last two years, implying that the recovery phase for freight has started.

Future Corridor:

The corridor countries expect a moderate economic as well as demographic growth in the upcoming years; this has a moderate impact on the demand. Looking at the national and regional scenarios, the average annual growth rates vary between 1% and 2.5%. Belgium and The Netherlands expect the highest growth rates (more than 2%) whereas Germany and Switzerland expect moderate growth rates below 2% annually. The region of Alsace was expected high annual growth of 3% up to 2025. Most national projections expect increased transit, imports and exports (more international traffic), with road still being sovereign for the hinterland transport and a potential growth for rail compared to inland waterways. These projections are however, not corridor-specific. To this end, the NEAC-10 model was employed using three runs: the 2010 (basis), the 2050 (baseline) and the 2050 (compliance); whereas the baseline projection is based only on socioeconomic assumptions, the compliance projection expects the full compliance by 2050 to the TEN-T standards. These scenarios were strictly defined for the corridor alignment and demonstrated the potential growth, given the relevant assumptions, on the corridor network.

Based on the baseline run, the freight demand expects a moderate growth up to 2050, ranging from –on average- 1.2% annually for road, 1.4% for rail and 1.5% for inland waterways. This would mean a 65% increase of the road demand, 57% for rail and 58% for inland waterways. Applying the policy interventions on the compliance scenario, these 2010-2050 growths become 60%, 75% and 61% respectively. The significant growth in rail is explained through the lower travel times and costs assumptions. On the other hand, road is becoming more expensive and time

[15] based on 2010 ETIS data

consuming and thus causing a shift to rail. Inland waterways will remain more or less at the same level, due to their low costs of transport and the maturity of the mode in the corridor. In terms of the market, the analysis showed that imports and exports (combined) occupy the highest share (more than 50%), followed by transit (around 25%, particularly high in the case of Switzerland). This is maintained also in the future scenarios, with transit gaining a share of 3% (reaching 28% of the total market) from domestic transport. In both scenarios, import and exports shares remain close to 55%. Mode-wise, for 2010, the analysis highlighted the sovereignty of inland waterways on the network; in terms of demand, the share is almost 70%, leaving road at 21% and rail at 9%. These shares in the baseline scenario remained the same whereas for the compliance scenario, there was a small shift from inland waterways to rail. The mode performance in tonne-kilometre shows the effect of the long-term distance transport for rail and the effect of short distance travel for road and inland waterways; the modal split based on tonne-km for 2010 was estimated at 51% for inland waterways, 29% for road and 20% for rail. In the compliance scenario, by 2050, the rail share is expected to grow by 2%, again gaining market shares from both road and inland waterways.

The analysis at link level demonstrates a higher growth trend for the central part of the corridor, especially for rail (in the area close to Köln, Frankfurt and Mannheim, followed by a strong presence through Switzerland and Italy). For inland waterways, the links from Rotterdam following the Rhine to Duisburg and then to Frankfurt are the busiest ones in the network. For road, the main growth potential is demonstrated around urban areas. This increase in capacity demand by 2050 was also confirmed in the supply side analysis for the corridor, in terms of both network and terminal capacity. There were several examples provided, such as the future network utilisation by DB Netz or the future terminal capacity needs by HaCon (2012) or the lock capacity in Amsterdam, which stressed that this growth cannot be accommodated. For road, next to the network limitations causing congestion around urban nodes, the capacity of rail-road terminals could also be affected by the demand growth (e.g. in Milano or Basel).

The supply analysis also indicated opportunities for a multimodal well-functioning Rhine-Alpine Corridor. The development of multimodal sites, longer trains, new services and better collaboration among stakeholders was mentioned as possible service-side improvements. The deployment of traffic management systems such as ERTMS, RIS and ITS could further improve the coordination, decrease the waiting times and increase transport safety. Finally, alternative fuel systems and noise measures could contribute to the environmental-friendly growth of the corridor, supporting both the growth of the transport services with limited effect on the surroundings. The latter is particularly important as the growing transport needs are identified close to the urban nodes deteriorating the quality of life.

Corridor objectives

General European objectives are identified, from which some specific objectives for the Rhine-Alpine Corridor are deflected. The corridor objectives can be clustered into the following subdivisions:

The global objective – "*The trans-European transport network shall strengthen the social, economic and territorial cohesion of the Union and contribute to the creation of a single European transport area*"[2] – can be declined in four main topics:

- Territorial and structural cohesion: the Core Network must ensure accessibility and connectivity of all regions of the European Union;
- Efficiency between different networks: the removal of bottlenecks, the increase in capacity of over-utilised sections and the bridging of missing links within

Member States' territories and between them must be a priority for the European network;

- Transport sustainability: all transport modes must be developed in view of addressing concerns regarding sustainability and economic efficiency;
- Increase in the benefits for the users: the European transport network must answer to the mobility and transport needs of its users.

Core network corridors should also address wider transport policy objectives and facilitate interoperability, modal integration and multimodal options"[16]. These corridors should ensure a seamless national and international transport by all kinds of transport modes, minimise environmental impacts and increase competitiveness.

Modal objectives have been defined, regarding:

- Multimodality and intermodality in the corridor: interconnection of transport modes at the nodes, real-time information in the transport chain, communication to the users at the stations, freight transhipment, etc.;
- Railways transport: ERTMS-equipped infrastructure, interoperability of national networks, full electrification, safety, multimodal nodes connected to rail, etc.;
- Road transport: reduction of congestion, interoperability on the network, safety, availability of clean fuels, reduction of emissions, etc.;
- Seaports, inland ports and inland waterways transport: minimum of CEMT class IV, adequate capacity of transport, continuous bridge clearance, good navigability, River Information Services (RIS), interconnection of ports and railway lines, roads, etc.;
- Air transport: at least one terminal accessible to all operators, implementation of Single European Sky, availability of clean fuels.

Specific objectives for the Rhine-Alpine Corridor are about:

- Improving cross-border sections;
- Improving capacity and remove bottlenecks;
- Eliminating missing links;
- Interoperability / compliance with TEN-T standards;
- Developing multimodality;
- Improving last mile connection;
- Tackling externalities / sustainability / innovation;
- Considering impacts on urban areas.

Programme of measures

The programme of measures defines the framework for the corridor work plan. The core results of the previous working steps are summarised, consolidated and condensed. Necessary measures for the improvement of the transport infrastructure are derived by matching:

- The results of the transport market study, defining quantitative requirements; and

[16] EU-Regulation 1315/2013, Article 4

- The corridor objectives, which are defining qualitative requirements from the point of view of the TEN-T policy and transport market stakeholders, mirrored against the current corridor characteristics.

The programme of measures delivers a comprehensive overview on necessary activities to promote the efficient development of the corridor Core Network by 2030 in accordance with the TEN-T Regulation 1315/2013 considering the relevance and importance for the Rhine-Alpine Corridor. Single measures were classified according to rail, road, IWW, ports, airports and rail-road terminals.

To go in line with the general objectives of the TEN-T Regulation 1315/2013, the Core Network shall enable the accessibility and connectivity of all regions. Road plays a major role in setting up this objective by providing interconnections between transport infrastructure of long-distance traffic and regional or local traffic. As the roads on the corridor have to be either express roads or motorways, this goal can be further developed by e.g. the modernisation of restricting links in the existing network. Safety of road transport is another main objective of the regulation. This implies measures for the modernisation of the road network, of e.g. outdated road sections, bridges, parking areas, etc. To reduce for instance the air pollution and enable sustainable and low-emission road traffic, improving the use of clean fuels is another main topic for road.

For inland waterways and ports, there is a set of strategic requirements defined by the regulation. They shall be maintained so as to preserve good navigation status, while respecting the applicable environmental law and thus protecting the environment and of biodiversity. Thus River Information Services (RIS) for inland waterways, but also LNG or onshore power supply play a big role for achieving those goals. But also measures to remove capacity bottlenecks such as the expansion of lock chambers or mooring places are considered, as well as measures to remove missing links (rail, road access) for enabling efficient multimodal interconnections.

Airports are part of the air transport infrastructure as per definition. The regulation defines also several priorities for airports, such as supporting the implementation of the Single European Sky or the improvement of rail and road connections (multimodality), taking the mitigation of the environmental impact from aviation into account. In compliance with those priorities, which are aiming at a safe and efficient utilisation of airspace, and the requirements on airport infrastructure, the respective airport measures were defined.

Terminals are a key component to ensure road-competitive intermodal transport services throughout Europe since they have to ensure an efficient and safe interchange between road, rail and other transport modes (inland waterway, short sea shipping including ferries). The capacity of a terminal is determined by a couple of factors, which cannot all be influenced by the terminal manager. The primary influences are the position of the terminal within the rail and road network, the size and shape of the real estate, the length of the transhipment tracks, and the number and capabilities of the handling equipment. One can discuss if the existing and to be built transhipment tracks have to have a usable length of 740m to be consistent with the targeted value for the permitted train length on the Trans-European core rail network by 2030 (TEN-T Regulation 1315/2013, Article 39, number 2a). On the one hand, it would be desirable if the "full" train could enter the terminal without further manipulation and if the terminal tracks could have the same length, though. On the other hand not each and every train will use the full length and the terminals tracks may be linked via a reception siding that allows to split the train into groups suitable for the maximum permitted handling track length. At this stage it can be recommended that at least new built terminals should argue carefully if their handling tracks are below the target value of 740m.

Implementation plan

The implementation plan is based on the identification of projects (which itself were the result of the pre-identified projects and the corridor characteristics) and influenced by involvement of stakeholders in the Corridor Fora as well as by the bilateral coordination with the involved countries.

To tackle all the critical issues and bottlenecks described in the corridor characteristics, the implementation plan foresees the realisation of in total 175 projects located in the Core Network of the Rhine-Alpine Corridor. Thereof 30 projects are assigned to Switzerland and have to be regarded separately.

Out of the remaining 145 projects, the majority (60) is assigned to rail. Following are inland waterways (28), seaports (19) and road (15). Inland ports (9), airports (7) and rail-road terminals (7) only have a small share.

Regarding allocation of projects to the respective Member State it becomes obvious that most projects are taking place in Italy (57). Germany has 31 assigned projects, The Netherlands 22, Belgium 15 and France 11. Additionally, there are 9 projects involving multiple countries.

The available project cost information amount to a total volume of €47,615 M. This information should be handled with caution as for 19 projects, specific information on project costs is not available yet.

In general, most projects (74) are planned to be finalised by 2020 latest. This concerns especially inland ports, seaports and inland waterway, where 37 out of in total 56 are expected to finish before the end of 2020. For 30 projects there is no information about the year of implementation; they were regarded as "finished later than 2030".

All the projects were clustered according to the in the corridor characteristics defined categories of critical issues (cp. chapter 4.2.9).

In a separate analysis it was examined if a project is related to a cross-border section. The cross-border sections were defined by the European Commission per mode. It was recommended by the European Commission not to refer to the TEN-T Regulation, since 2013/1315 art. 3(p) leaves too much room for discussion.

Applying that definition, 56 projects were evaluated as cross-border relevant. However, the overwhelming majority of these 56 projects (namely 39) is only partially related to cross-border issues.

Following that methodology, capacity has the lion's share of mainly assigned projects (64). Interoperability measures account for the second highest share (31). Missing link (5) and urban area (4) – related projects have the smallest part. Although the facilitating and implementing of TEN-T infrastructure around urban areas was only the main focus of four projects, this category was relevant for a total of 21 projects. This leads to the assumption that projects often took place around urban nodes (and thus including the implementation and facilitating of infrastructure), but had their main focus elsewhere. An example for that are the noise reduction measures for rail in and around urban nodes; this project is mainly addressing externalities/innovation.

A similar situation can be found for multimodality, where only 13 projects are mainly addressing this category, but 26 were also regarded as additionally relevant for multimodal transport.

Despite the high quantity of Member State projects and the multitude of their specific improvement measures, there are still critical issues to be tackled and TEN-T requirements to be fulfilled (the latter until 2030). In order to do that, several projects were proposed by the consultants in order to solve these bottlenecks (Annex 7-9; projects with the internal number >3000).

Investment

Analogue to the implementation plan, the investment analysis only covers the total amount of costs which is known and/or publically available. The work plan identifies 145 projects on the alignment of Rhine-Alpine Core Network Corridor (compare above). The estimated overall cost of the 145 projects amounts to €47,615 M. The analysis of the 145 projects included in the work plan allow for the identification of the projects falling under the CEF funding priorities which are defined by art. 4 of the Regulation 1316/2013[17] and included in the Multi-Annual Work Programme for financial assistance in the field of the Connecting Europe Facility-Transport sector for the period 2014-2020[18].

According to the applied assessment, 70 out of 145 projects fall under the definition of *"Pre-identified Projects"* for Rhine-Alpine Core Network Corridor (cp. Annex 9) as specified in Annex I (Part I) of the Regulation 1316/2013. The expected total costs of the above mentioned 70 projects accounts for €29,854 M. Additionally, 10 projects which are located on the alignment of the Rhine-Alpine Corridor are also considered *"Pre-identified Projects"* for the North Sea-Med Corridor. The estimated additional cost of these 10 projects is €2,158 M.

In addition to the 80 (70+10) *"pre-identified projects"* mentioned above, there are 52 projects which can be associated to at least one of the Specific Sectoral Objectives set by art. 4 of the Regulation 1316/2013. The estimated overall cost of the additional 52 projects sums up to €10,245 M.

In summary, about 90% of the projects on the alignment of Rhine-Alpine Core Network Corridor (132 projects) fall under the priorities of CEF funding. The estimated overall cost of the 132 projects is at €42,256 M.

It should be mentioned that this analysis is a preliminary exercise based on partial information. The decision if a project is eligible for CEF funding is under the responsibility of the European Commission (in particular INEA) which will base its decision on the evaluation of the applications submitted according to the calls for proposal.

The objective of "Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections" covers the largest number of projects (86) for a total cost of €34.3 billion. The objective of "Optimising the integration and interconnection of transport modes and enhancing the interoperability of transport services, while ensuring the accessibility of transport infrastructures" presents a lower number of projects (36) and a total cost of €6.7 billion. Finally, the objective of "Ensuring sustainable and efficient transport systems in the long run, as well as enabling all modes of transport to be decarbonised" is pursued by only 10 projects for a total cost of €1.3 billion.

The largest numbers of projects falling under the priorities of CEF funding are located in Italy (52) Germany (26) and The Netherlands (19). The highest costs are found in Germany (€ 17,020 M), followed by Italy (€ 14,367 M).

[17] *C(2013) 9690 final*

[18] *C(2014) 1921 final*

4.2 Description of the characteristics of the corridor

4.2.1 TEN-T compliance analysis

Building upon the results of the previous Progress Reports, the analysis of the corridor characteristics has been expanded and supplemented with the analysis of critical issues on the corridor. The data collection for the TENtec system has been driven forward for the Member States and Switzerland. Integrating the studied bottlenecks and gaps in the analysis allows identifying the critical sections and nodes along the corridor for the perspective until 2030.

The basic corridor specifications for the Rhine-Alpine Corridor were included in the corridor alignment. The detailed description of the corridor characteristics is based upon:

- the definition of the Core Network corridor routing and nodes, including the identified necessary additions to the network;
- the check of compliance of the identified infrastructure with the TEN-T Regulation 1315/2013;
- the identification of bottlenecks and gaps in the implementation of the corridor work plan;
- the evaluation and synthesis of the results.

For the Rhine-Alpine Corridor analysis, the national sectioning and node alignments with all parameters specified in the relevant corridor "working document" were collected and aggregated in table format to give an overview about the availability of data and gaps in the collection process. Then a data analysis was performed to check the implementation of the critical technical parameters of the TEN-T Regulation (summarised in the following table per infrastructure category) for all sections and infrastructure nodes defined. This allows the full overview check presented for compliance of the current infrastructure with the defined parameters based upon the TEN-T Regulation 1315/2013.

Table 10: Requirements according to Annex I of the "Working document"

Mode/Node	Parameter	Requirement
Rail	Electrification	Core network to be electrified by 2030 (including sidings where necessary)
	axle load	Core freight lines 22.5t axle load by 2030
	line speed	Core freight lines 100 km/h by 2030 (NB: no speed requirement for passenger lines)
	train length	Core freight lines to allow for 740m trains by 2030
	ERTMS / signalling system	Core network to be equipped with ERTMS by 2030
	track gauge	New lines to be built in UIC standard gauge (1,435mm), except in certain circumstances
Inland Waterways	Length of vessels and barges	from 80-85m
	Maximum beam	from 9.50m
	Minimum draught	from 2.50m
	Tonnage	from 1,000-1,500t

Mode/Node	Parameter	Requirement
	minimum height under bridges	from 5.25m
	Availability of alternative fuels	Indication of availability by 2030
Roads	Road class	Roads have to be either an express road or a motorway by 2030
	parking areas along the roads, including their security level	Sufficient parking areas, at least every 100 km, by 2030
	Availability of alternative fuels	Available by 2025
Maritime Transport: Ports and Motorways of the sea	connection to rail network, inland waterways and road network	Core ports to be connected to rail by 2030
	Availability of alternative fuels	Available by 2025
Airports	capacity to make available alternative clean fuels	*Available*
	connection to transport network	heavy rail or urban rail system and road network, *certain airports have to be connected to heavy rail by 2050*
Rail-Road Terminals	Capacity/ Traffic flows	Indication

Source: Rapp Trans

The identification of critical issues and bottlenecks relates to the detection of missing links, cross-border issues, missing last mile connections, externalities as well as multimodality and interoperability barriers according to Article 3 of the TEN-T Regulation 1315/2013, but also the impacts resulting from slower implementation of planned studies and projects. In accordance with the corridor-based approach, the results have been summarised by transport modes and nodes. Additional input was given by the Member States.

The following corridor characteristics chapters are separated by modes and nodes and give an overview on the technical parameters on the corridor, highlighting sections and areas where the requirements are not fully met today (2014) and where critical issues are apparent or can arise in near or distant future.

4.2.2 Characteristics Rail

For the rail infrastructure a relevant network of 3,225 km is analysed through the Rhine-Alpine Corridor. For the entire network the defined infrastructure requirements (cp. Table 11) have been checked and the gaps are highlighted in the following paragraphs. The rail alignment for Switzerland is currently not included in the TENtec database. It has to be noted that the alignment for Switzerland already considers the Gotthard base tunnel which will be finalised in 2016. The presently used old Gotthard tunnel was also studied, but is not represented in the total section kilometres. The collected information for the Swiss rail routing is based on rail freight operations and does not include sections exclusively used for passenger transport.

The Rail Freight Corridor Rhine-Alpine (RFC1), based on regulation 913/2010/EU covers most of the rail sections of Rhine-Alpine Corridor. The implementation plan of the RFC1 provides a thorough analysis of important issues related to the rail transport on the corridor but covers more sections than detailed in this study, according to the TEN-T Regulation 1315/2013 and 1316/2013, and refers to the freight transport only.

The aim is to create a coherent high speed rail net for passenger transport integrating the relevant urban nodes and airports. To aid this development, a separation of freight and passenger operations is necessary -wherever possible- to eliminate capacity constraints and to minimise operational conflicts. Further this supports improved reliability and performance of both passenger and freight rail. Dedicated freight infrastructure is recommendable at least when by-passing dense areas with high frequency passenger services (e.g. the rail nodes of Oberhausen, Köln, Basel, Novara, Milano, Genoa).

Table 11 shows the TENtec fulfilment of technical parameters in the current status of the network.

Table 11: Compliance of rail with TEN-T Regulation 1315/2013

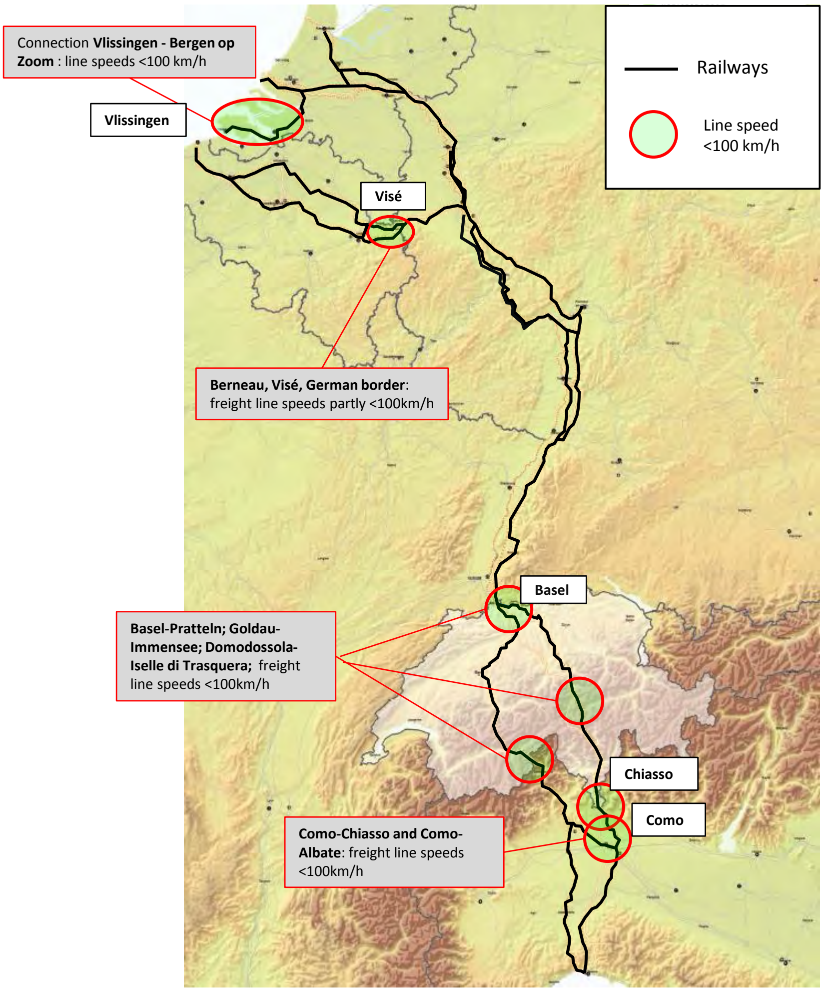
RAILWAYS		**All entries: Share of all sections fulfilling the respective standard**					
TENtec Technical Parameters		**NL**	**BE**	**DE**	**CH**	**IT**	**Total**
Length of all sections	km	435	499	1,322	560	409	3,225
Electrification Requirement	Electrified	100%	100%	100%	100%	100%	100%
track gauge	1,435mm	100%	100%	100%	100%	100%	100%
line speed (core freight lines)	≥100km/h	83.0%	81.6%	100%	90.4%	97.8%	92.9%
Axle Load (core freight lines)	22.5t	78.2%	100%	100%	100%	100%	97.0%
Train length (core freight lines)	min. 740m	100%	100%[19]	100%[19]	100%	0.0%	87.3%
ERTMS/signalling system	YES	49.8%	18.4%	0.0%	15.5%	0.0%	12.3%

Source: Rapp Trans

[19] Train length for the Belgian and German corridor network is in general 740 m. Restrictions due to timetabling and the operational situation can partially influence the actually possible train length.

The electrification of the lines is completely fulfilled. A line speed of 100km/h is realised on 92.9% of the corridor. Germany fulfils this requirement fully; Italy fulfils this requirement with more than 97% of all section km and Switzerland on more than 90% of all section km. In Belgium the requirement is fulfilled on 81.6%, while train speeds in the ports of Ghent and Antwerpen are by design also compliant, but in operation kept below 100 km/h for safety reasons. In The Netherlands, on the Betuweline between Maasvlakte and Zevenaar, the usual operational speed is 85 or 95 km/h depending on the direction of the traffic, even though the design speed is above 100km/h and thus fulfils the regulation requirement. In total more than the indicated 82.3% of the Dutch network are thus enabled for higher freight train speeds. The Vlissingen port railway line only allows 60km/h. In Switzerland, line speed limitations apply on some parts of the network due to profile issues. There are already projects planned and/or started to solve these bottlenecks.

Figure 6: Freight line speed <100km/h



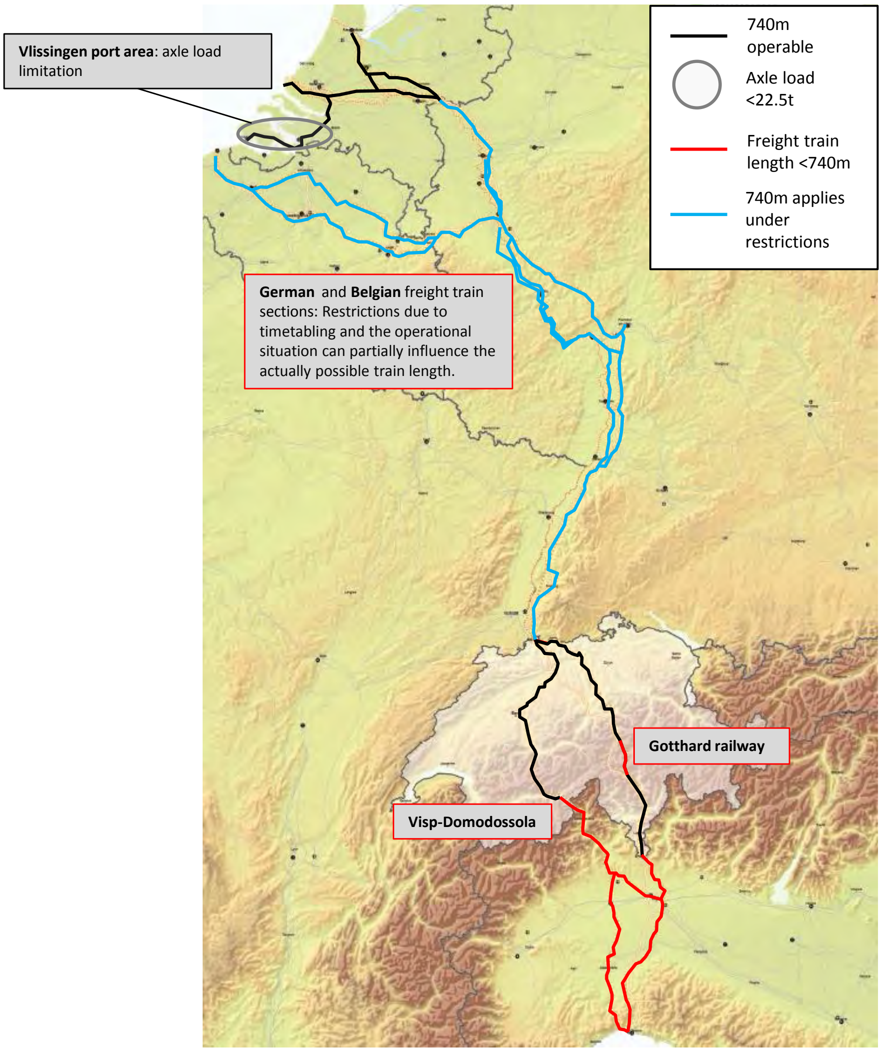
Source: Rapp Trans

Along the entire corridor the track gauge of 1,435mm is fully established. In Switzerland trains of 740m length can be operated on the full network. The sections from Visp to Domodossola and the Gotthard rail line require double traction. For the Gotthard passage rail corridor sections this will change with the opening of the base tunnel foreseen for 2016. In Belgium, the network has been described as compliant with 740m length trains. Trains of that length can be operated but not during peak hours. These sections are marked with limitations in the map below. Train length for

Germany is in general 740m (restrictions due to timetabling and the operational situation ca partially influence the actually possible train length). The relevant Italian network usually allows trains of 575-600m; no section is yet capable of operating 740m trains. In The Netherlands, 740m trains are the standard on the network. Further details for relevant sections are highlighted in the Rail Freight Corridor Rhine-Alpine study on Long Trains (Study of Management Committee for Executive Board, 2013)

Trains with single axle loads of 22.5 tonnes are fully operable on the majority of the corridor for freight trains. Limited exceptions exist only in The Netherlands: the Vlissingen port railway line in The Netherlands does not allow trains up to 22.5 tonnes axle load.

Figure 7: Low axle load and permitted freight train length issues on Rhine-Alpine Corridor

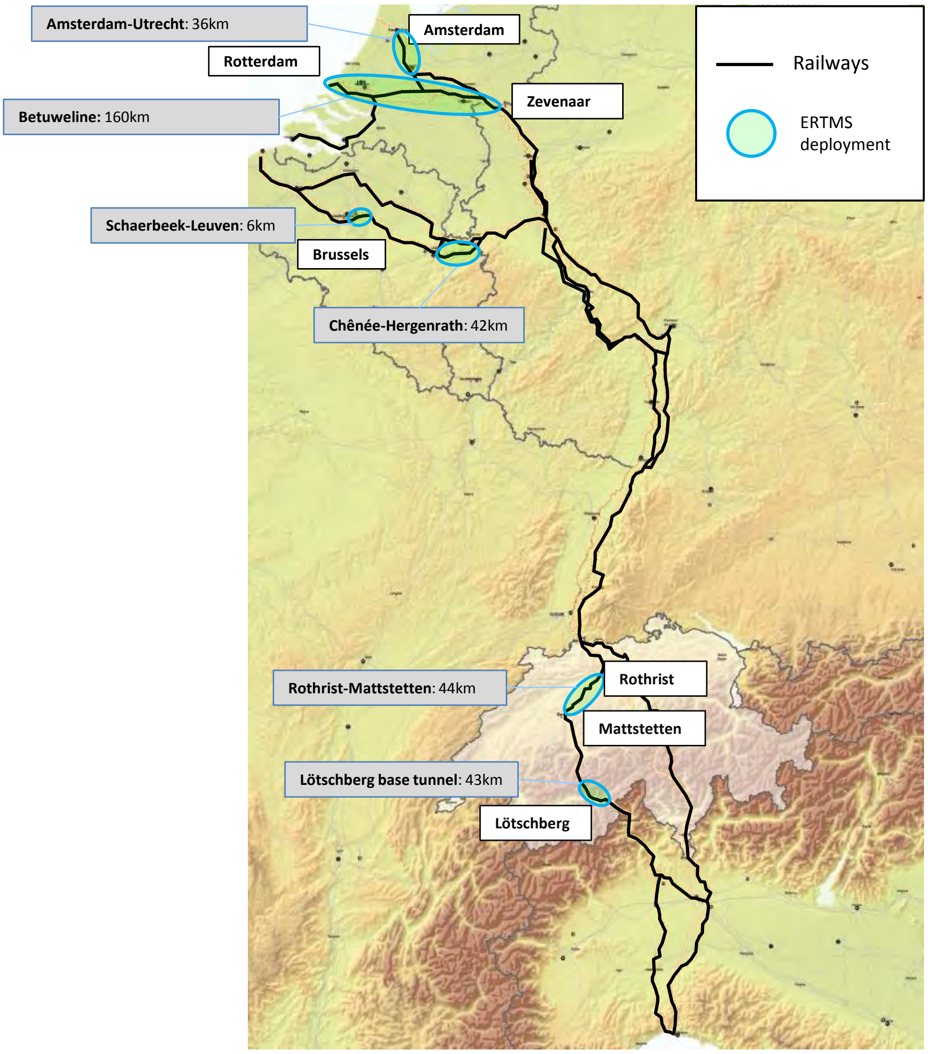


Source: Rapp Trans

Current interoperability constraints result from the different safety systems in The Netherlands (ATB), Belgium (TLB1, TBL1+, Crocodile), Germany (PZB/LZB), Switzerland (Signum/ZUB) and Italy (SCMT). ERTMS will strongly support rail interoperability and should be applied and operated internationally, including border crossing (cp. ERTMS deployment plan (chapter 4.5.3)).

In 2014, ERTMS deployment is still in its early stages: only 11% of the relevant corridor deploys the technology. The German and Italian networks are not equipped with this technology. The Dutch Betuweline as well as the sections Amsterdam – Utrecht and Lage Zwaluwe – Barendrecht (part of the HSL South Line) are already running ERTMS, while in Belgium ERTMS can be operated between Schaerbeek (near Brussels) and Leuven as well as between Chênée (near Liège) and Hergenrath (German border). Switzerland equipped already four sections along the relevant rail freight lines (87km) in the Lötschberg base tunnel and between Rothrist and Mattstetten with ERTMS. In The Netherlands, 49% of the network sections are equipped with ERTMS, in Belgium 18%. The current status of ERTMS implementation can be seen in Figure 8.

Figure 8: ERTMS deployment



Source: Rapp Trans

In general, it is agreed that all corridor lines should be equipped with ERTMS. For the current status in 2014 gaps in the deployment are identified for all countries and multiple sections. The existing sections and main implementation projects are detailed within the ERTMS deployment plan (cp. chapter 4.5.3).

Additional interoperability constraints for the entire corridor, especially on border crossing sections, result from different electrification systems in The Netherlands (1.5 kV and 25 kV), Belgium (3 kV / 25 kV on HSL sections and some conventional lines), Germany, Switzerland (15 kV) and Italy (3 kV). These issues are addressed in the utilised rolling stock a unification of electrification systems is not foreseen.

In addition, the rising awareness of the population towards environmental impact and the decline of public acceptance of rail freight will oblige administrations to intensify measures and projects against rail noise. Germany already started projects on noise reduction regarding wagons and housing along the lines on the corridor.

Besides the issues arising from the compliance analysis performed for the TEN-T requirements, for the current status of 2014 multiple further critical issues were identified in the individual countries along the rail lines on the Rhine-Alpine Corridor.

In The Netherlands the passenger accessibility of the rail station in Amsterdam constitutes a capacity bottleneck, while Arnhem central station and Rotterdam were upgraded recently. Also the capacity on the line from Amsterdam to Arnhem via Utrecht is identified as critical. The Meteren freight line is highly utilised and would require additional capacity or a bypass. From the port of Rotterdam to Zwijndrecht the port hinterland connection does not suffice. Between Zevenaar - Oberhausen there are prevalent capacity issues and a third track is needed; the construction phase itself causes bottlenecks due to limited availability of a second track.

Level crossings present safety, punctuality and capacity issues on the Belgian network. Capacity bottlenecks exist between Dudzele - Brugge and Brugge - Ghent; this connection from Ghent to the port of Zeebrugge is identified as an important axis for the diffusion of goods throughout Europe. Further physical bottlenecks are identified between Brussels - Denderleeuw, as one of the most utilised lines in Belgium, and at the Brussels North-South junction (used by multiple countries' trains, such as ICE for Germany and TGV for France). Bottlenecks exist on the cross-border connection from Antwerpen into Germany; Belgian authorities propose to give priority to solving the bottleneck on sections between Aachen - Köln and Aachen - Duisburg.

In Germany the area around Düsseldorf to Duisburg and the rail nodes of the Rhein-Ruhr-Express are existing critical capacity bottlenecks on the network. Frankfurt and Mannheim require upgrades in their station infrastructure. An efficiency bottleneck exists along the line between Karlsruhe - Offenburg - Freiburg - Basel. The infrastructure does not supply sufficient capacity and has long travel and transport times. As a gap in the European high speed rail infrastructure the connection between the region Rhine/Main and Rhine/Neckar is missing. In the areas of Duisburg - Moers, Düsseldorf, Haan - Leichlingen, Hürth, Köln and Mühlheim – Oberhausen noise pollution levels are critical due to rail noise emissions. Between Düsseldorf and Köln there is an insufficient capacity for the volume of freight transports.

In Switzerland in the Basel area connecting to Germany capacity is an issue due to limited track capacity. The Simplon rail tunnel cannot cope with safety requirements.

On the Italian network critical capacity bottlenecks are identified around the Giovi pass, between Chiasso - Milan, Novara - Oleggio, Oleggio - Arona, Rho - Gallarate, Tortona - Voghera, Pavia - Pieve Emanuele and Milano Rogoredo - Pieve Emanuele. Additionally the rail nodes Genoa, Novara and Milano require upgrades to cope with capacity, service quality and accessibility requirements. Between Genoa and Milano as well as Novara higher travel speeds could be realised. Restrictions in intermodal loading gauge apply on sections Chiasso - Milano and Genova - Arquata - Novara. Noise emissions are critical between Novara - Domodossola and Milano - Chiasso.

A detailed list of critical issues identified in connection with the projects listed in Annex 7, is provided in Annex 8.

4.2.3 Characteristics Road

Along corridor Rhine-Alpine all road sections (1,721km) are categorized as motorways, except for the west most connection to the port of Rotterdam to Oostvoorne which is a rural road with separate directions. In the east of The Netherlands, the connection between Bemmel (A15) and the A12/A18 is planned to be finished by 2019 to complete the motorway connection to the German border.

Table 12: Compliance of roads with TEN-T Regulation 1315/2013

ROADS	**All entries: Share of all sections fulfilling the respective standard**						
TENtec Technical Parameters		**NL**	**BE**	**DE**	**CH**	**IT**	**Total**
Length of all sections	km	260	275	708	286	192	1,721
Fulfil road category as: express road or motorway	Express or motorway?	90.8%	100%	100%	100%	100%	98.6%
Sufficient parking areas	≥ 1 area/ 100km	100%	100%	100%	100%	100%	100%
Availability of clean fuels	Section km with clean fuels avail.	100%	1 station in Kallo	100%	41.3%	46.4%	84.3%
Use of tolling system or other traffic management?	Toll road km	0%	0%	100%	100%	100%	68.9%

Source: Rapp Trans

All road sections on the Rhine-Alpine Corridor run widely in parallel to rail and IWW (up to the Swiss border with Germany).

At the present stage, many identified barriers for road transport have been addressed to the mature state of the aged infrastructure. The analysis of the TENtec data on the road network along the Rhine-Alpine Corridor does not lead to identified bottlenecks and barriers comparable to the level observed for the other infrastructures on the Rhine-Alpine Corridor or on other Core Network Corridors relying more heavily on road transport.

Since the road infrastructure does not differentiate between passenger and freight transport, capacity constraints relate to both uses equally.

The main infrastructure capacity bottlenecks include:

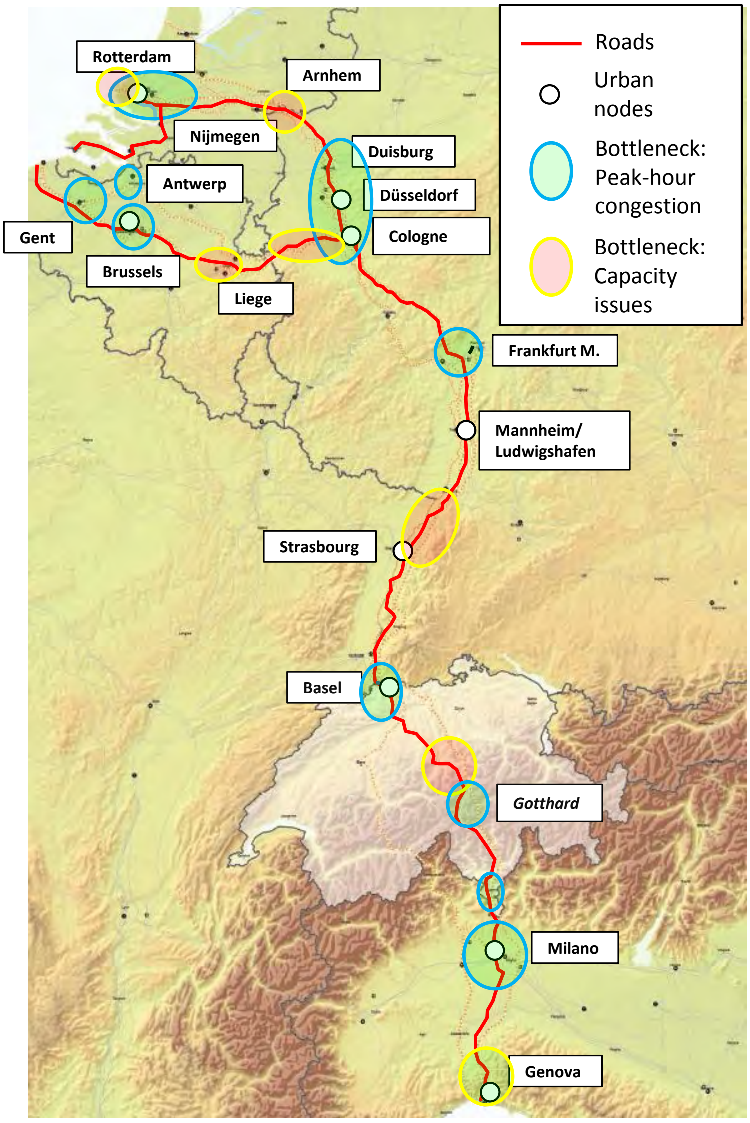
- Capacity constraints on motorways in urban centres areas and around urban nodes especially in the morning and evening peak hours when private commuter traffic increases congestion levels are presenting a challenge for the road infrastructure.
- Traffic on the motorway sections along the corridor conflicts with the local use of motorways to access the urban nodes. Motorway infrastructure around the urban nodes along the corridor is matured and built to address capacity constraints but the following identified sections require further extensions:
    - In The Netherlands, high levels of congestion and capacity constraints are observed in the Rotterdam, Arnhem, Utrecht (especially in the southern regions) and Amsterdam area. The A15 between Rotterdam and Arnhem does not serve as a cross border route today; traffic has to divert north into the congested Arnhem area or use alternative routing south of the A15 artery. In the Rotterdam-Area, the A4 (linking the A15

and A20) is a capacity bottleneck (congestions here are affecting the A15) as well as the Botlek bridge. The motorway Rotterdam - Venlo - Duisburg is an alternative to the congested area near Arnhem. This route is also congested itself, being a hinterland connection for the Rotterdam port. In the southern Utrecht area motorways have high congestion levels.

- The Belgian Walloon motorway needs rehabilitation in order to avoid reduction of speed, accidents and a local decrease of capacity due to renovation of infrastructure. The ring roads of Antwerpen as well as Ghent (west R4) and Brussels have capacity bottlenecks. At the moment the hinterland road connections to the port of Zeebrugge proves as a bottleneck.
- In Germany, along the A3 between Köln and Leverkusen critical levels of traffic congestion are recorded, in particular during peak hours, due to increasing traffic volumes. This also applies for the A1 also on the Rhine bridge, in the Köln area which is a bypass for the A3 and connecting A3 and A4. Along the A4 in the cross-border sections leading to Belgium between Düren and Kerpen the capacity is not sufficient. The motorway A5 between Offenburg and Baden-Baden requires physical upgrades to accommodate the peak hour traffic. Bridges on A5 near Heidelberg, Weil/Rhine, and Walldorf (intersecting with A6) have severe traffic congestion, peak hour traffic capacity problem and require upgrades. Along the A3, A4, A5 and A44 new constructions and upgrading of truck parking and service areas are required to accommodate sufficient numbers of trucks during night time (see chapter Truck parking (4.2.3.2)).
- In Switzerland, bottlenecks are identified for transit transport especially on the Basel city motorways close to the German border. . Also capacity bottlenecks occur on the border crossing sections into Italy in the section between Bellinzona and the border, in the Lucerne area Rotsee - Lopper and between the intersections Härkingen - Wiggertal. The Gotthard road tunnel today presents only a seasonal or temporary capacity bottleneck. In 2001 the Swiss FEDRO introduced a truck dosing system for the Gotthard tunnel which limits the possible truck passages per hour between 60 to 150 trucks, depending on car traffic. In case of higher volumes, trucks are stopped in dedicated waiting areas along the motorway. The tunnel needs full rehabilitation works between 2020 and 2030. Both directions will be closed down and this will disrupt all transit road traffic. A new tunnel as an alternative is under study while the overall Alpine road transit capacity cannot be increased due to Swiss laws. The motorway border section to Italy between Lugano and Chiasso has been identified as a bottleneck; required upgrades are under study.
- Besides the congested motorway sections around the urban node of Milan, further bottlenecks have been identified in the node of Genoa due to the overlapping of urban traffic flows, long-distance traffic flows and traffic flows related to port activities.

The following map highlights the identified bottlenecks and the sections that do not yet comply with the regulation. Congestion bottlenecks refer specifically to the urban areas where congestion occurs frequently. It can be seen, that bottlenecks are not exclusively limited to border crossing sections and urban nodes, but are distributed across the entire corridor.

Figure 9: Road bottlenecks along the Rhine-Alpine Corridor



Source: Rapp Trans

4.2.3.1 Road transport policy issues

The night time driving ban for heavy vehicles in Switzerland poses a capacity challenge on sections leading from Italy and Germany into Switzerland for parking facilities and border crossings. The night time driving ban in Switzerland is in effect between 22:00 and 5:00 and applies to:

- Heavy motor vehicles;
- Articulated trucks with a permissible gross weight of over 5t;
- Vehicles pulling a trailer with a permissible gross weight of more than 3.5t.

The ban requires trucks to stop before the border. While this is considered in planning of transports, unexpected events and delays can require additional stops in cross-border areas requiring more parking facilities than on other road sections. Along the A5 motorway in Germany leading towards Switzerland, an extension program for increased parking capacity is in progress. In the morning time after the ban is lifted, the border crossing capacity at checkpoints creates a bottleneck for truck transports.

In morning hours on busy days 3-4 hours can be needed for the stopped trucks to clear the congested border sections. To secure the availability of parking and a distribution across the infrastructure information systems are under study within the ITS action plan.

Systems for heavy goods vehicle charging along the road network are applied on Italian, Swiss and German motorways. For The Netherlands and Belgium, systems are under study. Italy has a road charging scheme for the motorways which requires payments depending on vehicle class, road category and distance driven for passenger and freight traffic. Payments are made at check-points distributed over the motorway network. Stopping is required for cash and card payments. A dedicated on-board unit (OBU) can be acquired allowing usage of extra lanes where only slight speed reductions are required if no road congestion accumulated at the check-point station.

In Germany, charging for HGV above 12 tonnes is automatically tracked with a GPS based OBU; charges are based on vehicle type and driven distance. For vehicles without OBU payments can be made for fixed time periods in advance at stationary terminals or online. In Switzerland, private cars have to buy a vignette for use of the motorways prior to entering affected roads.

The Swiss HGV-charging schemes proves today as a cross border disruption for foreign HGV. 99% of foreign registered HGV do not have a dedicated Swiss OBU, which requires them to stop at border crossing terminals to manually scan their mileage (in kilometres) on entry and exit to Switzerland. Since new terminals have been installed at the border crossings with the project *Transito*, the process is sped up and aligned with standard customs checks. Swiss OBUs are compatible with the German HGV charging system, but not vice-versa. The implementation of the European Electronic Toll Service (EETS) as specified in Directive 2004/52/EC would significantly reduce cross border disruptions along the corridor.

4.2.3.2 Truck Parking

Due to EC regulation 561/2006 truck drivers need rest stops at least every 4.5 hours and should adhere to strict limitations. Thus having available truck parking on the relevant road sections with one rest area at least every 100 km is essential. Current information about available parking areas on the corridor can be accessed via: http://www.iru.org/transpark-app. This web service offers an overview on location and amenities of all accessible parking areas. For the corridor Rhine-Alpine this criterion was checked from all northern starting point on the road network as well as from Genoa; it is fully met with rest areas. Usually distances between parking facilities are less than 100 km. A full sufficiency assessment on the number of parking spots cannot be performed based upon public data. The information on usage and number of available parking spots is lacking on corridor level, even though truck parking infrastructure is a critical issue along the Rhine-Alpine Corridor as it is in all European regions.

While the sum of all parking spots suffices, along the corridor parking availability is a matter of distribution to areas. Congested parking areas occur close to the core nodes and border crossings. Trucks could be guided to free safe and secure parking via Intelligent Transport systems (ITS) as addressed in the ITS Action Plan and the ITS Directive 2010/40/EU. The importance for guidance, safe and secure parking was recently addressed in key EC funded projects:

- Study for the ITS Action Plan priority actions e and f: An impact assessment of costs and benefits of truck parking was performed and technical solutions were evaluated.
- SETPOS: An EC pilot project set to establish common truck parking standards, support construction and upgrading of safe and secure parking facilities and

pursue further implementation of parking ICT, reservation and guiding systems. It finished in 2009 with the production of a best practice handbook.

- LABEL: An EC funded project between 2008 and 2010 that developed a labelling scheme for truck parking areas.

A detailed list of critical issues identified in connection with the projects listed in Annex 7, is provided in Annex 8.

4.2.4 Characteristics IWW

On the Rhine-Alpine Corridor, 1,577km of waterways were reported, including the rivers of Moselle and Neckar and an alignment for French sections of the rivers. The description of the relevant parameters of corridor inland waterways is adapted from the classification of the European Conference of Ministers of Transport, often referred to as ECMT classes. The requirements for the corridors relate to class IV of the ECMT.

Table 13: Compliance of IWW with TEN-T Regulation 1315/2013

IWW		**Share of sections fulfilling the parameter**						
TENtec Technical Parameters		**NL**	**BE**	**DE**	**FR**	**CH**	**IT**	**Total**[20]
Length of all sections	km	218	1,022[21]	1,155	183	21		1,577
Length of vessels and barges	from 80-85m	100%	92%	100%	100%	100%		100%
Maximum beam/width	from 9.5m	100%	92%	100%	100%	100%		100%
Maximum draught allowed	from 2.5m	100%	95%	74%	90%	100%		82%
Tonnage	from 1,000-1,500t	100%	92%	100%	100%	100%		100%
Minimum height under bridges	5.25m	100%	72%	97%	100%	52%		97%
Availability of alternative fuels in inland ports	Availability	no data	part.[22]	no data	no data	no data		

Source: Rapp Trans

Relevant are 424 km in The Netherlands, 1,155 km in Germany, 21 km in Switzerland and 183km in France. Italy does not have an alignment for inland waterways on the Rhine-Alpine Corridor.

The length (minimum 80m), tonnage (minimum 1,000 t) and breadth (minimum 9.5m) of vessels is not restricted below ECMT class IV levels on the entire corridor besides in some small sections in Belgium. In Switzerland the Rhine between Basel and Muttenz only allows a height under bridges of 5.1m, affecting the section, allocated to Germany, between Niffer (F) and Rheinfelden (CH). All other sections on the corridor fulfil the minimum 5.25m.

[20] without Belgium
[21] Belgian IWW is not part of the corridor but it has been added for informative purposes, thus not affecting the total values
[22] LNG in Port of Antwerp, SPS in Port of Antwerp and Ghent

Along the German Rhine sections between Lobith - Krefeld (2.8 m), Krefeld - Koblenz (2.5m), Koblenz - Iffezheim (2.1m) and Iffezheim - Swiss border (3m), the fairway depth is not always sufficient for the TEN-T requirements of maximum allowed draught. For full operational capacity extensions of the fairway depth are needed on all German sections along the Rhine. On the Neckar extensions should be made to accommodate large barges with 135m length (11.4m wide, 2.8m draught). At Plochingen additional port area is needed for capacity reasons. Due to the increasing traffic of larger barges on the river, on the Moselle River lock capacity is lacking and limiting the operational volume. New lock chambers are needed between Koblenz and Trier to adjust to demand.

In The Netherlands there is a local lack of mooring places between Dordrecht - Emmerich, Rotterdam - Gorinchem (Merwede River), near Lobith and the Rijn-Schelde connection between Rotterdam and Antwerp/Vlissingen. Lobith is the most prominent one and being very close to Germany also facilitates cross border traffic. The Amsterdam IWW network has only insufficient access to the maritime. In the connection to Ijmuiden there is a lack of lock capacity, also in Terneuzen and Volkerak.

In The Netherlands the erosion of the Rhine river bed is seen as a crucial issue. It can lead to damages in locks and thus disturb operations. The controlled dumping of gravel to stabilise the river bed is a resource consuming process, necessary equipment are limiting the capacity of the river infrastructure during operations.

In Belgium critical issues are identified in the reliability and gauge imitation in the canal of Terneuzen for sea and IWW vessels. Also height and capacity limitations apply in the Albertkanaal.

France has very good access to high capacities on the river Rhine. Though there are some bottlenecks to be mentioned, especially in the Strasbourg port areas: The last mile connections with rail connectivity and the lock capacity are insufficient. The Gambsheim lock has reliability issues due to capacity constraints and an insufficient port information system. Also the ports of Strasbourg and Ottmarsheim have critical issues with the multimodal transhipment capacity and the cross border cooperation. Mulhouse requires a wider area for port activities.

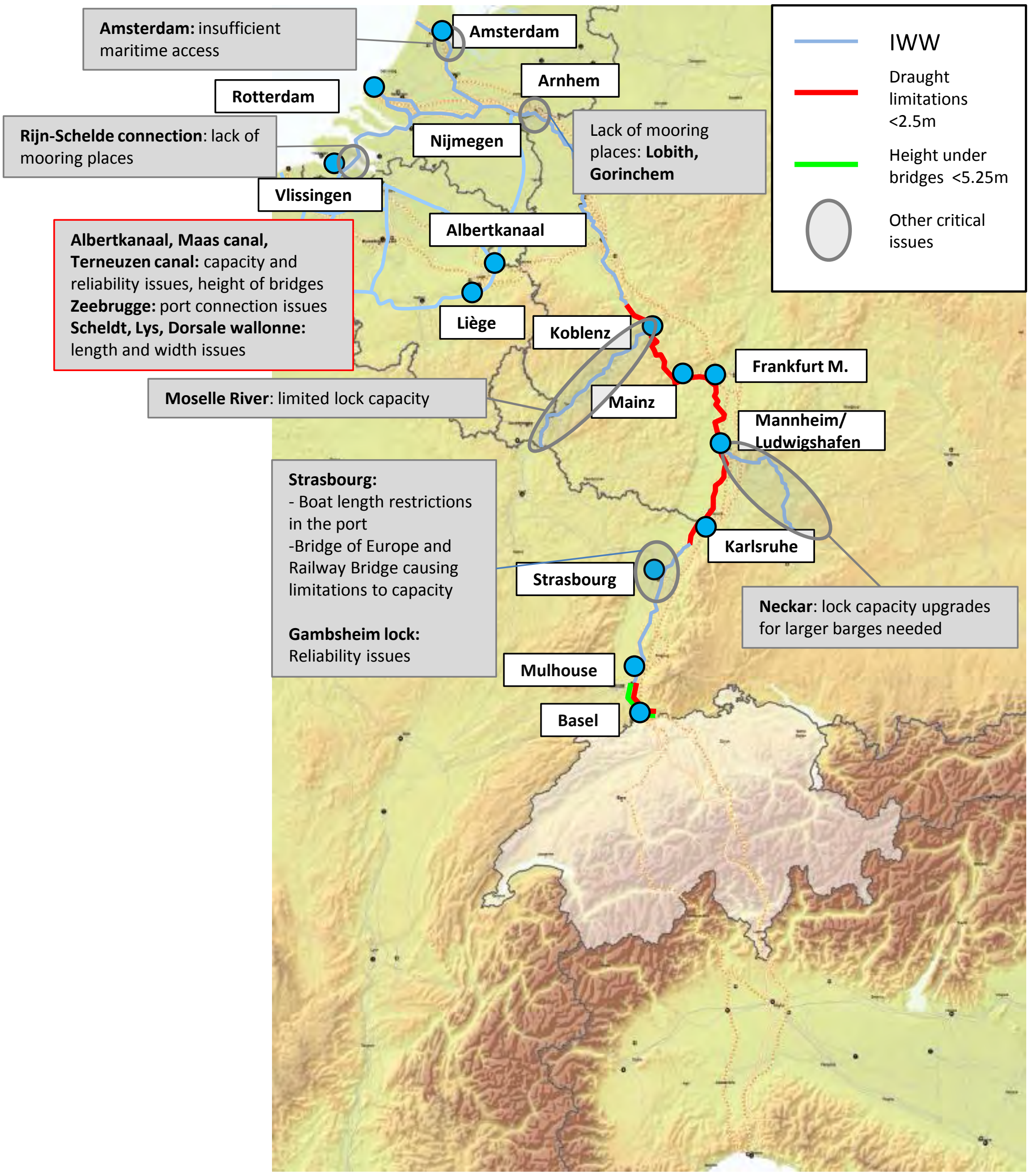
In The Netherlands LNG fuels are available along the rivers and canals with truck-to-ship bunkering available in the ports of Amsterdam and Rotterdam; further supply chains for the LNG establishment are currently under study. Germany reports the implementation of alternative fuels along the rivers, upgrading locks for increased capacity and implementation of river information service (RIS, see chapter 4.5.4) as under study. In the Moerdijk area an upgrade of the IWW traffic management systems is needed.

The Belgian Network is connected to the Rhine through three strategic points: the canal Ghent-Terneuzen, the Rhine-Scheldt connection and the Lanaye/Juliana canals at the cross-border lock compound in Lanaye. Belgium has a very wide spread network. Generally the network is very well developed. Nevertheless there are some bottlenecks remaining, especially concerning capacity and reliability in the Albertkanaal, the Maas and the Terneuzen canals. Some gauges issues have also to be mentioned such as the height of the bridge in Albertkanaal, the access to the port of Zeebrugge or the width and length in the Scheldt, the Lys and the "Dorsale Wallonie".

The EU "White Paper on transport", which especially aims to reduce the amount of greenhouse gases by 60% until 2050 implicitly demands a more coherent and more efficient transport policy. The high level of transport activities in the Upper Rhine Region bears a high potential for prospect emission reductions with initiatives concerning new fuel strategies. The port of Strasbourg coordinates the efforts along with the ports of Colmar, Kehl, Karlsruhe, Ludwigshafen, Mannheim and the consortium of Rhine-Ports Basel-Mulhouse-Weil.

The following map (Figure 10) illustrates the location of bottlenecks and missing alignment to the regulatory requirements which can be allocated to limited areas.

Figure 10: Bottlenecks and compliance issues for IWW



Source: Rapp Trans

Strengthening the position of inland navigation in the TEN-T corridors is the PLATINA II project, a European Coordination Action which started in 2013 aiming to implement the NAIADES II policy action programme into practice. The focus is on a better use of the river infrastructure and the support of the integration of inland waterway transport into the TEN-T corridors.

A detailed list of critical issues identified in connection with the projects listed in Annex 7, is provided in Annex 8.

4.2.5 Characteristics Ports

Along Rhine-Alpine Corridor, a total of 24 ports were considered in the analysis; 8 ports are classified as seaports and 22 inland waterway ports. All maritime ports are classified as inland waterway ports as well, except Genoa. All surveyed ports have a rail connection for full co-modal transhipments. This characteristics section deals with the maritime ports. Critical issues for inland ports are mentioned in the section referencing the inland waterways.

The availability of clean fuels for the current situation is difficult to assess due to absent information from centralised databases. The ports of Rotterdam, Amsterdam, Antwerpen (bunkering operations for inland vessels) and Zeebrugge report availability of LNG. In the following Table 14, seaports which have an IWW connection (e.g. Rotterdam) are analysed as one port.

Table 14: Compliance of ports with TEN-T Regulation 1315/2013

Ports		All entries: Share fulfilling the respective standard					
TENtec Technical Parameters		NL	BE	DE	CH	IT	Total
No. of relevant nodes	#	6	6	8	1	1	22
Connection to the rail network	Rail connection	6	6	8	1	1	22
Connection to the IWW network (seaports)	IWW connection	4	3	0	0	0	7
Availability of alternative fuels in inland ports?	Alternate fuels available?	2	2	1	0	no data	5

Source: Rapp Trans

The connection of seaports for mass freight transport (sea, inland waterways and rail) is critical for several reasons: from a European perspective, it guarantees freight traffic to and from the economic regions along the corridor; it improves the sustainability of transport by lowering the road share and subsequently reducing environmental impacts and road congestion for passengers; it guarantees the competitiveness of seaports. The following issues have been identified from the study review, highlighting the bottlenecks in the port areas, which need to be overcome for further growth.

- The fast growing port of Zeebrugge accounts for the lowest share within the North Range for IWW (1%) and rail (15%). It is facing some critical issues concerning its bulk freight transport connections in terms of connectivity and capacity. The major bottleneck concerns its low gauge connection to the IWW network leading to a low share of the IWW traffics.
- The port of Ghent faces reliability problems concerning its accessibility and rail connections. The critical IWW issue concerns the capacity of the cross-border Terneuzen locks. It is composed of 3 locks including one of them 100 years old. Two locks are dedicated to IWW. The locks host 53,000 IWW and 9000 seagoing vessels on a yearly basis. At present time, both inland and seagoing vessels are affected by high congestion, gauge limitation and reliability problems. The other main bottleneck is the connection to the rail network from the left bank of the port to host 740m trains and in this way provide a multimodal platform at the existing container terminal where there remains free space and rail is fully electrified.

- Antwerpen is also facing capacity and connectivity issues. The critical ones are: the access to the left bank of the port including upgrading of a sea locks the inland navigation connection to/from Antwerpen via the Upper Maritime Scheldt (Boven-Zeeschelde); the second rail freight access connecting and giving capacity from the continental network to the port area (including Krijgsbaan and Oude Landen bottlenecks); the connection between the Antwerpen North marshalling yard and the interior which needs the building of a branch line to replace Schijnpoort and ensure that freight trains can cross each other easily. Upgrades of the bridges and locks in Albertkanaal are also foreseen to increase inland waterway share.
- Rotterdam has a good connection with its hinterland. The crucial issue concerns maintaining capacity. In Rotterdam there are scale difficulties in the organization of inland waterway transport and, to a lesser extent, railways. This will not be limited only to the port of Rotterdam. Two important issues are represented by:

  i. The lack of contractual relations between deep sea container terminals and hinterland transport modes - leading to a longer stay of containers ships in the port. This applies for all maritime ports.

  ii. Insufficient (shared) attention for the organisation to improve the balance between deep sea, container terminal and inland container shipping and a limited involvement of shippers in the problem solving.

  In practice, this implies that inland waterway vessels have to load at sometimes 20 to 25 different terminals in the port before they can start their journey. This is not only very inefficient, but it also limits the capacity of IWT and it weakens the competitive position of IWW. A similar problem exists for rail transport (shunting), where a train needs to visit two different terminals before being a 'full' train. As is the case for IWW, this makes transport by train more expensive (as compared to road transport) and has a negative effect on the capacity (because of the lower frequency).
- Amsterdam crucial issues concern sea accessibility. On short term a new location is assigned where bulk cargo sea ships are lightened in their load to pass the canal towards the port of Amsterdam. On long term a new sea lock is needed to increase the port handling capacity, improve safety and to handle larger sea going vessels (both passenger and freight, for all type of goods).
- The port of Genoa has lack of physical expansion space due to the fact that it is constrained in a strip of land enclosed by the city. The port is also afflicted by limited maritime accessibility for large vessels and limited rail and road accessibility.

It becomes clear, that the port operations are commonly facing bottleneck issues in the hinterland transportation. The ports are reliant to be efficiently connected to the other corridor transport nodes in order to reduce freight barriers. Along the Rhine-Alpine Corridor all ports are connected with rail, motorway (except parts of the port of Rotterdam) and Inland waterway with the exception of Zeebrugge and Genoa. It is the challenge to remove the congestion constraints and to upgrade the infrastructure (see also characteristics of roads chapter) feeding the ports.

A detailed list of critical issues identified in connection with the projects listed in Annex 7, is provided in Annex 8.

4.2.6 Characteristics Rail-Road Terminals

There are approximately 59 individual rail-road-terminals operating along the Rhine-Alpine Corridor. Single terminal nodes along the corridor can be subject to multiple facilities operating individually or as a unit. Due to the organisation of the rail-road-terminals operators, unified data on capacity and traffic flow is scarce from public sources. An adequate aligned measurement of capacity is absent. Annual traffic flows are not commonly published or do not lead to conclusive comparison between the assessed terminals. Different measurements in tonnes, loading units and TEU lead to further difficulties to establish a comprehensive overview for external evaluation. All addressed terminals, including their respective operators along the Rhine-Alpine Corridor are listed in chapter 1.3.2 and in Annex 10.

Infrastructure bottlenecks are observed in The Netherlands around Zaandam, Amsterdam, where further growth cannot be accommodated by the current terminal capacities in the future. In Belgium the Liege region lacks intermodal capacity and in Antwerpen the port and terminals require improved connections.

In Germany additional capacity for terminals is needed in different federal states and terminal areas: Duisburg, Frankfurt, Karlsruhe, Koblenz, Köln, Mannheim Ludwigshafen, Neuss/Düsseldorf and Stuttgart.

Switzerland has critical issues with terminal capacity in the Basel region, also Aarau, Rekingen and Chiasso terminals require capacity upgrades with growing freight streams.

The Italian terminal nodes in Milano and Novara lack multimodal transhipment capacity. Vado Ligure has an insufficient last-mile connection to the road and rail network as well as capacity issues in transhipment.

A detailed list of critical issues identified in connection with the projects listed in Annex 7, is provided in Annex 8.

4.2.7 Characteristics Airports

Airport infrastructure on the Rhine-Alpine Corridor is well established and provides good long distance connections. These infrastructure conditions lead to an intensive competition between all relevant transport modes along the corridor for both passenger and freight transport.

Along the Rhine-Alpine Corridor 13 airports are considered. The main hub airports for passenger transport Amsterdam, Brussels, Frankfurt, Zürich and Malpensa are all part of the corridor alignment and have direct rail connections. In Germany the additional airports show high passenger and freight flows, where rail connections have been realised in early stages of operation or have been directly implemented. In Belgium, The Netherlands, Switzerland and Italy there are neither light nor heavy rail tracks connected to the terminals of the additional airports. Liege and Bergamo are the two airports with high freight flows which are not connected to the rail network. It will be the challenge to launch rail links for higher efficiency on the corridor. To be in compliance with the TEN-T Regulation 1315/2013 the airport connections need to be established until 2050. The compliance perspective on alternative fuel availability in the airports by 2030 is rather limited. Even though IATA commits to the development of alternative jet fuels no dedicated roadmap, central feasibility study or specific information for the horizon 2030 is available. The development will be primarily cost driven, based on the intra-sectoral high pressure on kerosene price competition today.

Table 15: Airport characteristics on the Rhine-Alpine Corridor

Airport	Connection with rail	Passenger traffic flow	Freight traffic flow
	Yes | No	*pax / year*	*tonnes / year*
Rotterdam Airport	No	921,083	2,568
Amsterdam Airport	Yes	43,540,045	1,384,772
Brussels National	Yes	18,971,332	459,265
Liege Airport	No	315,293	561,000
Dusseldorf Airport	Yes	20,800,064	86,671
Köln-Bonn Airport	Yes	9,257,742	730,129
Frankfurt/Main Airport	Yes	57,260,904	2,065,457
Zürich Airport	Yes	24,789,083	326,525
Basel EuroAirport	No	5,880,771	93,940
Linate (Milan) Airport	No	9,178,375	19,808
Malpensa (Milan) Airport	Yes	18,716,315	414,317
Orio al Serio (Bergamo) Airport	No	8,899,480	116,732
Genova-Sestri Airport	No	1,377,003	404
Total sum	**7**	**219,907,490**	**6,261,588**

Source: Rapp Trans

The critical issues are the missing rail links to the airports of Rotterdam, Liege, Basel/Mulhouse, Milano (Linate), Bergamo and Genoa. In Milan, at the Malpensa airport a missing terminal connection and thus lacking freight capacity.

A detailed list of critical issues identified in connection with the projects listed in Annex 7, is provided in Annex 8.

4.2.8 Multimodality

On the subject of multimodality, critical issues are analysed in the sections relating to individual transport modes. This section gives an overview of the relevant transhipment issues for multimodal bottlenecks in the inland ports and terminals.

The issue in terms of interoperability in the port of Rotterdam is the most prominent example. Container terminal capacity in The Netherlands is described as sufficient. In future scenarios with modal shift (from road to IWW and rail) and high growth transport volumes in general, there might be a capacity bottleneck.

Capacity bottlenecks are identified for terminals in different federal states/terminal areas in Basel, Duisburg, Frankfurt am Main/Mainz, Karlsruhe, Koblenz, Köln, Mannheim/ Ludwigshafen, Neuss/Düsseldorf. Increased terminal handling capacity is required, according to market needs.

Capacity and connectivity upgrade needs of the Upper Rhine are currently under study in the framework of the "Upper Rhine a connected corridor". Cooperation is foreseen between Germany, Switzerland and France to implement common investments or measures such as the creation of a common river and port information system permitting the automatic transmission of information (arrivals/ departures of barges) and facilitating the management of activity in the ports or the collaboration of the nine Upper Rhine ports in the field of marketing, counselling and structuring of a common logistic offer.

In France, Strasbourg faces several bottlenecks that concern principally cross-border, interoperability and multimodality issues: the northern road access of the ports of Strasbourg and Kehl to avoid the central access located in an area with ongoing urban development; the extension and electrification of rail tracks in the port's switch yard; the extension of tracks to a standard of 1,000m and electrification in order to improve capacity and facilitate handling; the extension of the two water gates aiming at the accessibility of port basins for 135m-barges and cruise liners; the modernization and automating of switches that aims at a capacity extension in the switch yard and the port's railway network; the upgrade of the railway connection between the port and the national railway network to improve capacity of the national railway network in Strasbourg in order to ensure capacity for freight traffic to/from the port's railway network; the electrification of the railway access of the northern tri-modal container terminal; modification of the connection of the port of Strasbourg to the national network in order to enhance accessibility from Germany; the creation of a common bimodal terminal for empty containers for the ports of Strasbourg and Kehl in order to improve stocking capacity; the simplification of procedures (signals, language etc.) on the railway tracks between Kehl and Strasbourg facilitating the access to the Strasbourg port railway network for cross-border-traffic, with approval of the two countries. Mulhouse is undertaking planning in the development of multimodal platforms.

In Belgium, multimodality must be promoted through a series of investments and services to develop the rail and IWW transport modes. For air/rail co-modality, the Liege Carex terminal aside the Liege airport is planned. This terminal will be part of the whole Eurocarex network. For IWW and rail, the tri-modal terminal in Liege is planned in order to increase the container capacity and the catchment area of the IWW network. For removal of level crossings as well as advancing accessibility and capacity of the Port of Antwerpen and Zeebrugge rail investments are foreseen to improve the multimodal chain characteristics. Other projects on the IWW network such as the Wijnegem lock improvement, the increase of the height of the bridges on the Albertkanaal, the locks upgrades and building works in the port of Antwerp, the Oostende-Ghent gauge increase, the fourth lock of Lanaye in canal Juliana contribute to the competitiveness of the multimodal chain of transport in the Rhine-Alpine Corridor.

Switzerland faces a lack of terminal capacity at Basel of 180,000 to 210,000 TEU/year. Lack of terminal capacity exists also in Aarau, Rekingen, Chiasso areas. There is the need for an upgrade of intermodal road/rail gateway terminal capacity for transhipment import/export traffic from the seaports. The plans for a new gateway terminal Limmattal from 264,000 TEU (2020) to 348,000 TEU (2030) have been cancelled to focus on the developments in Basel.

In Italy the Novara CIM West Terminal needs an expansion and rail accessibility to cope with demand. This has to be implemented in order to remove the current technical bottlenecks hindering the development of intermodal traffic and the consequent opportunity of modal shift on the corridor. The action will be implemented through the installation of a 600 meter long track, the revamping and increase of the intermodal yard, and the installation of fixed equipment for ITU transhipment. The Milano Smistamento terminal faces a lack of capacity and is in need for improved connections with the railway network. This could prevent overlappings between passenger and freight lines.

4.2.9 Summary of compliance and critical issues

This chapter briefly summarises the identified gaps in the compliance analysis and highlights the identified critical issues. The infrastructure on the Rhine-Alpine Corridor is in general technically well advanced. With the rail, road and inland waterway systems running widely in parallel multiple mode options for freight transport are possible. The passenger transport offer on rail is continuous; the road network offers a dense network of motorways and high capacity alternative routes. The TEN-T compliance analysis revealed certain limited shortcomings in reference to the defined requirements applicable for all TEN-T corridors. Additional critical issues were identified across in the study review, through the comments submitted by Corridor Forum participants, invited stakeholders as well as the expert consortium editing this report.

Rail

The rail characteristics show the wide gap in ERTMS implementation, only 12.3% of the rail sections are currently equipped, especially Germany and Italy can be identified as critical bottlenecks in the corridor-wide rollout. Current interoperability constraints result from the different safety systems in use. ERTMS will strongly support rail interoperability and should be applied and operated internationally, including border crossings. The interoperability if further hindered through the difference in electrification systems between participating countries, which hinders border crossings or requires dedicated locomotives or train outfits. Italy's rail sections do not allow 740m trains in operation, which should be enabled on the full corridor. Especially for rail freight transports the maximum axle load and the line speed need to be developed to the required levels. The fulfilment of these criteria is with 97% and 93% respectively very high on the Rhine-Alpine Corridor. Usually only single sections need to be upgraded. It also has to be considered that while infrastructures are compliant per design, other operational restrictions such as safety and the prevention of noise emissions limited the full conformance. Rail noise is repeatedly identified as a critical issue for sections running through densely populated areas. Throughout the corridor track capacity issues have been identified, these commonly relate to high demand. Travel times could be shortened and main rail hubs optimised for better accessibility and service quality.

Road

The extensive road network of the corridor fulfils the TEN-T requirements to a large degree. Tolling systems are used except for in Belgium and the Netherlands.

Capacity bottlenecks are caused due to the mature state of the infrastructure which was often not designed for today's demand levels. Especially during peak hours sections around urban centres and nodes are congested. Because long distance transports on the road are conflicting with local use for commutes the capacity in these areas does not suffice. In border crossing sections and around important multimodal nodes and ports the truck parking demand surpasses the supply of available parking. This presents a problem for drivers trying to comply with applicable driving time regulations. It also imposes a safety and security risk with trucks parked on off-ramps and off of designated parking. The night time driving ban for trucks policy in Switzerland poses a bottleneck for cross-border road transport.

Road transport is one of the main sources for greenhouse gas emissions. Clean fuel alternatives are a priority. The provision of fuelling infrastructure is the key to supply, while the transport demand has to adjust with the acquisition of suitable vehicles. Along the Rhine-Alpine Corridor the availability of alternative fuels can be improved; currently about 84% of sections have access to a station in the required range.

IWW

The inland waterway infrastructure on the Rhine-Alpine Corridor covers the Netherlands, Germany, France and a short Rhine section in Switzerland, all sections are well developed up to the TEN-T requirements, with only minor compliance issues. The main compliance issues identified are the draught limitations along the Rhine in Germany where only 74% of the waterways fulfil this criterion. Insufficient lock capacity and mooring places, especially near Lobith, as cross-border section between the Netherlands and Germany, are critical. Lock capacity is an issue also along Neckar and Moselle rivers. As IWW serves as an important hinterland connection for maritime transports the accessibility in the seaport areas and larger urban areas along the river network needs to be secured.

Also the dissemination of clean fuel alternatives can be regarded as a critical issue. In the light of ambitious greenhouse gas emission targets this can be an important factor. In the coming years efforts have to be made to supply ports with sufficient fuels and also to install infrastructure to fuel vessels. River information services have to be implemented to increase efficiency and interoperability in local and, importantly, the cross border crossings and communication between ports.

Ports

The Rhine-Alpine Corridor has 8 maritime ports included in its alignment. The connection of the maritime ports for freight transport is critical for a supply with imported goods for all countries along the corridor. The high volumes transported by sea are more environmentally friendly than road transports. From the corridor perspective some critical issues for the port perspective have been identified, which need to be overcome for an increase in efficiency, further growth and a continued competitive market position of the European port and hinterland infrastructure. The Belgian ports of Antwerp, Ghent and Zeebrugge face connectivity and capacity issues, further extensions of the area and improved connections to other transport modes, especially to a fully developed rail network, are necessary. The port of Rotterdam has to secure sufficient capacity for future developments in the port and port connections to the hinterland transport modes. Amsterdam requires an improved maritime access. The port is limited in its physical expansion planning by the geographical situation. This requires further efficiency upgrades and improvements in accessibility of the port area from the land and maritime side. The port of Genoa has lack of physical expansion space due to the fact that it is constrained in a strip of land closed by the city. The port is also afflicted by limited maritime accessibility for large vessels and limited rail and road accessibility.

Airports

The 13 airports associated with the Rhine-Alpine transport corridor have a total passenger volume of 220 million passengers and a combined transport volume of 6.3

million tonnes per year. The compliance analysis focuses on the rail connection to the airports which has to be established until 2050. The main passenger hub airports along the Rhine-Alpine Corridor are all connected to the rail network. Improvements are needed for the freight hubs and smaller airports along the corridor, where rail connections will support the integration of co-modal transport chains.

Rail-Road-Terminals and multimodality

For rail-road terminals and the multimodality operations along the corridor bottlenecks are identified in the available capacity and accessibility by different modes. The critical issues are related to multiple regions where increasing capacity within terminals and the corresponding infrastructure is required for further growth in multimodal transports. Another critical issue is the connectivity and communication between actors along the corridor in order to promote multimodality. Utilising the affiliated benefits of each mode to fulfil the transport chains requires exchange and interface standards, ICT enabling high quality and reliability, as well as efficiency in transhipment.

While terminal capacity is described as sufficient in the Netherlands for the current situation, further increases in terminal handling capacity are required, according to market needs. The German regions and Basel in Switzerland have identified multiple capacity bottlenecks. In France, Strasbourg faces several bottlenecks which concern principally cross-border, interoperability and multimodality issues including a better connection and electrification of port rail lines and improvements to the stocking capacity for empty containers. In Belgium, multimodality must be promoted through a series of improvements to develop the rail and IWW transport modes, increasing tri-modal transhipment capacity, and also the air/rail co-modality. In Italy the Novara CIM West Terminal needs an expansion and rail accessibility to cope with demand and the Milano Smistamento terminal faces a lack of capacity and is in need for improved connections with the railway network.

Categorisation of critical issues

Based on the identified critical issues, a categorisation has been carried out in order to cluster these issues. This process was closely coordinated with the corridor Advisor for the Rhine-Alpine Corridor. This process was closely coordinated with the corridor Advisor for the Rhine-Alpine Corridor. The following methodology has been applied:

1. Collection and summary of all identified critical issues relevant for the Rhine-Alpine Corridor;
2. Clustering of the critical issues into 8 main groups (critical clusters issues ≙ project category) according Table 16.

Table 16: Project categories

Project category	Description of category (not exhaustive)
Capacity/Bottleneck	Network capacity issues: e.g. road congestion in urban nodes, IWW lock capacity, rail capacity
Missing link	Missing links e.g. in highway system and rail high speed lines
Interoperability / Compliance with TEN-T standards	Technical compatibility of infrastructure/vehicles and systems e.g. missing ERTMS, RIS, ITS deployment
Multimodality	Issues facilitating multimodal transport services for freight and passenger transport e.g. terminal capacity issues (expansion/upgrade/construction)
Last-mile connection	Issues regarding last mile connection: e.g. lack of rail connections to airports, inland ports, seaports
Externalities / Sustainability / Innovation	Issues regarding negative transport externalities e.g. noise, pollution, accidents, low transport quality; Innovation issues / pilot projects e.g. LNG, e-freight, tracking and tracing
Urban areas	Actions implementing/facilitating TEN-T transport infrastructure in "Urban nodes of the Core Network" according Reg. 1315, Annex II, part 1
Cross-border[23]	Issues addressing cross-border sections (according the recommended EC cross-border sectioning).

Source: HaCon

4.3 Transport Market Study

4.3.1 Introduction

The Transport Market Study (TMS) purpose is to inform the corridor-relevant stakeholders about the current and prospective transport market conditions on the corridor combined to the –current and future- modes utilisation levels. The TMS main contribution to the Work Plan is to analyse the existing and future transport market trends from a supply and demand side for the Rhine-Alpine Corridor[24]. Demand-wise, the TMS will focus on the volumes, commodities and the modes performance in the corridor. Supply-wise, the study will identify whether the existing capacity and expected infrastructure changes will be able to cope with the future transport activities and the reasons for low utilisation of specific modes. The TMS will finally provide recommendations for increasing multimodality in the corridor.

4.3.1.1 General methodology and process

The Transport Market Study (TMS) intends to analyse the Rhine-Alpine Corridor-related transport and "assess the capacity and traffic flows on the respective parts of the infrastructure[25]", covering the time period from 2010 to 2030. The time horizon up to 2030 was selected as this represents a major milestone for European policy and at the same time, provides reliable results with regard to the future.

[23] Email from the European Commission (Menno van der Kamp), 06 November 2014

[24] Belgian IWW network has been included in the TMS in order to have a complete analysis of the corridor

[25] From the "Starting the Core Network corridors" Working document, par. 6.2.1 (Brussels, 26 February 2014)

At first, the TMS will prepare the macroeconomic framework of analysis for Corridor transport activities. To this end, the TMS will first identify which regions linked to the corridor contribute the international transport activities setting the "catchment area". Moreover, the study will identify the external socio-economic drivers, i.e. variables which affect the corridor transport activities, such as the GDP and the population for the explored time period (2010-2030), in order to define the socioeconomic framework for the assessment of future transport activity. During this step, the study will also present the main policies which could potentially impact the corridor transport activities; these could involve political, environmental as well as technical targets up to 2030.

Secondly, the TMS will specifically analyse and evaluate the existing and future transport activities, i.e. the demand, focusing on the international freight demand concerning transported volume, commodities (type of cargo) and mode utilisation (modal split). Next to the existing demand structure based on these elements, this assessment will highlight the mode performance, in order to identify the cases of low utilisation of modes. The time horizon of this task is also from 2010-2030.

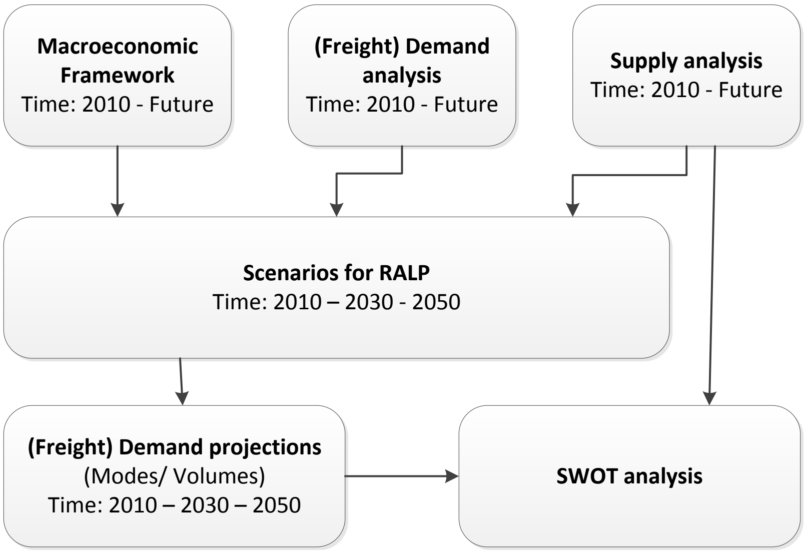
The third task of the TMS will focus on the supply side of the market, presenting the main supply current and prospective characteristics, focusing on capacity (utilisation rates), for the corridor and assessing whether the existing infrastructure, as a total, is able to cope with the current and the expected traffic flows and the reasons for possible under-utilisation of specific modes. The different parts of the TMS will be brought together through a SWOT[26] analysis for a multimodal corridor, which will identify how multimodal solutions could be adopted in the Rhine-Alpine Corridor.

For each one of the steps a specific methodology will be followed, which, together with the draft results, will be thoroughly described in the coming paragraphs. It is the intention of the TMS to provide insight on the corridor macroeconomic framework and the current and prospective transport demand mainly for international freight. For this reason, the outcomes presented in the present report will be drawn from existing literature, studies and models.

The following Figure 11 presents the tasks of the TMS linking them to the TMS outcomes.

[26] Strengths – Weaknesses – Opportunities – Threats (SWOT)

Figure 11: The Transport Market Study in a nutshell



Source: Panteia

4.3.1.2 Drivers for growth and scenarios

Overall, the transport system is influenced by several parameters of high or low uncertainty. In order to project the current demand to the future, it is important to identify these parameters (drivers) which influence the demand. For passenger demand, these are factors related to trips (generation and distribution), as well as modal split. Similarly, for freight demand, these are related to trade (generation and distribution) and modal split. Examples include, among other, the population and income parameters for estimating the future number of trips, GDP (in import and export countries) and sectoral growth for the projection of trade, transport distances for routing and transport times and costs for modal split. These parameters can be defined externally and, in case of scenarios, they can be modified in order to present a range of plausible futures, for example, modelling the effect of decreasing transport times for a specific mode on the transport demand and the mode share.

The present report presents for the national scenarios the socioeconomic assumptions, which are externally defined and shape the picture of the future passenger and freight demand. Whereas other parameters have an effect on the volumes, these two parameters are the most representative when presenting a scenario; this is the reason we describe them in the TMS. Other parameters of interest, such as the fuel prices, motorisation and urbanisation rates, are not described in this report as they are internal model variables and therefore not publicly available. Secondly, the report presents the status of the corridor demand. This is an extraction of the catchment area regional Origin-Destination demand (in tonnes and trips) from the ETISplus database. ETISplus is the main source of information which can provide the scale of the demand reflecting only the Rhine-Alpine corridor-related flows. Regarding the demand, the TMS also presents the expected growth[27] on demand (passenger and transport), depending on the available data; in most cases, these are parts of national models (covering larger parts than the corridor areas) and are divided per market sector (domestic, imports, exports and transit) and mode shares. Even though these projections are reflecting the flows beyond the corridor activity, they still provide an insight on the potential for specific demand and modes growth and could be used to derive conclusions on the future market demand also in the corridor area.

[27] Year of projection varies depending on the country

These projections are, in most cases, baseline scenarios, i.e. scenarios that assume that the framework of analysis will remain the same during the projection years; occasionally, these scenarios simulate policy changes or structural changes (for example, expected infrastructure works in the network within a specific timeframe. Next to the national scenarios, there are several studies targeted to specific Corridor parts (e.g. port studies and related forecasts) or transport plans. These depict specific parts of the corridor catchment area and will be examined to draw conclusions on the effects of specific attributes on the transport demand, i.e. to perform a sort of different scenarios' analysis.

The literature-based exercise can generally explain how demand will develop in the future and how this is linked to supply (over- and under- network utilisation) for the TMS. As an additional step, the TMS attempts to clarify what is the impact of socioeconomic and supply parameters to the demand on the corridor sections. This is performed in two steps:

- Running a baseline/ reference scenario. The reference scenario uses as base year the 2010 ETISplus network and freight data for the whole of Europe and projects the demand up to 2050 using the economic assumptions (GDP/ GVA values) of the EU Reference scenario (2013);
- Running a policy scenario. The policy scenario differs from the reference scenario as it uses additional modelling parameters. More specifically, in addition to the economic parameters from the EU reference scenario (2013) it also assumes the compliance of the network to the TEN-T standards, linking the expected/ complying supply characteristics with the prospective demand.

4.3.1.3 Data coverage of the TMS

The TMS intends to provide information on all the TMS elements, namely, the catchment area characteristics, the demand and the supply perspectives. All information sources used in the TMS come from publicly available material. Potential enhancement to the TMS would include information (especially with regard to the supply side analysis) directly from ports and public authorities. This however, was not possible in the given time and/or due to data availability. Therefore the TMS relies on existing sources. A direct consequence is that the TMS is rather generic, not presenting specific corridor-related aspects. However, based on the current data coverage, the TMS provides important conclusions on the current and prospective market features which could affect the Rhine-Alpine Corridor. With respect to the socioeconomic background, there are enough sources available, both at regional and national level. For the demand analysis, the study employs the ETISplus database (2010, freight and passenger) to provide a clear view of the existing cross-border flows in the corridor, whereas for the prospective demand, the study, in dearth of available corridor-specific scenarios, is presented through national and –if possible- port scenarios. Supply-wise, the study is based on the findings of section 4.2, the corridor characteristics, as well as other studies focussing on additional/complementary supply features.

4.3.2 Definition of catchment area (literature-based)

The first step of the TMS is to define the geographical coverage or the "catchment area" for the corridor. This is done based on a NUTS2 classification scheme and involves all the regions with core nodes in the Rhine-Alpine Corridor based on the Regulation (EU) 1315/2013 sections presented in the first Progress Report. In total, 33 NUTS2 regions are identified: seven in The Netherlands, eight in Belgium, eight in Germany, one in France, six in Switzerland and three in Italy.

The map below presents the catchment area per country. These 33 regions are the basis for the identification of the origin/destination (O/D) flows which belong to the corridor. From the total number of flows, the study focuses on the ones which involve international trade, i.e. the O/D flows crossing at least one corridor-related border. For example, the corridor traffic analysis includes flows between Milano and Antwerp, Rotterdam and Köln etc.

Figure 12: Geographical scope of the TMS (Definition Rail Freight Corridor Rhine-Alpine)

Source: HaCon/KombiConsult/Panteia/ProgTrans

4.3.2.1 Socioeconomic framework

This section presents an overview of the corridor at NUTS2 level, based on information collected from the ETISplus database (observed data from 2010), shaping the socioeconomic framework for the TMS. Furthermore, the section presents the forecasts coming from national models in order to give an impression on how the socioeconomic framework is expected to develop in the upcoming years.

For projected national data, there are several European sources, including the EU Reference Scenario/European projections for 2013 (EU Reference Scenario, 2013). For regional data, the main data sources were national – for both existing and forecasted data - and the ETISplus database, for 2010 data. A complete overview of the data availability is presented in the Table 17 below.

Table 17: Population and GDP data availability

Country/ Indicator	GDP		Population		Source(s)
Type of data	**National**	**Regional**	**National**	**Regional**	
Belgium	Historical Projected	Historical Projected	Historical Projected	Historical Projected	SPF Economie
France	Historical Projected	Historical Projected	Historical Projected	Historical Projected	ETISplus database EU Reference Scenario INSEE
Germany	Historical Projected	Historical Projected	Historical Projected	Historical Projected	BVWP (2013)
Italy	Historical Projected	Historical Projected	Historical Projected	Historical Projected	ISTAT EU Reference scenario
The Netherlands	Historical Projected	Historical Projected	Historical Projected	Historical Projected	CPB (2004) CPB (2006)
Switzerland	Historical Projected	Historical Projected	Historical Projected	Historical Projected	BFS

Source: Panteia

Other available macroeconomic indicators/sources:

The Netherlands:

The CPB study also indicates the annual percentages of change for different types of sectors such as agriculture, industry, energy, construction, services etc. Moreover the CPB (2006) study presents the relative changes in population growth and unemployment figures up to 2030 in four scenarios.

Belgium:

Regional employment figures were indicated for 2010 from Eurostat. Moreover, sectoral growth comparison to the previous year (2009-2010) is presented from the BNB.

Germany:

The BVWP study up to 2025 projected next to the GDP and population indicators also the expected sectoral growth indicators (agriculture, industry, construction and services) as well as the growth factors for commodities based on the NSTR European Classification for the modes of rail, road and inland waterways. Moreover, the BVWP study also provided regional indicators of employment.

Switzerland:

Additional macroeconomic historical values on sectoral (GVA) factors for agriculture, industry, construction and services were collected (BFS, accessed 2014). From OECD (2010), the existing national employment figures were collected.

For France, existing regional statistics were collected from ETISplus (observed 2010 data).

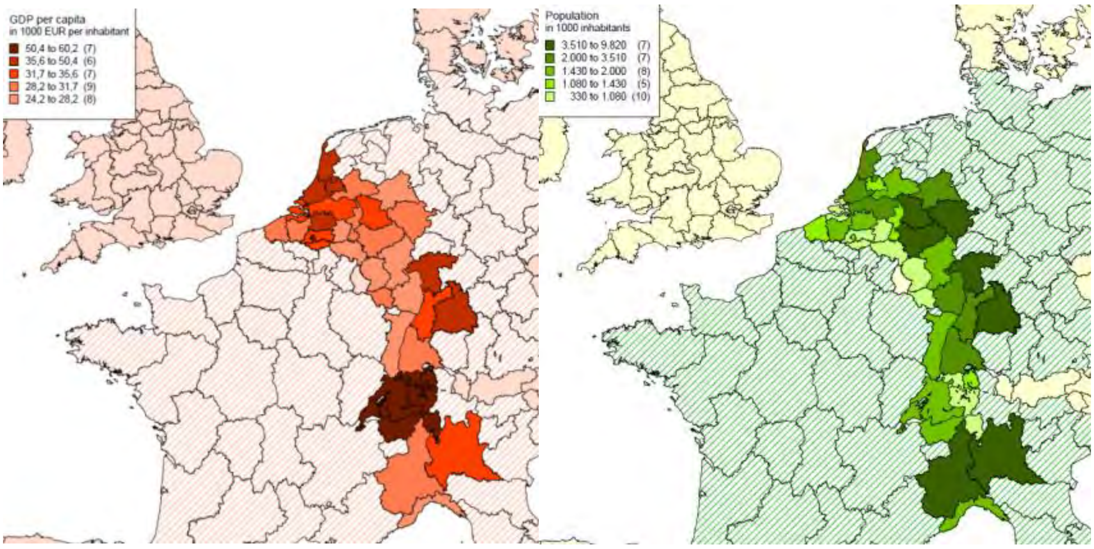
Italy:

Regional employment figures were indicated for 2010 from the Italian National Institute of statistics.

An overview of the corridor

The following figure presents the GDP per capita and population values at regional (NUTS2) level for the corridor. As depicted, the corridor catchment area is in most cases densely populated; seven of its NUTS2, such as the Brussels and Lombardy, areas have more than 3.5 million inhabitants. Based on the 2010 observed values, the total population of the area amounted up to more than 80 million people and the corridor GDP added up to more than 2,700 billion Euros, resulting to a relatively high GDP/capita (on average more than 33 thousand Euro per person). These figures result to a high economic activity for the corridor, reflected in both freight and passenger movements, around the core nodes of the network, as well as in national and international (cross-border) mobility.

Figure 13: GDP and population on the corridor catchment area



Source: ETISplus (2010), Panteia

Socioeconomic projections

The socioeconomic projections are an important part of the TMS analysis as they depict plausible scenarios for the development of the socioeconomic framework, consequently affecting the mobility of passengers and goods on the corridor.

The Netherlands

The Dutch Statistical Bureau (CPB) prepared a study on the macroeconomic developments in The Netherlands in 2004, which covered the 2020 and 2040 time horizon. The study described four scenarios, which estimated the growth ranges for GDP, population as well as sectors' and modes' performance. Regarding the population, the study provided moderate growth factors, from 0% to 0.5% annual growth up to 2040, conforming to the annual growth of 0.3% presented in the European projections.

The CPB scenarios also provided estimations on the GDP and sectoral figures. The GDP (587 billion Euros, 2010 Eurostat) growth trend for all scenarios was expected to reach its peak in 2015 (from 1%-2.9% p.a. growth) and then slow down until 2030 (from 0.4% to 2.3% p.a. growth). The European projections fall within this range with an average annual growth factor of 1.34%.

Sector-wise, the CPB (2004) study demonstrates the trends up to 2025. All the sectors depict an increasing trends, especially, agriculture (from 0.1%-1.6% p.a. depending on the scenario), industry (from 0.4%-2% p.a.) and construction (-0.7% - 2% p.a.) as well as the services (1%-3% p.a.). These ranges cover also the sectoral European projections for The Netherlands; for example, industry on average should be growing by 1.3%, agriculture by 0.4% p.a. etc.

No regional projected data were provided for The Netherlands.

Belgium

Next to the European projections (2013), the data for Belgium were provided by the BNB - National Bank of Belgium - to a disaggregated NUTS2 level. The basis for the GDP (2010 value) was indicated to 356 billion Euros of which 310 belong to the NUTS2 region covered by the corridor and specifically two thirds of them within the Flemish region. This value is expected to grow –on average- within the range of 1.4% to 1.5% annually. Based on the national assumptions, the GDP growth for all regions is expected as well at the average level of 1.4% p.a.

From the 2009-2010 change, the most growing sector has been the industry which increased by 5.1 units compared to 2009, followed by the agricultural sector with 4.3. On the other hand, services and construction only grew by 1.6 and 0.7 units respectively. The EU Reference scenario estimates that by 2030, the main growing sector will be the industry (from 1% to 2% p.a.), and specifically the engineering and metal sectors, as well as the chemical sectors. The market services are also expected to grow at a similar rate.

Population-wise, there is a minimal growth expected by 2030, of average 0.47% - 0.61% annually. Similarly to the GDP, the discrepancies between the national and European growth factors are marginal. From the SPF regional data, the highest growth is expected for the regions of Brussels, Walloon Brabant and Antwerpen, demonstrating an urban-oriented trend to 2030.

Germany

The population in Germany is expected to demonstrate a slightly negative trend of 0.17%-0.31% on average per year based on European sources, conforming to the national projections. At the same time, the employment rate is expected to increase by 4% in total based on the BVWP (2013) projections.

There are three main sources for the GDP growth for Germany, the European scenario as well as two national (BVWP) sources dated in 2007 and 2013 respectively. The 2007 study indicated an 1.7% average annual growth, however without including the effects of the crisis. The follow-up study in 2013 projected a growth up to 2030 of 1.14% p.a. This value is fairly consistent with the 1% p.a. growth from the European scenario.

Most of the sectors are expected to demonstrate a moderate growth by 2030. The industry (engineering, metals and chemicals) together with the market services anticipate the highest growths based on both the European as well as the BVWP (2007) scenarios. These are within the range of 1.2% to 1.9% annually.

France

Population in France, almost 63 million in 2010 (Eurostat), is expected to demonstrate a small growth of 0.4% p.a. (European projections). For the Alsace region (INSEE, 2007) the population is overall expected to grow in a similar way, by 0.36% p.a., however, depicting discrepancies among different sub-regions; for example, the population in Strasbourg is expected to grow 0.6% p.a.

The economy based on the European Scenario expects a more upwards trend, with an average annual growth of 1.7% (1,936 billion Euros, 2010 value from Eurostat). Based on the sectoral values, the industry together with the services sector expects the highest growth of around 1.8% p.a. Trade also demonstrates a high trend with a 2% annual increase by 2030.

Switzerland

Switzerland is covered by national sources only. The national data provided were for both national and regional statistics (BFS). Regarding the population, the average growth is 0.56% p.a. In NUTS2 level, however, the expected growth is deviating from this number: from 0.36% for Bern to 0.83% in Genf. Moreover, based on OECD statistics, for 2010, the employment rate in Switzerland was 78.5%.

The GDP performance (572 billion CHF, 2010 BFS value) for Switzerland was projected up to 2015 (and not 2030 as in the other countries). The average annual growth was estimated for the 2010-2015 time horizon at 2%, with marginal differences in the respective regional data.

The Table 18 below summarises the macroeconomic findings for the corridor countries.

Italy

Based on the EU reference scenario (2013) and national statistics, the population of Italy (more than 60 million in 2010) is expected to grow on average by 0.25%-0.4% per year. The national statistics presented a deviation from the national expected trend in regional data, with the Lombardy region to grow by 0.65% p.a., showing the potential for passenger and transport demand from and to the region.

The national GDP expected growth is based on European projections for Italy (1551 billion Euros at 2010, Eurostat) and is estimated at 1.18% per year. Based on national statistics, for 2010, one fifth of the national GDP is allocated to the Lombardy region and more than 8% to the Piemonte region.

Regarding the sectoral performance, the highest growth is expected for the services sector as well as the industry (specifically in non-metallic products and chemicals). The trade (imports/exports) is also expected to grow by 1.6% annually.

Table 18: Population and GDP growth rates up to 2030

Country	Average annual population growth (2010-2030)	Average annual GDP growth (2010-2030)
Belgium	0.47% - 0.61%	1.4% to 1.5
Italy	0.25% - 0.4%	1.18%
France	0.4%	1.7%
Germany	(-0.31%) - (-0.17%)	1.0% - 1.14%
The Netherlands	0% - 0.5%	0.64%-2.54%
Switzerland	0.56%	2% (2010 – 2015)

Source: Panteia

4.3.3 Policy priorities affecting the transport market

Next to the macroeconomic assumptions, the transport market performance for the corridor is also affected by policies at European, national and regional level. In the present report, the focus is on policies on European level which impact the whole corridor. As mentioned before, the growth in (passenger and freight) demand is heavily dependent on external parameters as well as policy measures.

Regarding the corridor freight policy, the measures which are aimed at facilitating trade, such as the freight management systems, or improving the transport services such as increasing reliability, are expected to have a high impact on the demand as well as the mode choice. Other measures, such as road pricing and other environmental measures aim at increasing the utilisation of specific modes. The international passenger demand refers to cross-border services in the corridor countries as well as the access to international hubs. Next to external drivers for growth, policies which aim at improving interconnections and multimodality, technical characteristics as well as the frequency and reliability of services are strong drivers for international demand growth as well as modal shift.

Table 19: Corridor-related EU policies

Policy/Effect on (compared to the baseline scenario)	Internat. freight demand	Freight modal split	Internat. passenger demand	Passenger modal split
Environmental and climate friendly traffic (Emission reduction, noise reduction, safety technology)		Different for urban/ interurban/rural		Different for urban/ interurban/rur al
Support of multimodality and modal shift (shift from road to rail and IWW)	+	++ non-road	+	+
Road pricing (Eurovignette) – polluter pays principle for road freight transport		++ non-road		++ non-road
Green corridors	+	++ non-road		-
Enhancement of freight management systems and specifically ERTMS for rail and RIS for inland waterways and potentially SESAR for air and SafeSeaNet for maritime transport	++	++ non-road	+	+ non-road
ITS Directive for road transport	+	++ road	+	++ road
Development and political support of TEN-T corridors	++	++ non-road	+	+ non-road
Development and political support of TEN-T corridors	++	++ non-road	+	+ non-road

Source: Panteia

Table 19 above summarises the expected impact of a set of selected policies, compared to a growth baseline scenario (where no policy takes place). The support of multimodality and modal shift policy is expected to affect mainly the mode shares. In general, the White Paper on Transport (2011) favours a shift to non-road modes for long-distance trips of more than 300 kilometres. Without any additional measures, this could lead to a modal shift from road to rail of around 8%, given that the existing infrastructure, vehicles and services are able to accommodate the additional rail demands (DB Schenker Rail, 2012). For inland waterways, the shifting from road policy could also have a positive impact, especially for transportation of bulk products (NEA, 2011). Green corridors similarly to other multimodal-oriented policies will also boost the non-road performance. Moreover, due to their infrastructural development, they are expected to also attract more international traffic from and to the corridor.

Environmental and climate friendly traffic policies could have different impacts depending on the travelled distance and the type of area. Whereas road is considered a highly polluting mode, in urban areas and with the expected penetration of fuel efficient or alternative technologies, it is considered the sovereign mode due to its lower noise effects. For urban areas, climate friendly policies could therefore decrease the non-road modes share. For interurban and rural areas, such policies are expected to increase the non-road share.

The polluter pays principle and specifically the road pricing schemes are expected to decrease the road share for international transport, due to the high operating costs and increase the rail and inland waterways shares, as more cost-efficient modes.

The development of various transport management systems is expected to attract additional demand due to the improved safety and reliability of the solutions. The types of system linking different areas (by rail, sea, road, inland waterways or air) will also identify the modal choice trend. For example it is expected that for various commodities, the RIS implementation will have a positive effect on inland waterways. In a similar way, the application of ERTMS in the corridor segments is expected to significantly increase the demand for rail, especially for freight.

The development and political support of TEN-T corridors is a principal driver for the corridor; the political support of the corridor will not only boost the development in the corridor itself but it will also attract demand and have an effect on the surrounding socioeconomic trends, bringing welfare to the corridor catchment area.

4.3.4 Demand analysis (literature based)

4.3.4.1 The current situation

The first section of the demand analysis presents the findings of the literature review and the statistical databases on the:

- international corridor flows (freight and passenger);
- other national and regional sources.

International freight transport demand (from ETISplus)

This section presents the figures of international cross-border freight transport, which is most related to the corridor traffic. The focus is the origin/destination (O/D) flows from and to the corridor countries. The main data for 2010 consists of three O/D matrices (rail, road and IWW), which are filtered based on the network definition, i.e. the catchment area NUTS2 regions for the Rhine-Alpine Corridor. Other modes, such as short sea shipping or air, were excluded from the present analysis. The aggregated results are presented at national level for origin and destination, per transport mode and per commodity.

For both road and inland waterways (IWW), the source of freight demand is ETISplus (2010). The break-down of commodities for all transport modes is given in the NSTR classification scheme as this is the one used in the TRANS-TOOLS freight module for all modes. Due to the multiple classification schemes for different transport modes, this classification was maintained in order to ensure harmonised results.

For consistency reasons, the results were cross-checked with national transport sources namely STATBEL (2010) for Belgium, ProgTrans AG (2010) for Switzerland, Destatis (2011) for Germany, SITRAM (2006) for France and CBS (2010) for The Netherlands. The Destatis (2011) data were additionally used for Belgium, France, Italy and The Netherlands. This two-level approach – EU and national data - ensured high quality O/D data.

The total international demand in the corridor belt for 2010 is estimated at 371.9 million tonnes covering 37% of total estimated demand in the defined network area including all flows (international and domestic); the latter is estimated slightly more than 1 billion tonnes.

The current international freight corridor demand is presented in Table 20, showing the origin – destination flows as a two dimensional table.

The main flows of the corridor are between Germany, The Netherlands and Belgium. These flows add up to 307.2 million tonnes, 83% of the total international freight activity. The highest import and export flows are between Germany and The Netherlands (103 million tonnes, 28% of the total corridor demand from The Netherlands to Germany, 152 million tonnes, the bidirectional flows, mounting to 41% of the total freight demand. Belgium has also a strong presence especially related to the country's activity with The Netherlands with 72.6 million exports (19% of the total) and 95.9 million tonnes of imports (26% of the total). The rest of the flows represent 17% of the international demand. The trade lanes from/to Switzerland account for more than 27 million tonnes (or 7.6% of the total corridor activity) and from/to Italy for almost 25 million tonnes (or 6.7% of the total corridor activity. Finally, the international freight activity for France is estimated at 19 million tonnes (or 5.3% of the total corridor activity).

Table 20: Existing international freight transport flows (2010) (O/D in thousand tonnes)

All modes	Destination						
Origin	France	The Netherlands	Belgium	Germany	Switzerland	Italy	Exports
France	-	2,584	3,074	2,503	1,622	717	10,500
The Netherlands	2,089	-	62,052	103,228	4,495	2,076	173,941
Belgium	3,552	39,889	-	24,868	1,288	3,032	72,629
Germany	2,322	49,468	27,698	-	8,983	6,314	94,785
Switzerland	606	1,031	462	3,668	-	1,851	7,617
Italy	554	1,040	2,621	5,249	3,047	-	12,511
Imports	9,122	94,013	95,907	139,516	19,435	13,991	371,984

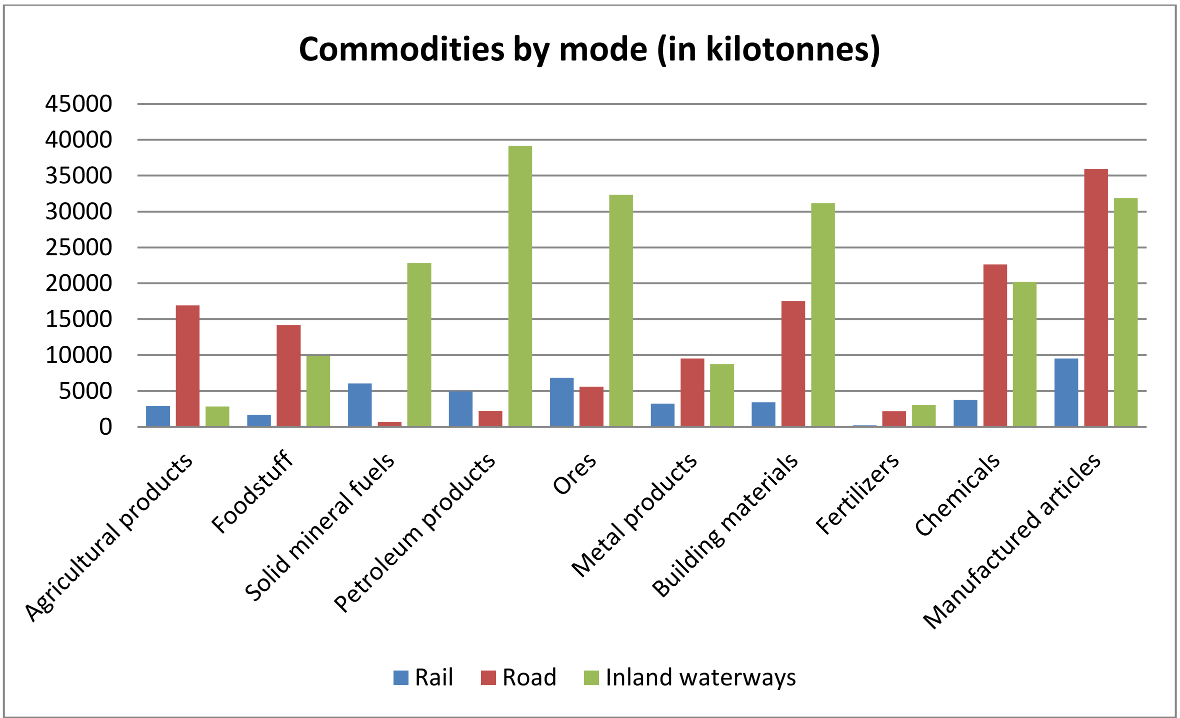
Source: ETISplus, Panteia

The modal split for the international activities is 11.4% rail, 34.3% road and 54.3% inland waterways, giving a sovereign position to inland waterways in the corridor. In fact, inland waterways international cross-border transport is estimated at 202 million tonnes, of which 178 million are between The Netherlands, Belgium and Germany; more specifically, the bidirectional demand between Belgium and The Netherlands, which accounts for 33% and the bidirectional demand between Germany and The Netherlands, for 47% of the inland waterway activity. Inland waterway is also the dominant mode of transport from France to Belgium and The Netherlands (for the other corridor destinations, the demand is transported mainly by road). With the exception of The Netherlands, the demand from Switzerland is mainly transported by road and rail (in the case of The Netherlands the demand is shared between inland waterways and rail). The road share is estimated at 127 million tonnes, of which 77% is between Germany, Belgium and The Netherlands. Road and rail are the dominant transport modes from and to Italy. Even though rail occupies 11% of the total international freight activity (42.5 million tonnes), it is present in the imports and exports from and to Italy and Switzerland.

Next to the mode performance in general, the following figure depicts the favoured modes per commodity, following the NSTR classification by volumes (expressed in kilo-tonnes). In total, the most transported commodity in the corridor are manufactured (miscellaneous) articles (21% of the total international demand) followed by building material (14%), chemicals (13%) and petroleum and ores (12% respectively).

The graph presents the dominance of inland waterways in the corridor; in fact, due to its large presence in the flows between Germany, The Netherlands and Belgium, inland waterway is the preferred mode for five out of the ten commodity types and comes second for other three. The only mode which is not favouring inland waterways is the agricultural products, for which road is dominant. Road is also traditionally favoured in the cases of foodstuff and chemicals as well as metal and manufactured products. In the case of manufactured articles, the discrepancy between road and inland waterways is quite small, due to the high performance of the second for the connection between Germany and The Netherlands. A similar trend is also depicted for the chemicals. Rail is, as to be expected with a modal share of 11%, not favoured in any of the commodities; manufactured products, coal (solid mineral fuels) and ores are among the commodities most transported by this mode.

Figure 14: Commodities in the Rhine-Alpine Corridor (2010)



Source: ETISplus, Panteia

International passenger transport demand (from ETISplus)

The passenger demand, expressed in number of trips, similarly to the freight demand, is based on the cross-border O/Ds in the corridor catchment area. Three major bidirectional traffic flows have been identified: the one between Belgium and The Netherlands representing 25% of the total traffic, the one between Germany and Switzerland (23% of the total) and the one between Germany and The Netherlands (19% of the total).

The dominant mode for the international passenger flows in the corridor is road, covering 87% of the total trips (more than 95,000 thousand trips for all international flows and almost 67,000 thousand trips for the three major bidirectional flows). Rail represents almost 9% of the total international traffic flows; the main traffic flow is observed between Italy and Switzerland (with 2,519 thousand trips; 45% of the total trips), followed by the one between Germany and Switzerland (2,178 thousand trips; 9% of the total trips). Other major rail flows are between The Netherlands (1,628 thousand trips) and Germany as well as Belgium and The Netherlands (1,448 thousand trips). Air, as expected, represents only a small part, 4.1%, of the total passenger demand. The main flows for air are identified between Germany and Switzerland, The Netherlands and Switzerland as well as Germany and Italy; in total, all these flows count up to 1,924 thousand trips (half of all air flows), representing a minor part of the total demand.

Table 21: Passenger traffic in thousand trips (2010)

All modes	Traffic						
O/D	**Belgium**	**Switzerland**	**Germany**	**France**	**Italy**	**The Netherlands**	**Outbound**
Belgium	-	372	6,725	255	333	13,765	21,451
Switzerland	373	-	12,510	1,135	2.799	487	17,305
Germany	6,725	12,525	-	4,189	1.098	10,396	34,933
France	255	1,135	4,191	-	258	182	6,022
Italy	350	2,801	1,102	258	-	422	4,934
The Netherlands	13,763	485	10,393	181	444	-	25,266
Inbound	21,466	17,318	34,922	6,019	4,934	25,253	109,912

Source: ETISplus (2010 modelled), Panteia

Regional information

Seaports, inland ports and airports are a very important part of the study as they serve as gateways for traffic, travelling across, entering and exiting the Rhine-Alpine Corridor. Following a top-down approach, this section presents available information on the specific performance of ports in the Rhine-Alpine Corridor. The focus of this analysis is not only the actual volumes but, when available, the type of cargo and the multimodal performance.

Seaports overview

Table 22 summarises the corridor seaports transhipments based on port statistics.

Table 22: Corridor seaport transhipments

Seaport	1,000 Tonnes	Year of data	Source
Antwerpen	190,849	2013	Port of Antwerpen statistics (2013)
Ghent	26,000	2013	Port of Ghent statistics (2013)
Zeebrugge	42,800	2013	Port of Zeebrugge statistics (2013)
Amsterdam	95,747	2013	Port of Amsterdam statistics (2013)
Rotterdam	440,464	2013	Jaarbericht (2013)
Genova	49,541	2013	Port of Genoa statistics (2013)
Moerdijk	18,500	2013	Moerdijk (2013)
Terneuzen/Vlissingen	35,520	2011	Jaarbericht (2011)

Source: Panteia, varius port annual reports

All ports besides Genova report their volumes for the Hamburg – Le Havre range

Rotterdam

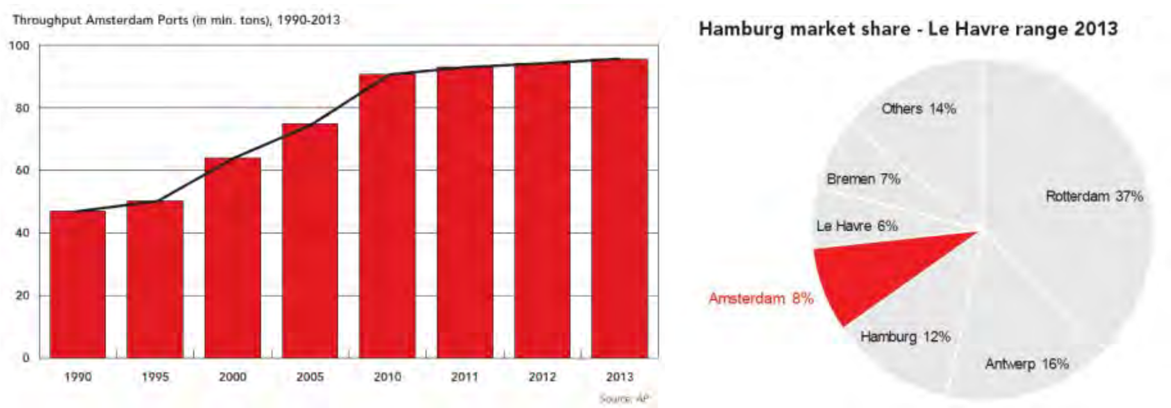
The Port of Rotterdam is the largest port in the corridor, accommodating more than 440 million tonnes (2013 value) and covering 37% of the Hamburg-Le Havre market (in 2013). Its containerised cargo amounts to more than 121 million tonnes, while its bulk cargo is almost 300 million tonnes (of which 90 million tonnes are dry bulk and more than 200 are liquid bulk, mainly oil and mineral products). Even though the port demonstrated a marginal decline, several cargo types such as LNG, agricultural products and coal demonstrated an annual growth of more than 20%. The main decline was observed in the oil products (7%).

Rotterdam is a multimodal hub with strong links to inland waterways and rail. In total 45% of the cargo is transported by road, the rest is accommodated mainly by inland waterways and to a lesser extent by rail. In 2013, 42.9% of the cargo was transported from and to the port via inland waterways; this high share of inland waterway transport is due to the vessel low visit times (less than 27 hours on average) as well as the implementation of information systems for berthing. The other 12% are transported by rail. This percentage is expected to grow due to the implementation of ERTMS as well as infrastructure works which will better link the port to the rail system.

Amsterdam

The Port of Amsterdam's hinterland connection accommodated in 2013 almost 96 million tonnes exceeding its prerecession activity and covering 8% of the Hamburg – Le Havre market (see figure blow) and 96% of the North Sea canal activities. Regarding vessels, in 2013, the port harboured more than 5,200 ocean-going vessels (excluding passenger ships) and approximately 40,000 inland navigation vessels. The favoured commodities in the port are fuel (petroleum, for both imports and exports, and coal, mainly for imports) products, adding up to 72% of the total cargo as well as to a lesser extent, agri-bulk and foodstuff (both mainly imports). Port of Amsterdam also reports on the containers number with almost 37 thousand containers of which 15 thousand were empty.

Figure 15: Port of Amsterdam Statistics (2013)



Source: Port of Amsterdam

Despite the fact that the total throughput has increased since the 1990s, the vessel number has demonstrated a declining slope, with 7,294 loaded sea vessels in 2013. In total, the port accommodated 12,120 seagoing vessels and 11,881 barges. Finally, the Port of Amsterdam has experienced a positive growth on passenger transport, with almost 700 thousand sea and river cruise passengers.

Due to its strong link to other modes, Amsterdam's connection to the hinterland is multimodal: 60% by barge, 5% by rail and 35% by road.

Moerdijk

Based on the 2013 annual report, every year the Port of Moerdijk, accommodates approximately 1,700 seagoing vessels and over 12,800 inland vessels, responsible for more than 18.5 million tonnes of transhipments (sea and inland waterway). The main types of goods are dry and liquid bulk (6.6 and 5.7 million tonnes respectively. Next to these types of goods, which cover most of the port transhipments (sea and inland waterway); containers have also a high presence with 3 million tonnes. For both ingoing and outgoing hinterland traffic, 60% is transported by barge, 36% by road and the remaining 4% by rail.

The Port of Moerdijk is connected to the hinterland via different modes such as road, rail and inland waterways. Regarding the rail connection to Moerdijk, in total for 2013, 476 thousand tonnes were transported by rail, following a downward slope from 2008. Compared to 2012, the total tonnes have declined by almost 30% (677 thousand tonnes by rail, 2012 value).

Vlissingen/ Terneuzen

In total more than 35 million tonnes were transported via the Zeeland ports, demonstrating an increase of 8%, compared to the 2010 value. From the total of 35 million tonnes, more than 26 were imports (mainly fuel products, construction material and chemicals) and nine were exports (specifically fertilisers, fuel products, chemicals and construction material). Only a very small percentage of the total cargo is containerised (190 thousand tonnes in total). The Zeeland ports moved via inland waterway connections 31.4 million tonnes in 2011, depicting a growth of 13% compared to 2010. In terms of vessels, the ports accommodated 6,224 maritime vessels and 21,265 inland waterway vessels, getting closer to their pre-recession performance.

Antwerpen

Antwerp is an international gateway for cargo entering the inland networks (three core network corridors). With a throughput of 190.8 million tonnes in 2013, including 102 million tonnes of containerized transport (8.6 million TEU); it is the largest Flemish port, and the second largest port in Europe. The Port of Antwerpen experienced an increase of 3.6% compared to its 2012 throughput, counting in total almost 191 million tonnes. Whereas its general cargo (including containers and RoRo operations) representing almost 117 million tonnes demonstrated a decrease of 2.3%, the dry and liquid bulk (of almost 74 million tonnes) increased by 14.7%.

A decline of 2.3% was also observed for the total number of sea vessels, from 14,556 to 14,220 vessels, implying higher load factors.

While Antwerp serves hinterlands within the corridor, especially Belgium, Northern France, and Western France, a large part of its inland traffic is directed towards the Rhine and Western Germany. Waterway flows to Germany use the waterway sections included in the NSMED corridor in Belgium and Netherlands, so a large part of Antwerp's total hinterland traffic is carried in the corridor.

The port constantly improves its multimodal facilities for connections with the hinterland as well as its environmental performance (in terms of waste, reducing emissions etc.). It also develops a new system for paying for onshore power and considers supporting a reduction in port fees for LNG-powered barges. According to the Port of Antwerp's 2011 Master Plan for inland transport, the port aims to increase rail's share from 11% to 15% by 2020, while new infrastructure is being built and new services being started. Current rail volumes therefore amount to some 20 million tonnes. For inland barge transport they aim to increase the share from 40% to 43% by 2020. This amounts to 94.3 million tonnes by barge. Inland road transport is currently 46%, and in the Master Plan they aim to reduce this share to 42%.

Ghent

The Port of Ghent, driven mainly bulk and RoRo operations recorded in 2013 traffic volumes of 48.2 million tonnes (2.6% less than in 2012), with sea-related cargo performing better than inland waterways (4% decrease in volumes) as a result of diminishing transatlantic traffic. The port also observed higher efficiency in vessel load factors, with 2,948 sea vessels and 15,193 inland waterway vessels.

Commodity-wise, the sea-borne traffic of 26 million tonnes was, in 2013, mainly related to ores and metal products, coal and perishable goods confirming its market position in dry bulk. The inland waterway traffic, with 22.2 million tonnes, was by a large extent dry-related (ores, building material and coal). The rest of the volumes were mainly petroleum products.

With the additional infrastructure investments in the surrounding port area covering different modes as well as the new IT support systems linking Ghent to its vicinity ports, the port intends to increase its volumes and achieve a shift from road to other modes, becoming a modern, multimodal logistics hub. Mode-wise, the port's connection to the hinterland in currently shared between road and inland waterways.

Table 23: Modal split for the Port of Ghent

Overview of modal split at the port of Ghent

	2010	2011	2012	2020 (objective)
road	44.3%	43.3%	41.8	35%
inland waterway	46.5%	47.9%	50.2%	50%
rail	9.2%	8.8%	8.0%	15%

Source: Port of Ghent, http://www.portofghent.be/file_uploads/17198.pdf

Zeebrugge

The Port of Zeebrugge with 42.8 million tonnes also reached its pre-recession levels. The port also in 2013, numbered 7,761 ships and 1,292 barges. The port, besides the inland waterway is connected to the hinterland by road (61%) and rail (13.4%). Part of its cargo is also transported through pipelines (2.3%).

With regard to the cargo, the main types are containers and RoRo related cargo (in total more than 32 million tonnes). The port also accommodates more than eight million tonnes of dry and liquid bulk. Due to its position, the Port of Zeebrugge accepts Ultra Large Container Ships, becoming a priority destination for containers.

Expectations for the port of Genova

The Port of Genova handles around 50 million tonnes yearly representing 10% of the total cargo throughput of all Italian ports. Genoa is also the main Italian container port gateway, with a throughput of around 2 million TEUs per year. The main commodities transported are general cargo products (almost 56%, of which containerised cargo was almost 70%), liquid bulk (34% of which most was mineral products) and dry bulk (8%). The number of incoming and outgoing sea vessels was more than 12 thousands[28].

The port of Genoa is a prime Southern European gateway in particular for Far East traffic moving via the Suez Canal and for MoS trades with North Africa and the Eastern Mediterranean. It is characterised as a multi-service port consistent of 25 specialised terminals, able to accommodate all classes of ships and cater for all commodity sectors and passengers traffics.

Passenger-wise, the port of Genoa accommodated in 2013 almost two million ferries and more than one million cruise ships, amounting in total to almost three million of passenger ships.

The port of Genoa connects more than 100 countries and 450 ports in the world, with over 150 regular liner services. The port facilities are spread along 22 kilometres coastline and cover a total surface area of approximately 7 million sqm.

The port has undertaken a lot of measures towards multimodality (logistics, infrastructure as well as IT measures), especially in respect to motorway and rail axis links from Genoa to the north of Italy and other southern Europe markets (up to Switzerland and Bavaria). The port favours longer distance transport with average

[28] Derived from 2013 statistics from Port of Genoa (http://servizi.porto.genova.it/en/traffici/statistiche/dati_storici.aspx)

distance departing or arriving from the port being 250 km and about 1.25 billion tkm annually transported, mainly by road, to the North of Italy.

In total, 130,935 rail wagons were connected to the Port of Genoa in 2013 equivalent to around 40 trains per day.

Inland ports

Mulhouse Rhein ports

The port of Mulhouse is a single entity which cooperates with its 2 neighbouring ports Weil am Rhein and Basel under the name of "RheinPorts Basel-Mulhouse-Weil". The complex of Mulhouse Rhein ports comprises a tri-modal hub-area linking three countries, namely Germany, France and Switzerland (Basel, Mulhouse and Weil). In 2011, 4.5 million tonnes were transported by barge, mainly consisting of petroleum as well as agricultural and mineral products, depicting a decline compared to 2010 figure of 5.3 million tonnes. In 2013, 5.1 million tons were transported by barge in the port, depicting an upwarding trend.

The effect on containers was more distinct with a 25% of the number of TEUs for the 2010-2011 time period. In 2011, the number of barges was 3,600. The rail demand followed as well as downwards trend in 2010-2011. In total almost 1 million tonnes were transported via rail, demonstrating an 8% decrease compared to 2010. The number of wagons reported was 16,803. Road was the only mode demonstrating an increase of 7% (2010-2011), with 2.6 million tonnes transported using 61,453 trucks.

Mode split-wise the port of Basel specifically handles two thirds of the traffic via rail and one third via road. Its harbour railway facilities consist of around 80 km of tracks on which around 4.5 million tons of goods are moved annually on around 185,000 railcars.

Strasbourg

The Port of Strasbourg is a tri-modal port comprising of several terminals. The total volumes transported via Strasbourg are almost 9 million, comprising mainly building material, fuel products, manufactured products and perishable goods. Compared to 2012, the total throughput marginally declined, due to the decrease in demand for building material. Other commodities such as minerals, metal and chemicals, however, showed a significant growth, implying a commodity shift. Furthermore, the port provided statistics on the modal share for the hinterland transport of containers: road is the sovereign mode, followed by inland navigation and finally rail.

Albertkanaal

The Albertkanaal is categorised as a core inland port node within TEN-T. In reality it is the most important waterway which connects Antwerp and Liège. Within the corridor it is a cluster of freight facilities, implicitly including the canal itself and the area enclosed by the Dessel-Kwaadmechelen Bocholt-Herenthals canals. Haven Genk has direct rail, road, and water connections. There is a rail connection via a 5km link to the main line which is part of the core network.

The canal hosts a total traffic of 35 million tons of freight which origins or destinations are mainly Belgium, The Netherlands and Germany.

On all Belgian IWW sections, a substantial growth in freight transport volumes is expected and aimed for to reduce the share of road transport.

Liège

Liège functions as a major inland hub. It is a core airport, and a core inland port. It is part of the waterway branch of the corridor leading from the Dutch seaports towards Namur and Lille. In the broader core network, it also forms a cross-border node in the North Sea Mediterranean and North Sea Baltic corridors.

Altogether the Liège Port Authority (PAL) operates 32 different sites, of which certain key facilities have been shown in the map. Projects are known to be underway on several parts of the Meuse waterway near Liège, including Lixhe, Renory, Flémalle, Ivoz-Ramet, Hermalle-sous-Huy and port de Monsin. The Liège Container terminal currently offers tri-modal facilities, and the development of the Trilogiport further north is planned to add to this capacity. Both facilities are directly connected to the core network.

On a total traffic of 19 million tons of cargo, Liège loaded and unloaded 13 million tons with IWW. The cross-border canal of Lanaye in the north of Liège hosts 10 million tons of cargo annually.

Frankfurt

Port of Frankfurt has demonstrated growth for inland waterway services and a small decline for rail services over the last three years, depicted in both the volumes as well as the number of vehicles and containers. Regarding inland waterway transport, whereas the tonnes transported by barge and the number of containers increased depicted a proportionate average annual growth (13%-15%), the number of vessels increased by 5%, illustrating a higher efficiency in vessels utilisation. On the other hand, rail transport in the port of Frankfurt decreased marginally: by 3% p.a. in tonnes and 1% in trains. The number of containers slightly increased possibly as the result of empty containers.

The main transported commodities are for water services: building material, fuel products (liquid and dry) followed by machinery & transport equipment (and containers) and ores. For rail, these remain the same, however, with fuel products occupying the biggest share of the volumes.

Table 24: Frankfurt port statistics (2011-2013, historical figures)

Frankfurt information	2011	2012	2013	Growth p.a.
Ship cargo handling (tonnes)	2,011,145	2,563,636	2,649,398	15%
Number of vessels	1,745	1,935	1,934	5%
Inland waterway containers	28,495	34,945	36,594	13%
Rail transport (tonnes)	1,717,996	1,629,104	1,617,335	-3%
Trains	50,028	51,172	48,978	-1%
Rail containers	36,427	33,443	37,493	1%

Source: Management für Hafen und Markt Frankfurt

Duisburg

The Port of Duisburg is the largest inland port in the world and one of the leading multimodal hubs in Central Europe, linking inland waterways to road and rail; in terms of international services, the port has a combined transport network of 360 weekly rail services to more than 80 direct destinations in Europe and Asia. Duisburg demonstrated in 2013 a decline in its throughput of 2% to 62 million tonnes, due to the loss of a key customer in coal logistics (2 million tonnes). The containerised cargo, however, increased by 16% (2012-2013) to 3 million TEUs. Based on the statistics for the entire Port of Duisburg, including private company ports, throughput in 2013 grew by 12% to 123 million tonnes.

The statistics also noted that in 2013 the ports of the Duisport Group handled a total of 31.3 million tonnes of goods by rail and ship/barge (15 million tonnes by ship/barge and 16.3 million tonnes by rail), compared to 32 million tonnes in 2012. It is further noticed that even though the inland waterways demand was 6% below the 2012 level, the rail cargo increased by 2%.

Duisburg Port's, due to Federal policy intends to increase the use of alternative energy sources, consequently leading to a drop in coal consumption.

Analysis of other core nodes in Germany

The demand analysis of core nodes in Germany is based on the NUTS3 statistics of the Güterverkehrsmatrix 2004; this analysis is based on 2004 figures and thus does not incorporate the effects of the economic crisis. This analysis provided the NUTS3-level demand, for selected core nodes, in tonnes for four modes of transport: rail, combined transport, trucks and finally inland waterways, covering different terminals. For simplification purposes, in the cases that combined transport did not occupy more than 1-2% of the total demand, it was added to the rail share in the table. In the cases of Köln and Mannheim, where combined transport occupied 5% and 3% of the total demand respectively, it was mentioned in the table separately.

The high volumes for Köln are due to the intraregional traffic by road and the inland waterway traffic from and to The Netherlands, the seaports of Rotterdam and Antwerpen and the port of Strasbourg. The connection to the Dutch and Belgian ports also explains the relatively high share of inland waterways, reaching in the case of Köln 19%.

Mannheim demonstrates a similar trend to Köln; its highest volumes are intraregional, however, it depicts a strong international activity (mainly by barge) with The Netherlands and specifically the port of Rotterdam, Antwerp, Strasbourg as well as Spain. The latter involves the transportation of machinery & transport equipment using combined transport and road as well of agricultural products using mainly road.

Karlsruhe and Düsseldorf follow, in terms of volumes, with around 30 million tonnes of transported goods each. Düsseldorf main flows are domestic, with a high share of road, especially for intra-zonal traffic, followed by rail in case of bulk goods. Düsseldorf depicts also strong international activity with Belgium (Liege by rail and Antwerpen by barge) and The Netherlands by barge.

Mainz and Koblenz are the remaining two regions, mainly accommodated by road due to the large share of intra-zonal trips followed by inland waterways.

Table 25: Overview of core nodes in Germany

NUTS3-region	1,000 Tonnes (2004)	Modal split	Favoured commodities
Köln	72,230	6% rail, 5% combined, 71% road, 19% IWW	Building material, machinery & transport equipment, chemical, petroleum products
Düsseldorf	29,780	12% rail, 80% road, 8% IWW	Machinery & transport equipment, building material, chemical, metal products
Karlsruhe	30,154	11% rail, 66% road, 23% IWW	Petroleum products, building material, machinery & transport equipment
Koblenz	8,754	3% rail, 80% road, 17% IWW	Machinery & transport equipment, building material, foodstuff
Mainz	11,788	2% rail, 72% road, 26% IWW	Machinery & transport equipment, building material, foodstuff
Mannheim	35,312	8% rail, 3% combined, 64% road, 24% IWW	Machinery & transport equipment, building material, foodstuff

Source: Güterverkehrsmatrix 2004, calculations Panteia

Nijmegen

The main route from the Dutch seaports to the Maas River branch is via the Waal, and the Maas-Waal canal. This connection between the Maas and the Waal occurs at Nijmegen, which is also a connecting point for East-West road and rail connections on the Rhine-Alpine and North Sea Baltic Corridors.

Nijmegen has its own inland port handling around 85,000 TEU in the container terminal (BCTN), and 2.2 million tonnes of conventional cargo. Upgrade works are ongoing to increase the container capacity up to 250,000 TEU per annum.

The port of Cuijk on the Maas, in Nijmegen) also contains a container terminal (Van Berkel Group), and this handles over 5 million tonnes of cargo.

Utrecht

Utrecht is situated along the Amsterdam Rijn Canal, close to the intersection with the East-West links from Rotterdam to Nijmegen. This is the most important waterway connection between Rotterdam and Amsterdam and from Amsterdam to all points towards the South and East. It is also a point of connection to the Rhine Alpine and North Sea Baltic corridors for all modes.

The main terminal is the Container Terminal Utrecht (CTU b.v.), which is an inland port within an industrial area with a rail connection to the main line between Amsterdam and Utrecht. The inland port handles between 3 and 5 million tonnes, mainly bulk cargo for the industrial area, and the container terminal handles 70,000 TEU.

Other Dutch ports

Moreover, Venlo and Venray/Wanssum are classified as two comprehensive nodes within TEN-T. They are included in this analysis as it is a key cross-border transport hub, situated on the cross-roads for the Nijmegen-Liège (Maas and highway A73) and Rotterdam/ Antwerp-Eindhoven-Duisburg sections (rail connection Rotterdam-Venlo-Duisburg and road A67) of the TEN-T network. The importance of the node is stressed from the amount of railcargo traffic; 19% of the international railcargo from the Netherlands passes the border in Venlo. This area handles more than 400,000 TEU container traffic and additionally 2.5 million tonnes of other cargo. Venlo is one of the hubs within the Greenport Holland network, and is classified as the number one logistics hotspot in the Netherlands.

Venlo consists of the Trimodal Container Terminal (ECT's TCT Venlo site), which is the extended gateway on the Dutch/German border, and the Cabooter rail terminal. Between 2015 and 2018 the new Railterminal Greenport Venlo (Trade Port Noord) will be developed on the international rail connection, as an extension of the existing Trade Port complex. At the same time the current Barge Terminals of Venlo and Barge Terminal Wanssum (BCTN/Port of Rotterdam) will be extended. It will add capacity of 350-400,000 TEU.

The new Trimodal port (Trade Port Noord) development in Venlo and Venray is needed because the current two rail terminals and two barge terminals are currently at full capacity, whereas the logistics business in the region continues to grow with the advent of new European Distribution centres (EDCs) and further cross-border growth in traffic between the Netherlands, and Belgium, Germany and further afield.

Albertkanaal

The Albertkanaal is categorised as a core inland port node within TEN-T. It is a stretch of waterway connecting Antwerp and Liège, as well as the Juliana Canal in the Netherlands. Within the corridor it is therefore considered as a cluster of freight facilities, implicitly including the canal itself and the area enclosed by the Dessel-Kwaadmechelen Bocholt-Herenthals canals.

Haven Genk has direct rail, road, and water connections. The rail connection is via a 5km link to the main line which is part of the core network.

Brussels

Apart from being a main urban node, Brussels functions as a crossroads within the corridor for the Paris-Amsterdam and Luxembourg-Flemish seaports branches. For passenger transport, Brussels connects road, air and rail (including high speed); Brussels airport has a direct rail connection.

The port of Brussels is accessible for both sea-shipping and barge transport, up to 4,500 tonnes. In 2010, container transport amounted to 18,000 TEU. For freight, there is a tri-modal terminal with a container port. There is a direct connection between road, rail and inland navigation, linking to core network corridor sections for both waterway and rail. Waterway connections to the port of Antwerp take 6 to 8 hours. Rail access is via a single track spur connecting to the Schaerbeek marshalling yard and the main lines towards Mechelen and Antwerp.

The Cargovil terminal, 12km to the north of the city, near Vilvoorde and Grimbergen, connects waterway and road transport, whiles the Dry Port Muizen, further north again, and connects road and rail.

Overall, connectivity is therefore good, in terms of the possibilities available for transferring between modes of transport, but room for expansion is limited in certain areas because of land constraints and access to congested parts of the road and rail networks. The waterway network around Brussels is also restricted by bridge height constraints; currently five bridges in the Brussels regions do not provide 5.25m clearance.

Liège

Liège functions as a major inland hub (passenger and freight traffic). It is a core airport, and a core inland port. It is part of the waterway branch of the corridor leading from the Dutch seaports towards Namur and Lille. In the broader core network, it also forms a cross-border node in the North-Sea Mediterranean and North Sea Baltic corridors towards Aachen and Köln. To this end, it is also important to consider connectivity with rail and road within the broader scope of the core network. The city functions as major node for rail and road traffics. In fact, it is practically a node where several networks interconnect. For road it concerns west-east traffics between Belgium and Germany and north-south traffics between The Netherlands, Belgium, Luxembourg and France. For passenger transport, Liège airport has only road connections.

Altogether the Liège Port Authority (PAL) operates 32 different sites, of which certain key facilities have been shown in the map. Projects are known to be underway on several parts of the Meuse waterway near Liège, including Lixhe, Renory, Jemeppe, Seeraing, Flémalle, Ivox-Ramet, Hermalle-sous-Huy and port de Monsin.

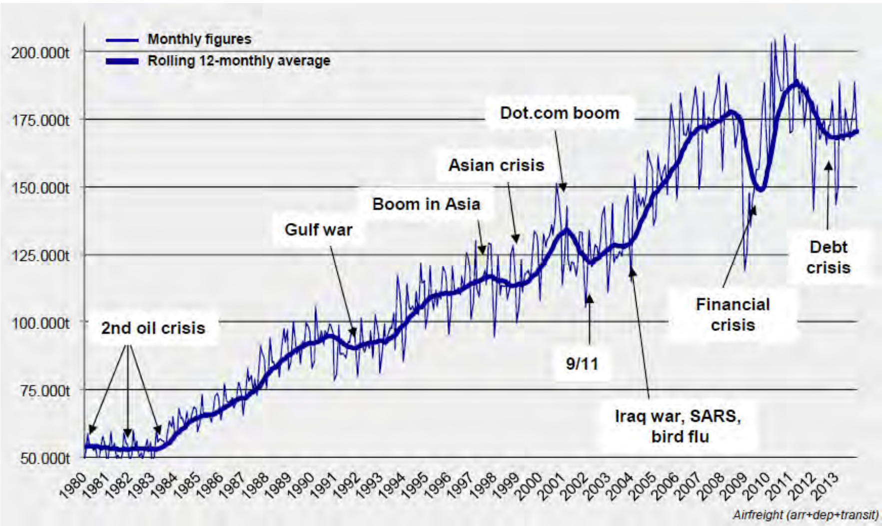
The Liège Container terminal currently offers tri-modal facilities, and the development of the Trilogiport further north is planned to add to this capacity. Both facilities are directly connected to the core network. The waterway connection is part of the NSMED corridor, while the road and rail connections are part of the Rhine-Alpine and/or the North Sea-Baltic Corridors.

Airports

A main part of the cargo traffic in airports is still transported in the passenger flights. There are however, increasing figures in air cargo representing cargo airplanes alone. In this study, we present these figures for the five hubs: Frankfurt, Amsterdam, Malpensa (Milan), Liège and Zürich. It should be noted that up to now, all national and regional statistics do not incorporate air figures (also obvious in their absence in the modal shares for freight).

Amsterdam (Schiphol) and Frankfurt are among the highest ranked cargo airports worldwide. Similarly to other types of ports, airports are also affected by financial and other social parameters. Figure 16 below demonstrates how various incidents have impacted on Frankfurt's air cargo; even though the overall slope is positive, still, it is obvious how the crisis effects in Europe after 2007 have turned this trend down. Another remark is that in the last few years, a recovery trend is also depicted reaching the 2007-2008 demand level. Finally, what is also interesting to mention is that the air cargo has evolved in terms of commodities, experiencing a decline in the airmail volumes in the last decades. In total for 2013, the cargo in the Frankfurt airport was slightly more than 2 million tonnes (all destinations), most of which (1.9 billion tonnes) had international destination and was accommodated in passenger flights. Europe-wise, Frankfurt accommodated around 250 thousand tonnes –close to 12% of the total- showing an increasing trend (compared to 2012) of 4.4%. This increase refers only to international flights as the domestic flights marginally decreased.

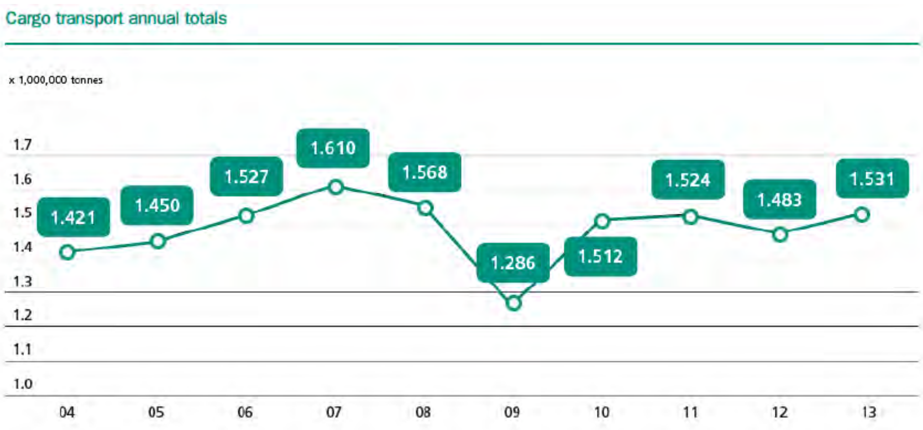
Figure 16: Airfreight for Frankfurt Airport (1980-2013)



Source: Frankfurt Airport, Air Traffic Statistics 2013

For Schiphol, the full freight services counted more than 15 thousand traffic movements transporting almost 0.9 million tonnes. This amount compared to 2012, increased by 5.9% (bridging the recession gap). Moreover, cargo was transported via passenger flights; it was estimated that almost 0.7 million tonnes were carried this way. Finally, airmail was estimated at 35 thousand tonnes. Together all figures mounted to more than 1.5 million tonnes, reaching the pre-recession levels. Similarly to Frankfurt, a small percentage of the total transported goods had European destinations (137 thousand tonnes). Nonetheless, this amount, for the EU depicted an increase of 9% (compared to 2009).

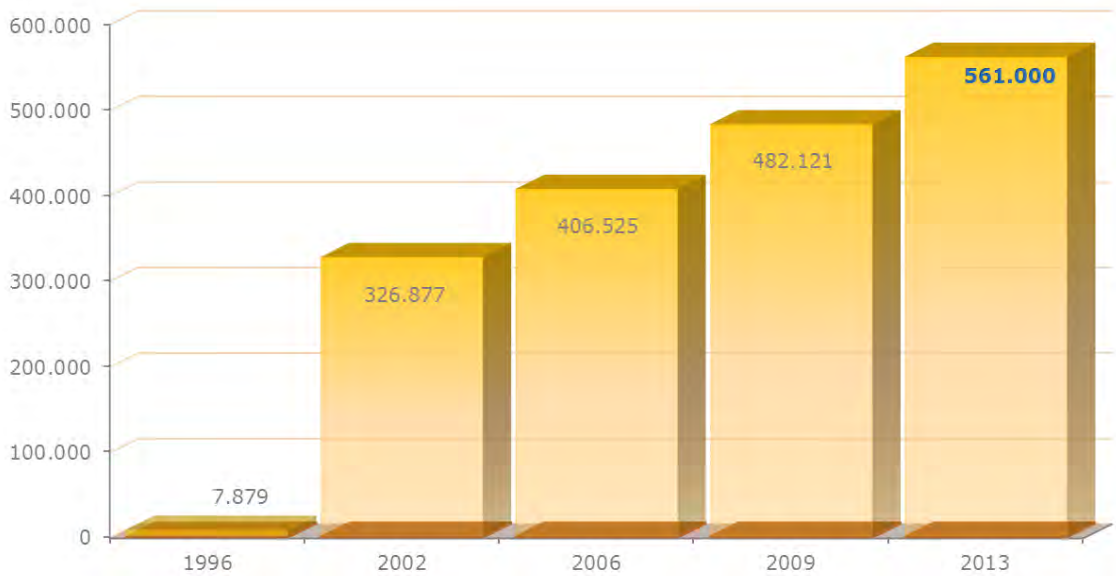
Figure 17: Cargo transport for Amsterdam Schiphol– annual totals (2004-2013)



Source: Panteia

The Liege airport has a very important position in the European air cargo market as it belongs to the centre of the Amsterdam – Paris – Frankfurt triangle, which is responsible for the transportation of 66% of the cargo in Europe, with more than 300 thousand passengers in 2013 (depicting a continuously growing trend). The airport is well located to the multimodal (railroad) platform of Liege Logistics and accommodates more than 560 thousand tonnes (2013 figures), again with an increasing trend –even during the recession period (see Figure 18).

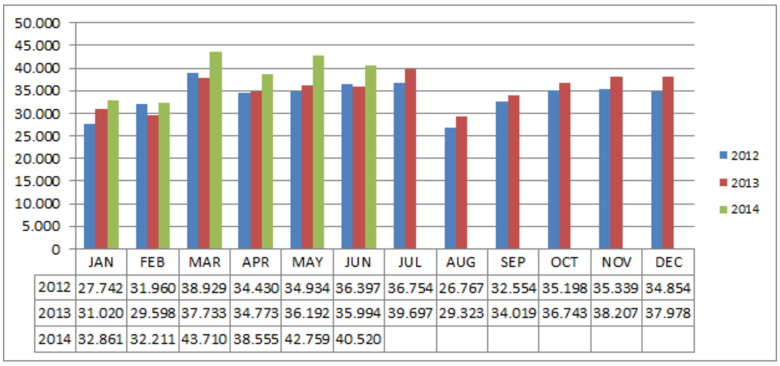
Figure 18: Cargo volumes for the Liège airport



Source: http://www.liegeairport.com/fr/volumes-cargo

The Malpensa airport has a throughput of on average 420,000 tonnes per year. The statistics do not clarify whether this is solely accommodated by freighters. Based on the last three years, the airport demonstrates an increasing volumes trend (Figure 19).

Figure 19: Milano freight traffic statistics (historical information)



	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2012	27.742	31.960	38.929	34.430	34.934	36.397	36.754	26.767	32.554	35.198	35.339	34.854
2013	31.020	29.598	37.733	34.773	36.192	35.994	39.697	29.323	34.019	36.743	38.207	37.978
2014	32.861	32.211	43.710	38.555	42.759	40.520						

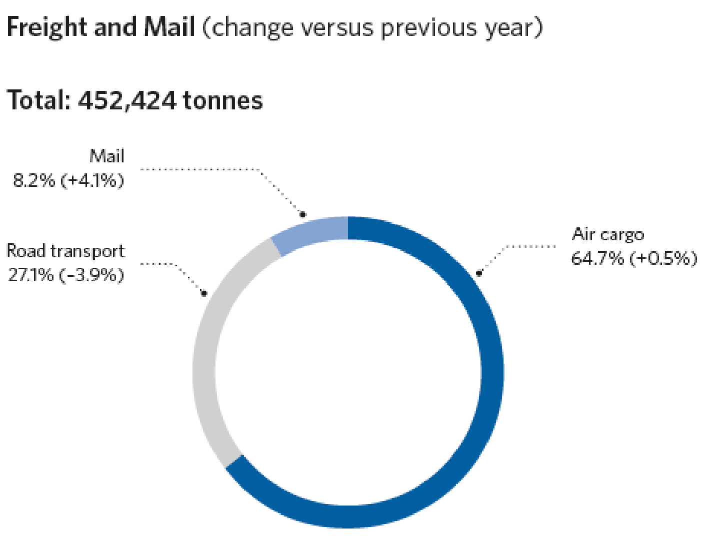
Source: http://www.milanomalpensacargo.eu/en/news-statistics/statistics

Zürich airport

The airport of Zürich in 2013, showed a total of 24.9 million passengers, a year-on-year slight increase of 0.3%. Cargo-wise, the airport serves as both an air and road hub; the latter is due to the size of some shipments which are transported by lorries but are still assigned with a flight number. The airport of Zürich is the country's main cargo air hub, followed by Basel airport (almost 94 thousand tonnes in 2013) and Geneva (with 52.4 thousand tonnes in 2013).

As it can be observed in Figure 20, almost 65% of the cargo in Zürich airport is transported by air, showing a marginal growth of 0.5% compared to 2012 (overall, the airport shows a recovery trend from 2009 and on). At the same time, the cargo transported by road shows a declining trend of 3.9% covering 27% of the total traffic.

Figure 20: The cargo services in Zürich



Source: Zürich airport (facts and figures 2013)

The Zürich airport operating under the license of the Federal Government follows two charging schemes (daytime and night-time) to offset the costs of flight operations. The charges income is allocated to the Airport of Zürich Noise Fund.

Cross border figures – Number of trains

The RFC1 (2014a) Progress Report[29] presented its observations in relation to the international number of trains (Figure 28). In general from 2009 and on there has been an increasing traffic in the Rail Freight Corridor Rhine-Alpine (RFC1) reaching and in some cases surpassing the 2008 figures. In 2008, the highest number of trains was observed for Basel, followed by Emmerich, Aachen and Domodossola. By 2013, this number has increased for the German areas and decreased the Italian and Swiss sections (however, the 2012-2013 figures demonstrate an opposite trend: higher growth for Italy, and Switzerland i.e. the transalpine traffic). The effect of infrastructural developments and limitations has been strongly affecting the number of trains. For example, in the 2011-2012 time period, two infrastructure incidents having a negative impact on the traffic: (1) the closure of Simplon tunnel in August 2012 for maintenance works with no alternative line and (2) the closure of Gotthard line after a rock slide in June 2012 (4 weeks re-routing via Lötschberg line).

In 2013, the closure of an automotive plant and the market loss of container traffic from Antwerp affected strongly the cross-border trips to Germany. At the same time, Luino showed an increase of traffic caused by re-routing of trains from Chiasso after the completion of works in 2011.

Figure 21: RFC1 Number of cross border international trains

2008	Aachen West	Emmerich	Basel	Domodossola	Chiasso	Luino
Trains (year)	21.825	18.592	48.947	21.908	18.196	11.073
2009	**Aachen West**	**Emmerich**	**Basel**	**Domodossola**	**Chiasso**	**Luino**
Trains (year)	18.005	17.892	41.669	19.979	9.042	11.568
Delta to 2008	- 3.820	- 700	- 7.278	- 1.929	- 9.154	495
Delta in %	- 17,50	- 3,77	- 14,87	- 8,81	- 50,31	4,47
2010	**Aachen West**	**Emmerich**	**Basel**	**Domodossola**	**Chiasso**	**Luino**
Trains (year)	21.698	22.871	43.552	20.023	12.477	11.463
Delta to 2009	3.693	4.979	1.883	44	3.435	- 105
Delta in %	17,02	21,77	4,32	0,22	27,53	- 0,92
2011	**Aachen West**	**Emmerich**	**Basel**	**Domodossola**	**Chiasso**	**Luino**
Trains (year)	24.471	27.674	45.899	22.625	15.671	7.589
Delta to 2010	2.773	4.803	2.347	2.602	3.194	- 3.874
Delta in %	11,33	17,36	5,11	11,50	20,38	- 51,05
2012	**Aachen West**	**Emmerich**	**Basel**	**Domodossola**	**Chiasso**	**Luino**
Trains (year)	23.380	25.200	44.295	19.868	14.233	9.262
Delta to 2012	- 1.091	- 2.474	- 1.604	- 2.757	- 1.438	1.673
Delta in %	- 4,67	- 9,82	- 3,62	- 13,88	- 10,10	18,06
2013	**Aachen West**	**Emmerich**	**Basel**	**Domodossola**	**Chiasso**	**Luino**
Trains (year)	22.128	25.500	46.955	21.282	15.139	10.265
Delta to 2011	- 1.252	300	2.660	1.414	906	1.003
Delta in %	- 5,66	1,18	5,66	6,64	5,98	9,77

Source: Rail Freight Corridor Rhine-Alpine, Progress Report (2014)[30]

The same study produced modal split figures per region[31], based on the hinterland traffic from the port of Rotterdam and Genoa as well as the transalpine traffic. As it can be observed and based on the collected information (Figure 30), Rotterdam main

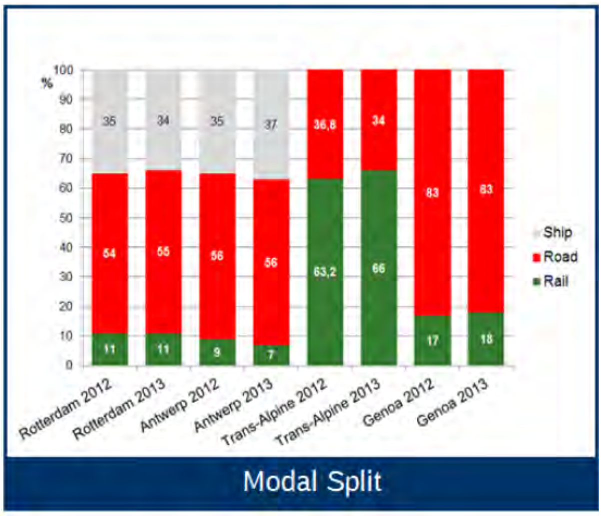
[29] RFC1 (2014a) Progress report 2013 published in October 2014

[30] 2014 indicates the publication date. The report's status and reference year is 2013. This also applies for the following Figures from the "Rail Freight Corridor Rhine-Alpine, Progress Report (2014)"

[31] Definition for modal split indicator*: freight traffic at seaport of Rotterdam, seaport of Genoa and trans-alpine. For Rotterdam and Genoa the modal split is calculated based on TEUs (containers) for the Hinterland traffic. For the trans-alpine freight traffic the basis is net tonnes. It is separated by rail, road and inland waterways (if applicable); measured on an annual basis*

hinterland transport is by road and secondly by inland waterway. For Genoa, road is the sovereign hinterland connection mode whereas for transalpine is rail.

Figure 22: Modal split Rail Freight Corridor Rhine-Alpine



Source: Rail Freight Corridor Rhine-Alpine, Progress Report (2014)

Transalpine traffic

The 2013 annual report for "freight traffic and transport crossing the Swiss Alps" provides the detailed figures for four Alp crossings: St. Bernhard Grosser Tunnel, Simplon, Gotthard (road) and San Bernadino Tunnel. The Gotthard road crossing occupies almost three quarters of the total heavy goods (road) transport, followed by San Bernadino (15% of the total road transport).

The report mentions that the share of rail has been recovering since its 3% drop (to 61% of the total transport) in 2009. In 2013, 66% of freight transport was allocated to rail reaching its before-2009 share. The total volumes documented in 2013 amounted to 38.2 million net tonnes, depicting a 2% growth compared to 2012, with road volumes dropping by 5%, rail volumes increasing by 6%. The rail growth was specifically observed for accompanied combined transport, which however depicted the strongest decrease in 2012. In the 2009-2013 time period, unaccompanied combined transport demonstrated the overall highest growth, with more than 6% average annual growth.

Figure 23: Historic freight volumes in net tonnes for the Transalpine crossings

Mode	2009 [mio. t]	09→10	2010 [mio. t]	10→11	2011 [mio. t]	11→12	2012 [mio. t]	12→13	2013 [mio. t]
Road	13.4	+7 %	14.3	+1 %	14.5	-5 %	13.7	-5 %	13.0
combined transport	14.5	+15 %	16.7	+7 %	17.8	-5 %	16.9	+8 %	18.2
UCT	12.7	+17 %	14.9	+7 %	16.0	-4 %	15.3	+7 %	16.3
ACT	1.8	+2 %	1.8	+1 %	1.8	-11 %	1.6	+18 %	1.9
wagonload transport	6.4	+16 %	7.4	+6 %	7.9	-13 %	6.9	+1 %	7.0
Rail	20.8	+15 %	24.1	+7 %	25.6	-7 %	23.7	+6 %	25.2
Total	34.2	+12 %	38.4	+4 %	40.1	-7 %	37.4	+2 %	38.2

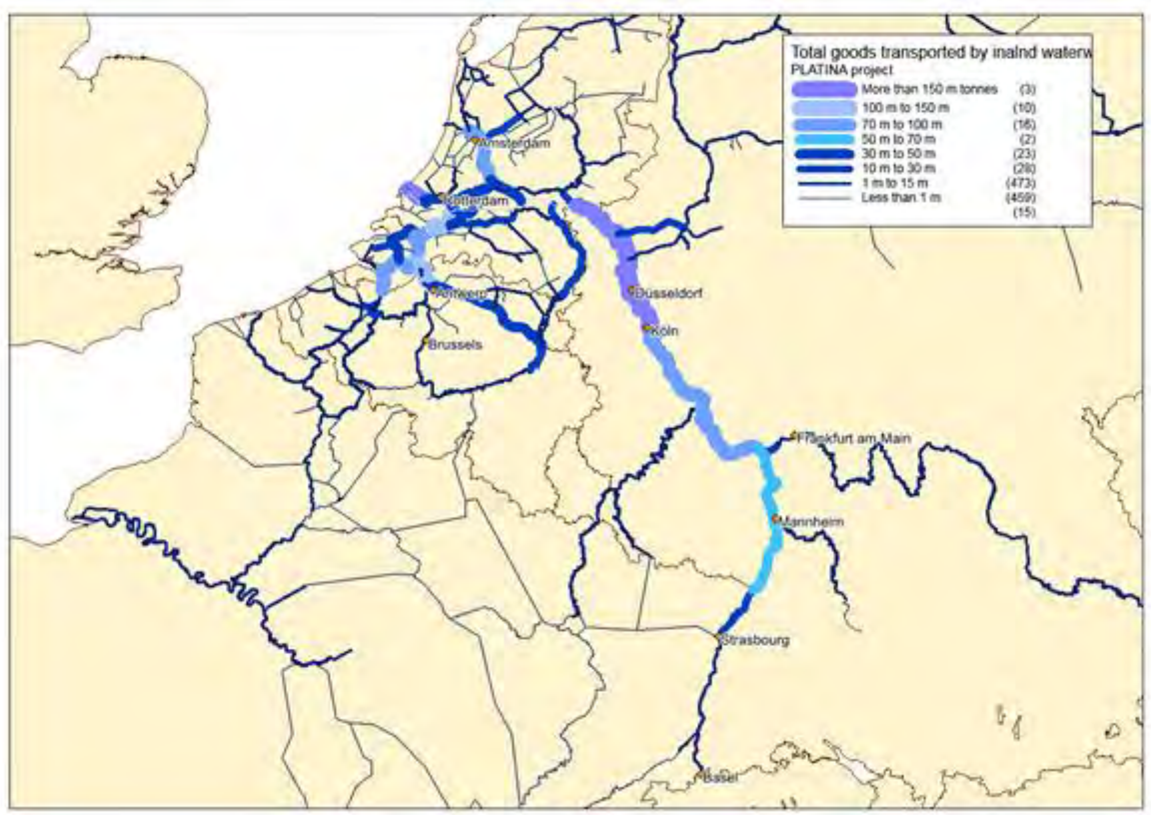
Source: Freight traffic and transport crossing the Swiss Alps 2013, BAV, July 2014

The 2011 Observatory of the Transalpine traffic study[32] showed in detail the modal shares per crossing for the 2010 volumes. Simplon had a road market share of 7.6% and Gotthard of 42.6%. The St. Bernhard Grosser Tunnel and San Bernadino Tunnel are only road crossings, however, their volumes are quite low, representing around 10% of the total volumes mentioned above. The total share of rail transport for the Swiss crossings was higher than the French and Austrian Alp crossings; this variance in rail share was explained by the different rail supply characteristics per country as well as the national transport policies.

Inland waterway flows (PLATINA project)

The PLATINA project also presented the total demand for inland waterways in Europe. The base year for the data was 2007 with 2013 updates for Belgium (MOW Vlaanderen and WenZ data) and France (TENtec data). The figure below presents the flows covering the Rhine Alpine corridor; these consist of all traffic flows such as imports and exports as well as domestic and transit. The main flows are observed between the Netherlands, Germany and Belgium.

Figure 24: Inland waterway network for the Rhine-Alpine Corridor



Source: PLATINA 2007, Belgian data 2013 (MOW Vlaanderen and WenZ), French data 2013 (TENtec)

[32] Alpifret observatoire des trafics marchandises transalpins rapport annuel 2011, février 2013, Rapport_annuel_Alpifret_2011_v6.doc

Conclusions (current demand analysis)

- The recession had a strong impact –as expected- on the freight demand. This affected significantly the corridor flows
- The volumes from recent port reports demonstrate a positive growth for demand in the last two years, implying that the recovery phase for freight has started
- The corridor traffic is multimodal (12% rail, 34% road and 54% inland waterways – only considering the cross-border flows). The relatively sovereign position of inland waterways is due to the strong exchange between The Netherlands, Belgium and Germany
- The least utilised mode is rail. The small share of rail freight services must be considered against the background of a market featuring overwhelmingly short- and medium-distance transports of bulk goods on trade lanes along the Rhine valley where particularly IWW has a competitive edge. In its territory, the Rhine-Alpine Corridor covers almost 75% of the port activities in the Hamburg – Le Havre range, involving ports, such as Antwerp, Rotterdam and Amsterdam with distinct inland waterway hinterland connections.
- Rail traffic –in terms of trains- demonstrated a positive growth trend the last few years (with the exception of 2012). RFC (2012) confirmed a growth of 9% from 2010-2011, with the most increasing activity in Chiasso (+ 25.6%) and Emmerich (+21%) and the only declining trend in Luino (-33.8%). The same study indicated that in the 2008-2011 time period, rail services (as the sum of border point activities) in the corridor increased by 2.4% overall. However, Rail Freight Corridor Rhine-Alpine (2012) observed for 2012 a decline of 6% in the number of international freight trains. This was mainly due to the closure of Simplon tunnel in August 2012 for maintenance works and the closure of Gotthard line after a rock slide in June 2012. The same report indicated a growth in traffic in Luino due to the completion of works between Luino and Chiasso.
- The main international cross-border corridor flows of the corridor between Germany, Netherlands and Belgium add up to 307.2 million tonnes (2010), covering 83% of the total corridor's international freight activity. The highest import and export flows are between Germany and The Netherlands (for example, the Rotterdam Düsseldorf link with almost 46 million tonnes, or Rotterdam-Köln with more than 10 million tonnes). Belgium has also a strong presence especially related to the country's imports and exports with The Netherlands (for example, the Rotterdam-Antwerpen link with more than 40 million tonnes). The rest of the flows represent 17% of the international demand. The trade flows from/to Switzerland account for more than 27 million tonnes (or 7.6% of the total corridor activity) and from/to Italy for almost 25 million tonnes (or 6.7% of the total corridor activity). Finally, the international freight activity for France (Strasbourg/Mulhouse region) is estimated at 19 million tonnes (or 5.3% of the total corridor activity).
- The main cross-border commodities are: machinery and transport equipment, fuel products (liquid and dry bulk), building material and ores. The favoured mode of transport for these commodities (hinterland transport) is inland waterways followed by road. This is also confirmed with the individual port statistics.
- Air cargo is only a small part of the EU-related demand; it, nevertheless, demonstrates an increasing trend for all airports presented in the study.

- The corridor brings together eight major seaports with more than 700 million tonnes throughput. The port statistics align with the overview for the corridor
- Ports also revealed their plans for growth; most of the ports include in their agenda, the multimodality aspect for economic as well as sustainability reasons. Another priority is the implementation of information systems for better services (targeting for example, waiting times). The environmental aspect is finally, explored by most port including waste management and LNG-friendly ports.
- In all cases, growth in ports is expected to result to growth in the general surrounding area, in terms of welfare, employment and so on.

4.3.4.2 The demand projections

Complementary to the current demand analysis, the studies review also explored various scenarios, with a direct effect on the corridor demand. These were divided into:

- National forecasts
- Other sources including regional forecasts, port forecasts etc.

The national/regional freight transport demand scenarios

This section presents the future demand scenarios developed by national models for each one of the corridor countries besides France and Italy. These scenarios describe the prospect of freight transport demand for a certain time horizon (e.g. 2030) based on a set of macroeconomic and policy assumptions. The main macroeconomic assumptions, GDP and population were indicated in chapter 4.3.2.1.

When possible, the national scenarios are complemented by port-focussed studies performed for the Ministries of Transport.

The Netherlands

The CPB study (2006) provided four scenarios on the development of transport up to 2040, given the different macroeconomic and policy assumptions for inland waterways, road, rail and pipelines tonne-kilometres (tkm) in the Dutch territory. Thus, the study does not provide disaggregated conclusions, or conclusions focussing on international flows.

The basis year for this study was 2002, with a total freight performance of 110 billion tkm. These were distributed among the four modalities as follows: 42 billion tkm for inland waterways, 4 for rail, 49 for road and 14 for pipelines. Depending on the scenario (from a very high to a very low), the total tonne-kilometres in the Dutch territory were projected from 113 to 171 billion tkm for 2020 and 107 to 243 billion tkm in 2040. Mode-wise, inland waterways are expected to demonstrate the lowest growth rates up to 2040, whereas road and rail are expected to significantly grow.

The four scenarios also served as input for the container development up to 2040 in the Dutch ports. Based on the projections (CPB, 2006), the overall port performance, from 487 million tonnes (2005), can follow different growth paths: from a marginal declining annual growth (-0.5%; RC scenario) to a 2.5% p.a. growth (GE scenario). This is due to the expected marginal growth for dry and liquid bulk. Container traffic (92 million tonnes in 2005) on the other hand, always experts a positive growth from 2005 to 2040, from a moderate 1.3% p.a. to a significant 5.2% p.a. This growth depends mainly on the international demand for containerised traffic, especially from China, as well as an increasing demand from the European market. The containerised traffic as depicted below (Figure 25) will increase significantly for all transport modes.

Figure 25: Containers projections in The Netherlands

	2002	2005	2020				2040			
			RC	SE	TM	GE	RC	SE	TM	GE
	mln ton									
Havenoverslag	432	487	448	559	646	716	415	646	802	1148
waarvan containers	66	92	123	160	175	222	144	290	287	542
	mld tonkm op NL grondgebied									
Wegvervoer	49,1	55,2	54,4	68,1	70,6	83,5	54,1	83,0	88,9	124,6
waarvan containers	3,1		5,1	6,4	7,0	8,8	6,0	11,5	11,4	20,5
Binnenvaart	42,1	43,1	39,9	48,3	55,0	59,9	36,5	53,0	65,1	82,8
waarvan containers	3,3		5,1	6,5	7,1	8,9	5,7	10,9	11,2	20,0
Spoorvervoer	4,3	5,0	5,5	7,8	8,4	9,8	5,7	10,9	11,5	18,0
waarvan containers	1,4		2,4	3,7	3,7	5,1	2,9	6,6	6,3	12,4
Pijpleiding internationaal	4,1		13,7	15,4	16,6	19,1	11,0	9,3	15,5	21,1

Source: CPB Memorandum 172, Aanpassing WLO scenario's voor het containervervoer (2006)

The Dutch study on the development of freight transport published in 2012 from Dienst Verkeer en Scheepvaart assessed the differences between the outcomes of the 2006 (CPB) study and their plausibility given the recession effects. Even though there has been an overestimation of the expected trends due to the trend extrapolation of macroeconomic variables (with 2004 basis), the demand for 2020 and 2040 is still expected within the range of the four scenarios.

Sea and inland waterway projections for The Netherlands

CPB (2007) looked into the Amsterdam region ports on the basis of the four national scenarios (Figure 26). The study investigated how the different commodities will be accommodated in the ports up to 2020. The study, similarly to the outcomes of CPB (2006), the study indicated that the most significant growth would occur for container traffic (for all scenarios). The GE scenario, which expected the highest growth for transport, was the only one with positive growth rates for all commodities; however, in total it did not expect more than 2% p.a. growth by 2020. All other scenarios depicted marginal growth and in some cases marginal decay.

Figure 26: Projection of commodities for the port of Amsterdam

	2006	Scenario in 2020					
		GE	TM	SE	SE'	RC	RC'
Kolen	15	24	26	19	15	17	12
Olie&olieproducten	24,3	45	43	40	24	36	22
Containers	3,2	26	26	17	6	17	5
Overige goederen	23	29	26	24	24	20	21
Totaal	65,5	124	121	100	69	90	60

Bron: SEO januari 2007 en Zeetoegang IJmuiden april 2007.

Source: Zeetoegang IJmuiden, tussentijdse visie, Ministerie van Verkeer en Waterstaat (2007)

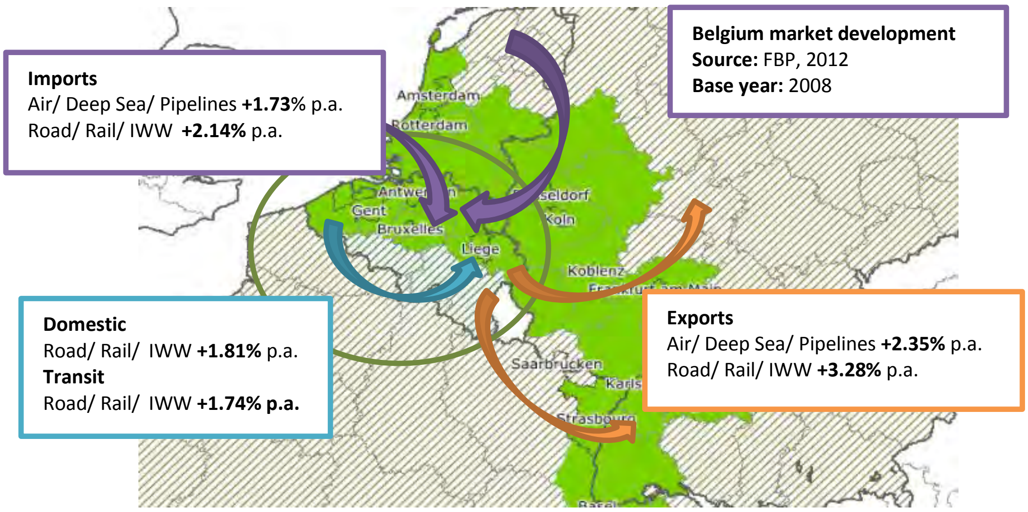
Belgium[33]

The main study (FBP, 2012) covering the projected transport flows for Belgium was conducted by the FOD (Federale Overheidsdienst) Mobiliteit en Vervoer together with the Federaal Planbureau, employing the PLANET national transport model (and specifically, PLANET version 3.2). The model uses a set of policies (e.g. environmental targets) and macroeconomic parameters to project the transport flows and the effects of policies on the economy. The base year for the study is 2008 and provides aggregated figures for tonnes (all modes) as well as tonne-kilometres and vehicle-kilometres figures (per mode) up to 2030. In addition, the study estimates the number of road vehicles for peak and off-peak hours. For passenger transport the model estimates the aggregated number of trips and passenger-kilometres. Hence, the study presents the growth rates for the future transport in Belgium however, due to the aggregated level; there are no conclusions for the corridor-specific performance.

For freight transport (Figure 27), in 2008, the total performance for road, rail and inland waterways in tonnes was 0.9 billion tonnes, of which 0.4 –or 46% of the total- are domestic freight transport, 0.4 billion tonnes –or 47%- between the rest of the world and Belgium and 0.1 billion tonnes –or 7%- transit without transhipment. There is also 0.1 billion tonnes transported from and to Belgium using air, deep sea and pipelines. The study estimates that the average annual growth rate for the road, rail and inland waterways is almost 2.3% annually, related mainly to the expected growth in imports and exports (expected to grow by more than 3% annually). The other modes are also affected by the exports growth, expecting a growth of 2.4% annually. This impacts the freight distribution, shifting from domestic to imports and exports, with 42% and 53% respectively. The growth in imports and exports as well as in the transit flows will positively affect the international corridor demand.

[33] This analysis includes BE IWW traffic forecasts.

Figure 27: Belgium freight growth factors



Source: Panteia

*** Explanation: Purple indicates the imports, orange the exports and blue, domestic and transit traffic*

Based on its tonne-kilometres results, the study also provides insight on the transport modes for the international freight demand. Sea (deep and short) is the dominant mode for imports and exports up to 2030, taking over more than 80% of the total performance. This is due to the higher tonnage that is transported by vessels but also the longer distances travelled. The second most favoured mode is road which demonstrates a slowly downward trend, specifically for the exports where its share is moved to the sea transport (from 12% to 11% for imports and 15% to 11% for exports). Rail and inland waterways have a similar share of 3% for exports; this share which is not expected to change significantly. For imports, inland waterways cover 6% of the total tonne-kilometres, whereas rail remains at 3%. Similarly to imports, there is no significant projected growth up to 2030.

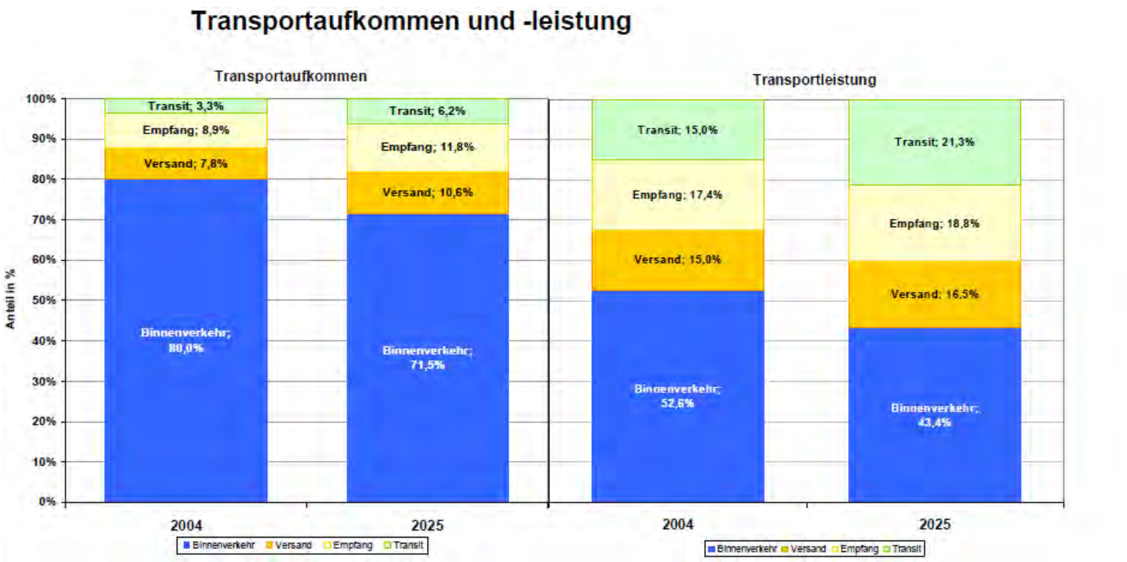
Germany

The ITP and BVU conducted in 2007 (BVWP, 2007) the study for the prognosis of the transport flows up to 2025 on behalf of the Ministry of Transport and Infrastructure. This study provided detailed results for the projection of passenger and transport flows with 2004 as the reference year based on the socioeconomic assumptions presented in the previous section and a set of policies, including all expected infrastructural developments (as defined in the year of the study).

Based on the 2004 values, road is the dominant mode for freight transport with 1.45 billion tonnes (72.2% of the total transport), followed by rail with 0.32 billion tonnes (16%) and inland waterways with 0.24 billion tonnes (11.7%). By 2025, the national estimations expect the road share to increase by on average 2% annually and reaching the share of almost 76%. Rail follows a comparable trend, however, with a lower growth of 1.4% p.a. and 14.5% of the modal split. Both road and rail in this forecasting draw demand from inland waterways, which grow by 0.9% p.a. and by 2025 have a share of 9.5%. The same trend is also observed for freight performance measured in tonne-kilometres.

The BVWP forecast also provides insight on the market characteristics (Figure 28) in terms of tonnes (left-side) and tonne-kilometres (right-side). From these graphs, the domestic transport (in tonnes) occupies 80% of the total, leaving 16.6% for imports and exports and 3.3% in transit. By 2025, it is expected that a large share of the market will turn to imports and exports as well as transit. In tonne-kilometres, domestic demonstrates much lower values due to the distance factor. Nonetheless, it follows as well a decreasing trend.

Figure 28: Market structure for Germany



Source: BVWP (2007)

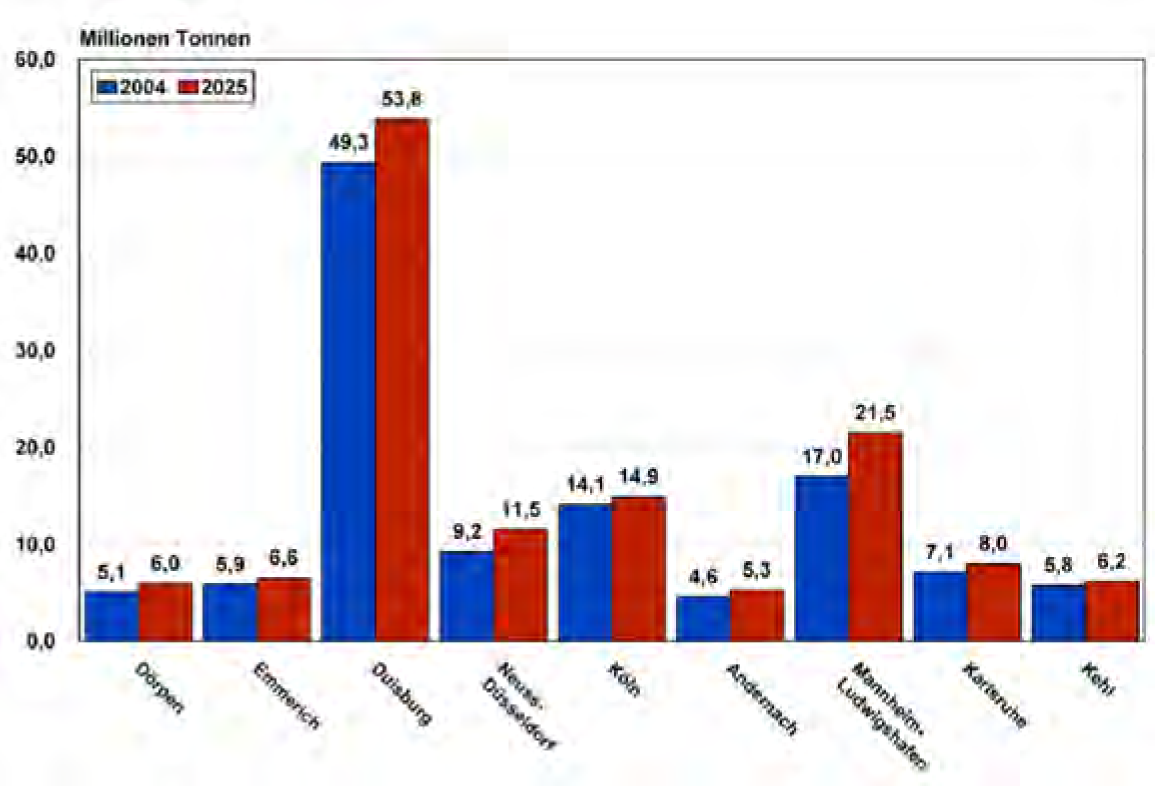
Comparing the average travelled distances between the modes, there is a strong shift to long-distance trips for rail, where distance is expected to increase by 24% within the 2004-2025 time period, reaching the 353 km as well as for road, which is expected to reach the 300 km (increasing 19%).

Projections for German ports[34]

The inland ports projections for Germany were based on the national prognoses (BVWP, 2025) together with supply-side assumptions. Figure 29 presents the 2004-2025 comparison for –among other- ports in the Rhine-Alpine Corridor. Duisburg demonstrates the highest volumes with 49.3 million tonnes in 2004 and expects a total increase of 9% up to 2025. The highest growth is observed for Mannheim and Düsseldorf; both of these ports expect a growth of 25-26% in the forecasted time period. The lowest growth of 6% is expected for Köln, from 14.2 to 14.9 million tonnes.

[34] *Source: Planco (2013): Gutachten zur Erhöhung der Wettbewerbsfähigkeit der Binnenhäfen*

Figure 29: Projections for inland German ports



Switzerland

The Bundesamt für Raumentwicklung (ARE) published in 2004 a study on the future of freight transport up to 2030. Based on a set of macroeconomic assumptions (including the imports and exports to neighbouring countries) and policy assumptions the study produced a baseline and two alternative scenarios. Each scenario presented the effects on the commodities (NSTR) and the growth factors for road and rail for domestic, import, export and transit traffic up to 2030 for tonnes and tonne-kilometres. The basis year for the study was 2002.

The baseline scenario demonstrated a moderate annual growth (on average 1.2% p.a.), with a decreasing slope over the years (for example, see Figure 30; the growth for total rail between 2002-and 2010 is 2.8% p.a. whereas for 2010-20, it decreases to 2.3% p.a.). Overall, the scenario showed a shift to rail by 7% between 2002 and 2030; this was even greater in the cases of imports where rail increased from 25.7% to 38.8%. For exports, rail was expected to occupy one fourth of the total tonnage and for transit more than 70% by 2030.

Figure 30: The baseline scenario for freight transport in Switzerland

*Tabelle 19: Kenndaten des Güterverkehrs**aufkommens** im **Basisszenario***

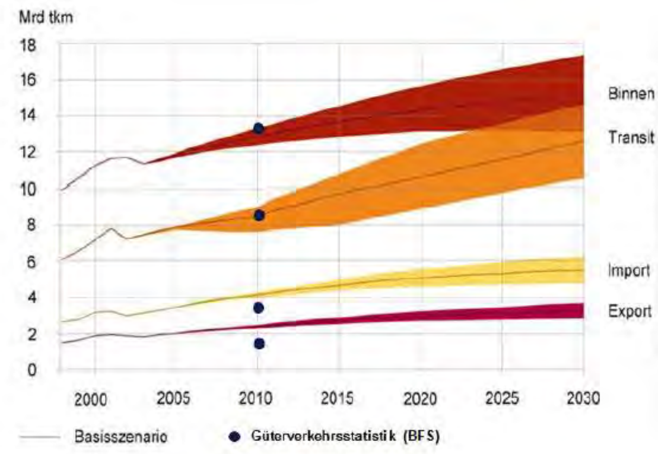
	Mio. Tonnen				jahresdurchschnittliche Veränderung			absolute Veränderung		
	2002	2010	2020	2030	02-10	10-20	20-30	02-10	02-20	02-30
Total										
Strasse+Schiene	250.12	283.52	324.27	349.05	1.6%	1.4%	0.7%	13.4%	29.6%	39.5%
Strasse	195.6	215.4	238.4	249.0	1.2%	1.0%	0.4%	10.1%	21.9%	27.3%
Schiene	54.5	68.1	85.8	100.1	2.8%	2.3%	1.5%	25.0%	57.5%	83.6%
Anteil Schiene	21.8%	24.0%	26.5%	28.7%						
Binnenverkehr										
Strasse+Schiene	167.70	175.90	191.32	202.27	0.6%	0.8%	0.6%	4.9%	14.1%	20.6%
Strasse	143.13	150.36	162.33	168.74	0.6%	0.8%	0.4%	5.0%	13.4%	17.9%
Schiene	24.57	25.54	28.98	33.52	0.5%	1.3%	1.5%	4.0%	18.0%	36.5%
Anteil Schiene	14.7%	14.5%	15.1%	16.6%						
Importverkehr										
Strasse+Schiene	36.96	51.84	63.77	68.32	4.3%	2.1%	0.7%	40.3%	72.5%	84.8%
Strasse	27.45	35.99	41.16	41.81	3.4%	1.4%	0.2%	31.1%	50.0%	52.3%
Schiene	9.51	15.85	22.61	26.51	6.6%	3.6%	1.6%	66.6%	138%	179%
Anteil Schiene	25.7%	30.6%	35.5%	38.8%						
Exportverkehr										
Strasse+Schiene	19.99	26.15	32.47	34.90	3.4%	2.2%	0.7%	30.9%	62.5%	74.6%
Strasse	15.98	20.54	24.87	26.00	3.2%	1.9%	0.4%	28.5%	55.6%	62.7%
Schiene	4.01	5.61	7.60	8.90	4.3%	3.1%	1.6%	40.2%	89.8%	122%
Anteil Schiene	20.0%	21.5%	23.4%	25.5%						
Transitverkehr										
Strasse+Schiene	25.47	29.62	36.71	43.56	1.9%	2.2%	1.7%	16.3%	44.1%	71.0%
Strasse	9.05	8.51	10.08	12.40	-0.8%	1.7%	2.1%	-5.9%	11.3%	37.0%
Schiene	16.42	21.11	26.63	31.16	3.2%	2.4%	1.6%	28.5%	62.2%	89.7%
Anteil Schiene	64.5%	71.3%	72.6%	71.5%						

Source: ARE (2004)

The updated study (ARE, 2012: additions to the perspectives until 2030) shows that the 2010 data does not vary significantly from the original predictions. The GDP growth predictions for 2030 are in total 6% higher than in the 2004 average prognosis but still in line with the most optimistic growth scenarios predicted in 2004.

For transport volumes the comparison of the Federal Statistical Office figures with the 2004 scenario shows that only marginal differences occurred. Transit traffic on road and rail is slightly below prognosis, as well as import and export transport. The stronger domestic traffic growth until 2010 compensates the total transport volumes to be in line with the 2004 prognosis (see Figure 31). The overall difference is less than 1 billion tonne-kilometres.

Figure 31: The adjusted baseline scenario for freight transport in Switzerland



2010	BFS		Perspektiven Basisszenario	
	abs.	%	abs.	%
Binnen	13.58	50	12.85	46
Import	3.27	12	4.08	15
Export	1.64	6	2.31	8
Transit	8.46	31	8.51	31
Total	26.95	100	27.75	100
Quelle: BFS, ARE (2004)				

Source: ARE (2012)

According to the updated study the overall transport market will grow by 45% until 2030 to 39.1 billion tkm. The rail transport will grow disproportionately high by 77% to 17.3 billion tkm (a 44.2% share) across import, export, transit and inland traffic.

Italy

A recent study (Confcommercio, 2014) projected the Italian freight flows up to 2015, given the national socioeconomic projections applied on the existing national flows by market type and mode. The study pointed out that freight transport has been severely affected by the recession period and will continue to experience negative trends until 2015; from 2015 the study indicates the first positive signs (see Figure 32).

Moreover, the study notes that there are marginal deviations from the existing market structure; the domestic demand occupies more than 50% of the total, with slight decline due to the recession; a similar trend is depicted for the imports (from 31.8% to 31.5% of the total). On the other hand, in the same time period, the exports increase their share from 16.8% to 17.2%. In any case, the absolute difference in tonne-kilometres is marginal due to the decreasing slope of the total demand (from 341.1 to 334.8 million tkm).

The study finally provides an insight on the modal share for all market types. In the 2004-2012 time period, traffic was almost shared between road and sea (combined reaching 94.5%), with a small presence of rail and a negligible of air. The two modes continue also in 2015 to occupy the largest share of the flows (94.2%), however, with a strong shift from road to sea. Rail is expected to marginally increase its share whereas air share is expected to remain the same.

Figure 32: The short-term forecast for Italy

Tab. A - Trasporto di merci per percorso

var. % e v.m.a. % di periodo

	2004-2007	2008-2012	2013	2014	2015
I-I	3,1	-4,4	-1,9	-0,7	0,5
E-I	1,5	-4,4	-3,8	-0,9	1,6
I-E	5,0	-1,8	-1,4	1,2	0,5
totale	2,8	-4,0	-2,5	-0,3	1,0

Elaborazioni e previsioni Ufficio Studi Confcommercio su dati Istat, Conto Nazionale delle Infrastrutture e dei Trasporti ed Eurostat

Tab. B - Trasporto di merci per percorso

quote % e livelli assoluti

	2003	2007	2012	2015
I-I	51,9	52,4	51,4	51,2
E-I	34,2	32,5	31,8	31,5
I-E	13,8	15,0	16,8	17,2
totale	100,0	100,0	100,0	99,8
totale livelli in miliardi di t-km	373,4	417,5	341,1	334,8

Elaborazioni e previsioni Ufficio Studi Confcommercio su dati Istat, Conto Nazionale delle Infrastrutture e dei Trasporti ed Eurostat

Tab. 34 - Ripartizione modale del traffico complessivo di merci (previsioni dal 2013)

quote %

	Gomma	Ferro	Mare	Aereo	Totale traffico merci
2003	50,2	5,4	44,3	0,1	100,0
2007	49,5	6,1	44,4	0,1	100,0
2012	45,3	5,9	48,7	0,1	100,0
2015	45,2	5,7	49,0	0,1	100,0

Elaborazioni Ufficio Studi Confcommercio su dati Istat, Eurostat, Conto Nazionale delle Infrastrutture e dei Trasporti

Source: Confcommercio (2014)[35]

France - A note on Alsace

By 2025, significant potential volumes are identified by the port of Strasbourg in the Alsace Rhine ports Master-plan. More specifically, for the French Rhine ports an increase of 67.5% in volumes is expected, including a 3.5-fold increase in container traffic. The Master-plan however, mentions that in order to achieve this volume potential, further actions need to be taken.

[35] Confcommercio (2014): Analisi e previsioni per il trasporto merci in Italia A cura dell'Ufficio Studi Confcommercio-Imprese per l'Italia, Maggio 2014.

National data prognoses – remark on data collection

The freight transport prognosis review pointed out certain similarities as well as differences between the corridor countries, also demonstrated in Table 26. In terms of similarities, the freight performance was in most cases provided in both tonnes and tonne-kilometres, with the exception of The Netherlands and Italy. Moreover, most of the national models showed the potential development in the corridor countries for domestic, imports, exports and transit freight demand (again, with the exception of The Netherlands that presented more aggregated results). Mode-wise, all studies covered road and rail; expect from Switzerland they also provided figures for inland waterways. Pipelines were described for Belgium and The Netherlands. Finally, Belgium and Italy were the two countries providing aggregated results for air.

In the case of The Netherlands more than one scenario was developed.

Table 26: Studies for national freight transport prognoses

Country	Time horizon	Freight modes covered	Freight markets covered	Freight units covered
Belgium (2012)	2008-2030	Road, rail, IWT, SSS Also aggregated results on air, deep sea and pipelines)	Domestic, imports, exports, transit Also commodity information	tonnes, tonne-kilometre
France	-	-	-	-
Germany (2007)	2004-2025	Road, rail, IWT	Domestic, imports, exports, transit Also commodity information	tonnes, tonne-kilometre
Italy (2014)	2003-2015	Road, rail, sea (including SSS), air	Domestic, imports, exports	tonne-kilometre
The Netherlands (2004)	2002-2040	Road, rail, IWT, pipelines	-	tonne-kilometre
Switzerland (2004/ adjusted 2012)	2002-2030	Road, rail	Domestic, imports, exports, transit Also commodity information	tonnes, tonne-kilometre

Source: Panteia

A major difference between the national sources is the input data. Due to the fact that the studies were conducted in different years, had different time horizons, and not harmonised macroeconomic and other inputs, their comparison should be done with caution. In addition, Germany and the Netherlands did not incorporate the effects of the recession on the freight transport forecasts.

For the Netherlands, the new forecast is an ongoing study, which is expected to be completed after the end of the present study. The range of plausible futures presented in the 2004 scenario, even though overestimated was confirmed (as mentioned above) by the CPB in 2012 to be still credible.

For Germany, there is an updated scenario from 2013 (for the 2010-2030 time period) including the crisis effects. This scenario, however, is not harmonised with other corridor-related projections, including the future rail utilisation rates from DB Netz, the transport development in Rheinland/Verkehrsentwicklung im Rheinland (2013), or the 2025 hinterland connections forecasts (Planco, 2013). In order to maintain comparable outcomes, the 2007 projections were preferred to the 2012 ones.

Conclusions from national/regional scenarios

The national long-term scenarios provided information related mainly to the modes and the market types for each of the Rhine-Alpine countries, except from Italy (short-term projections) and France where there are no national projections (Table 27).

The analysis provides an insight on the future transport performance trends as well as the future modal split. The main conclusion to be drawn is the anticipated increase in imports and exports as well as transit traffic, which together with the increase of the average travelled distances are expected to have a strong impact on the international transport flows, affecting in consequence, the demand for the Rhine-Alpine Corridor. The expected growth in volumes and distances also creates an opportunity for shifting to non-road modes.

In terms of modalities, there are not many changes predicted by the scenarios. Even though, non-road modalities are favoured, their share in the project modal splits does not noticeably change. Considering that these scenarios do not model any policy changes, this is rather expected. Moreover, what is clearly shown is that in order to change the current regimes further actions need to be taken.

Table 27: Main conclusions from the national forecasts

Country	Time horizon	Modalities	Volumes	Other remarks
Belgium (2012)	2008-2030	Sea is favoured, road will experience a small decline	Average growth of 2.3% p.a.	Increase in imports/ exports and the average travelled distance
France	-			
Germany (2007)	2004-2025	Road is still sovereign, followed by rail	Average growth of 1.9% p.a.	Increase in imports/ exports and the average travelled distance
Italy (2014)	Up to 2015	Sea becomes the sovereign mode, followed by road	1% (2014-2015)	Increase in exports
Netherlands (2004)	2002-2040	Road is still sovereign, followed by rail. Lower performance for inland waterways	Average growth of 2.5% p.a. based on the highest growth scenario	-
Switzerland (2004, updated 2012)	2002 - 2030	Growth for rail	Average growth of 1.9% p.a.	Increase in imports/ exports and the average travelled distance

Source: Panteia

Other corridor-related projections

Besides the national forecasts, there have been additional studies for more corridor-related prognoses.

The Verkehrsentwicklung im Rheinland (2013) presented, based on the BMWP (2007), scenarios about the future of cross-border freight demand along the Rhine and between The Netherlands, Belgium and Germany. The analysis (Figure 33) pointed out that the most favoured mode in the future will be road, increasing by 129% for the time period 2004-2025, followed by rail, which is expected to increase by 69%. The inland waterways, similarly to the other national scenarios, depict the least expected growth (34%).

For rail, whereas imports and exports expect a moderate growth, transit traffic will significantly grow from 10 to almost 17 billion tkm, a growth of on average 2.5% annually. For road, all markets will grow besides the domestic market: imports and exports by 2% annually and transit by 4%. Compared to the national scenario, this is an "inflated" outcome due to the fact that road transit demand is very present in the Rhine-Alpine Corridor. The other market types behave similarly to the national projections. Inland waterways grow moderately, with the domestic share decreasing (in accordance with the national scenario), imports and exports marginally increasing and the transit traffic depicting the highest average growth of 1.4% annually.

Figure 33: Performance overview according to BVWP (2007) between DE, NL and BE

Source: Panteia

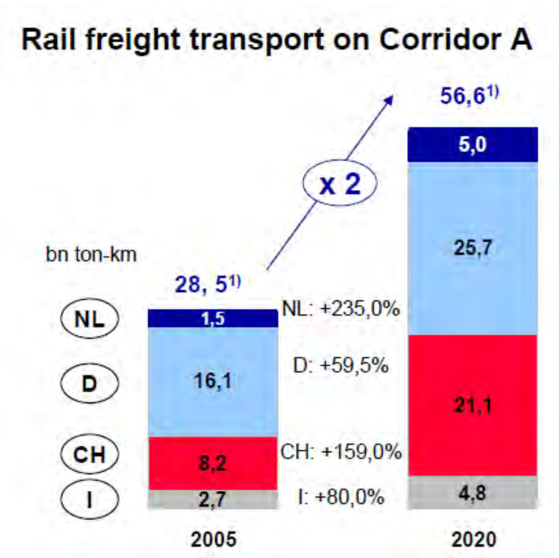
The study also pointed out the effects on Rheinland ports, projecting the Zeebrugge, Antwerpen and Rotterdam container transhipment to grow by 130% in the 2004-2025 period. The study expects that the hinterland connections modal share of inland waterway will remain the same whereas rail will draw traffic from road. This element is however not incorporated in the demand projections showing a discrepancy between the port projections and the national scenarios.

With regard to rail, the study furthermore explored the daily freight trains from 2004 up to 2020. There, the main differences observed (in the 2004–2025 time period) are between Venlo and Duisburg, from 30 to 50 trains, Antwerpen and Düsseldorf, from 87 to 183 trains, and Antwerpen and Köln, from 67 to 141. The respective passenger trains are not part of the analysis.

Rail freight corridor projections

The Implementation of Regulation (EC) 913/2010 concerning a European Rail Network for Competitive Freight also locally presented the 2005-2020 expected growth on the whole Rotterdam Genoa section for rail. The outcomes indicated that the rail traffic in the corridor was expected to double by 2020 (Figure 34) especially due to the German and Swiss volumes growth. This projection was aligned to the BVWP (2007) scenario, which anticipated up to a 2.9% p.a. growth for the hinterland transport as well as the Rotterdam projections of 8% growth p.a.

Figure 34: The Corridor A rail freight projections up to 2020



Source: Panteia

Demand projections conclusions

- the national scenarios do not anticipate a major difference in the future modal shares; these however do not model any policy changes and expected improvements in the network;
- based on the projections, road and rail will grow faster than inland waterway;
- the projections also outline that the highest corridor related growth is expected for Germany and Switzerland;
- the expected traffic segments to grow are transit traffic, followed by imports and exports;
- containerised cargo is expected to grow faster than the other commodities, bulk is expected to marginally grow by 2030;
- the average travelled distance for freight transport is expected to grow, making non-road modes more competitive.

4.3.5 Supply analysis (literature based)

The supply-side analysis focusses mainly on the capacity of the non-road modes in the Rhine-Alpine as well as the terminals capacity. More specifically, the supply analysis is based on section 4.2 findings complemented by additional features of the rail, ports and inland waterway capacity focussing on their market impact. In terms of characteristics and based on publicly available information, the following elements are explored:

- Capacities and utilisation rates and
- Waiting times
- Other technical parameters such as punctuality and speed

The supply side is also complemented by an indication of the environmental impact (section 4.3.6) of non-road modes as an additional argument in favour of multimodality. The TMS finally binds together the supply and demand features in the form of a SWOT analysis (section 4.3.7).

4.3.5.1 Supply analysis for rail

This section presents the current situation from the supply-side for rail.

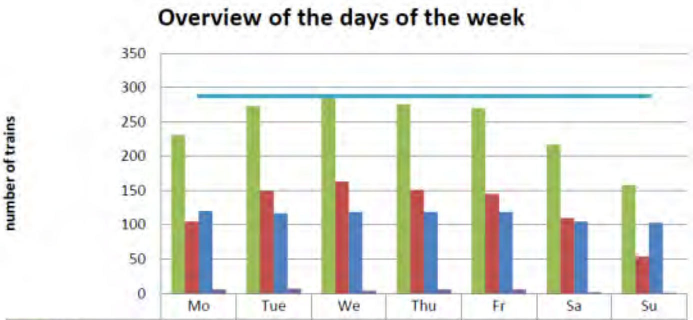
Rail capacity and utilisation

There have been several publicly available studies looking into the capacity and indicating potential network capacity issues for rail. At first, the Verkehrsentwicklung im Rheinland (2013) looked into the freight trains (per day) in the Netherlands, Belgium – Germany network and concluded to three potential problematic sections, meaning three sections which expect a high volume growth by 2025 which cannot be accommodated by the current network: Venlo and Duisburg, from 30 to 50 trains, Antwerpen and Düsseldorf, from 87 to 183 trains, and Antwerpen and Köln, from 67 to 141. The respective passenger trains were not part of the analysis.

A more targeted analysis[36] for the Upper Rhine Valley (Figure 35), including passenger trains, presented the weekly capacity utilisation levels for the area, highlighting the high usage from Tuesday to Friday. This analysed usage appeared to be quite close to the maximum of 288 trains per day, more than half of which being freight trains. In fact, the Wednesday load of 286 trains corresponded to a capacity utilisation of 99.3%. According to forecasts of how the volume of freight traffic is going to develop in the coming years, the study concluded that the utilisation of the section is going to be well over 100% of its capacity, leading to delays and longer waiting times along the whole corridor and shifting demand to road.

[36] *Drewello & Kehl (2013)*

Figure 35: Rail utilisation rates for the Upper Rhine Valley



	Mo	Tue	We	Thu	Fr	Sa	Su
total	231	273	286	276	270	217	158
freight trains	105	149	163	151	145	110	54
passenger trains	120	117	119	119	119	105	103
others	6	7	4	6	6	2	1
capacity	288	288	288	288	288	288	288

Source: Drewello & Kehl (2013)

The high utilisation (passenger and freight trains) of the German rail network is also forecasted by DB. Based on the 2025 projections, five sections are expected to overload, with average utilisation rate more than 110%. These are namely: the sections between Offenburg – Muellheim, Mannheim (Friedrichsfeld Süd) and Darmstadt, Köln-Mühlheim Berliner Strasse and Langenfeld (Rheinland), Bonn-Beuel and Neuwied as well as Karlsruhe Hbf and Wiesental. Furthermore, 24 sections are expected, by 2025, to use their full capacity, with average utilisation rates from 85%-110%.

Confirming the results from the corridor characteristics, the available capacity in the corridor will not be sufficient to accommodate the increasing freight flows. Even by assuming that minimal changes are expected for the passenger flows, in a baseline scenario (without additional development projects) the capacity limitations will not be able to accommodate the expected traffic growth.

Potential longer trains

According to the RFC1 (2012)[37] analysis for the Alps, the current train formations are under-utilised. In total, about 80% of all trains do not exploit their available train length for reason such as the increase in weight and the rolling highway. For example, only 19% of the trains use the available length in Lötschberg and Gotthard and less that 4% and 14% respectively use their current maximal weight, increasing the inefficiency of rail freight services.

The potential of the longer trains was presented in Rail Freight Corridor Rhine-Alpine implementation study RFC1 (2014)[38]. Based on the report, and depending on the transported goods type, the added value from longer trains applied in the different corridor sections[39], could be quite significant.

Commodity-wise, due to the rather low weight, freight trains with empty wagons, automotive or combined traffic have the biggest potential for long trains. The formation of 740-metre trains would potentially lead to productivity growth of 10%-

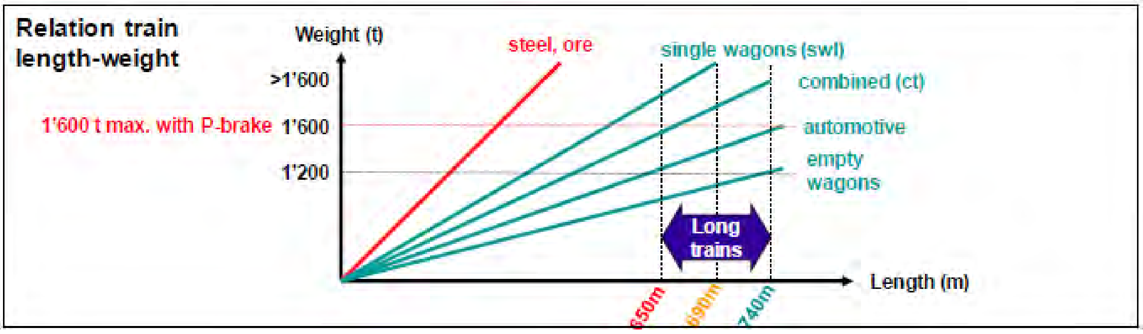
[37] RFC1 (2012): Progress-Report 2012 Executive Board Rail Freight Corridor 1: Zeebrugge-Antwerp/Rotterdam- Duisburg-Basel- Milan-Genoa

[38] RFC1 (2014):Study Long Trains (740m) on Corridor Rotterdam-Genoa 22 May

[39] This implies infrastructure developments in various sections, including the whole of Italy, requiring an investment of –in total- 130 to 180 million EUR for the missing links.

25% for the Railway Undertakings. Moreover, the capacity would instantly increase accommodating additional traffic.

Figure 36: Long train potential



Source: Rail Freight Corridor Rotterdam-Genoa, Progress Report (2014)

However, before the application of longer trains, it should be noted that there are several institutional, administrative and financial barriers to overcome.

The Betuwe line

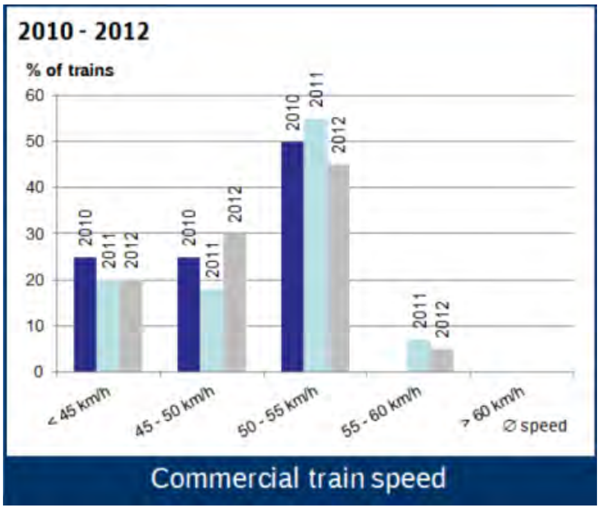
The 140 km of new corridor lines sum up to additional capacities of about 100 train paths between Rotterdam and Zevenaar, as well as from Frutigen to Raron. However, this additional capacity does not yet fully contribute to the corridor capacity due to the limited connecting line capacities. The growth of the number of trains started after the economic crisis in the last quarter of 2009 and continued in 2010, resulting to an increase of 400 trains on a weekly basis. The Betuwe line's expected impact is to strengthen the available capacity and attract demand from road. However, further improvements are necessary including the network infrastructure and terminal capacity especially between Zevenaar and Germany.

Rail speed

This factor is an indication of 35 pairs of trains in the Rail Freight Corridor Rhine-Alpine (Source: Rail Freight Corridor Rhine-Alpine, Progress Report (2012)). The average speed range in Rail Freight Corridor Rhine-Alpine in 2011 has been 32.4 km/h - 58.6 km/h (the maximum speed is based on the timetables). The study indicated that fastest train paths were offered on the short distance, stressing that the average speed decreased while the length of the path increased due to cross-border waiting times and potential construction work delays. RFC (2012) observed an increase in the minimum speed in 2012 to 33.6 km/h whereas the fastest connection offers 58.3 km/h remained the same. In 2012 the average speed of all measured trains was 49 km/h, decreasing from the average speed of 50km/h in 2010 (Figure 37).

The average travel speed impacts directly the average travel time as well as the travel costs. Thus, increasing the average speed on the network could significantly affect the preferred mode for transport.

Figure 37: Rail Freight Corridor Rhine-Alpine average speed (historical data)



Source: Rail Freight Corridor Rhine-Alpine (2012)

Arrival punctuality for rail

The punctuality index 2010[40] demonstrates the Rotterdam Genoa average punctuality level[41]. The KPI from Rotterdam to Melzo is not available due to validity problems on the Dutch side. The overall punctuality compared to 2009 dropped due to the high number of construction works (e.g. spiral tunnel Varzo), including those announced at short term, along the corridor and an increased traffic volume. The likewise growing number of passenger services also affected freight traffic negatively.

In 2012, the RFC1 reproduced this figure (right side) including the index for the Antwerpen – Gallarate stretch and in 2013 the Zeebrugge – Gallarate section. Trains between Antwerpen and Gallarate (2012 figures) are directed via (1) Luino and (2) Domodossola allowing a comparison of punctuality. As it can be seen in the figure, the higher punctuality on the double track line via Domo is very noticeable compared to the single track line via Luino (77% to 46%). In 2013, there was an improvement in the Freiburg – Novara section punctuality as there was no necessary re-routing in the Alps as in the year before.

Overall, punctuality did not benefit from the decrease in rail freight volumes because of the stable passenger traffic demand as well as the network works around freight trains[42]. For example, works in the Emmerich – Oberhausen section significantly decreased average punctuality in the Rotterdam – Novara route.

[40] Source: Situation and Perspectives of the Rail Market TREN/R1/350-2008 Lot 2

[41] average punctuality level is the arrival at destination within a 30 minutes time span for selected relations of: Freiburg–Novara; Rotterdam–Melzo (new) and Cologne–Gallarate (all start/ end points of these transport relations are directly located on Corridor A/1). A level of 80% is targeted.

[42] The report refers to unusually long and cold winter season in Central Europe which needed special efforts to keep tracks and switches ice free. Mud slides and rock slides on the Gotthard axis brought traffic to a standstill three times during the period under report. In particular a big rock slide in June 2012 caused a week-long rerouting via the Lötschberg line, installation of noise barriers south of Cologne with re-rerouting of freight trains (2 months).

Table 28: Arrival punctuality for Corridor Rotterdam Genoa

Section/Year	% arrival punctuality			
	2010	2011	2012	2013
Freiburg – Novara	54%	48%	51%	58%
Antwerpen – Novara	-	-	46% (via Luino) 77% (via Domodossola)	62% (Antwerp – Gallarate)
Rotterdam - Melzo		60%	61%	
Rotterdam-Novara				54%
Köln - Gallarate	56%	68%	65%	
Zeebrugge-Gallarate				68%

Source: Rail Freight Corridor Rhine-Alpine, Progress Report (2014)

The Rail Freight Corridor Rhine-Alpine expects the following improvements by 2030:

- Reliability: +26%
- Capacity: +52%
- Time: -20%
- Infrastructure managers costs: - 10%-15%.

ERTMS deployment

ERTMS main contribution is on interoperability, capacity, performance and safety. ERTMS is expected to have strong impacts on the rail performance and additional economic, environmental and societal benefits. A study (Decision, 2010) commissioned by the Dutch Transport Ministry indicated that, for The Netherlands, the ERTMS deployment could have very beneficial outcomes. More specifically, for cargo operators, the decrease in travel times is directly translated into cost reduction. The study however, stresses that the deployment costs are still very high and that, in the short term, reductions are feasible if costs savings are possible on infrastructural measures to increase capacity whereas in the long term, the signalling system can lead to cost reductions, if it becomes cheaper in maintenance and purchase.

The implementation of the ERTMS systems is expected to have a strong positive impact on the rail share of the corridor as it could result in an estimated increase in locomotive productivity of 20–30%, driving approximately an extra 60,000 kilometres per year (considering also complementary infrastructural measures). Based on the cost-benefit analysis, the study estimated that the expected time-savings would affect approximately 35% of the costs per train-kilometre, leading to a maximum reduction of transport costs of 10.5%. The study, furthermore, stresses the positive societal and safety impacts. Related to different operating methods, rail network structures and signalling systems however, the Dutch results cannot be transferred to other countries without a detailed analysis.

Rail safety (derailment accidents)

Derailment accidents have various types of costs including human losses, environmental burden as well as equipment (infrastructure and rolling stock) and disruption losses. The following figure (Figure 38) shows the direct costs (per type) for a single generic derailment calculated as a "weighted average according to probabilities of different severities and incidence of dangerous goods using the ERA cost benefit analysis values". Disruption costs represent the total delay costs and are the highest type of costs – on average – per derailment considering the ERA values[43], followed by the track costs. The costs for fatalities and environmental burden are lower assuming a low number of severe- and dangerous goods- related derailments.

Figure 38: Derailment costs

Derailment category	Weighting	Track	Wagons	Disruption
Immediate severe (DG)	4%	200 000 €	220 000 €	750 000 €
Not immediate severe (DG)	3%	750 000 €	220 000 €	750 000 €
Immediate severe	29%	200 000 €	120 000 €	750 000 €
Not immediate severe	17%	750 000 €	120 000 €	750 000 €
Not severe	47%	20 000 €	12 500 €	90 000 €
Total Costs (Weighted)		**225 400 €**	**76 475 €**	**439 800 €**
as percentage of Track + Wagons		*75%*	*25%*	*146%*

Source: D-Rail D1.2 Report on Derailment Economic Impact Assessment (2011)

The D-Rail study (2011)[44] indicates that half of the derailment accidents (based on 2005-2010 historical data) cost up to 0.2 million euros and less than 20% cost more than a million euros.

Safety is a major parameter influencing multimodality not only from cost and time but also reliability perspective. Safety improving measures for infrastructure, rolling stock as well as communication services (including ERTMS) are important to ensure the competitive edge for rail services in the Rhine-Alpine corridor.

4.3.5.2 Supply analysis for inland waterways and drivers affecting demand

The inland waterway network in the Rhine-Alpine is a well-developed network linking significant sea and inland waterway ports. All port plans for the future indicate expansion works aimed to increase the capacity and improve their multimodal hinterland connections. Based on the findings from the corridor characteristics (section 4.2.3), the existing inland waterway network could benefit from further infrastructural works for example by increasing the number of locks and the depth so as to accommodate larger vessels.

Supply factors for competitive inland waterways

The infrastructure for inland waterways is one of the critical production factors in the supply of services. In fact, the infrastructure conditions directly determine the competitiveness and modal share of inland waterways. Moreover, the waterway infrastructure quality (fairway conditions and bottlenecks) directly determines the cost levels per unit (vessel utilisation and, load factors), as well as the level of service (transport speed, time reliability). Although the utilisation rates for inland waterway in the corridor are not available, a list of barriers that limit the inland waterway utilisation and further constrain shipping operations are shortly stated below.

The main cost drivers in inland waterway transport consists of standby costs - personnel, depreciation-interest payments, insurance, and repair & maintenance costs and operational costs – mainly fuel costs. The average fuel consumption per vessel type depends mainly on utilisation rates of vessels (due to loading restrictions), the parity of traffic (empty voyages), and the prevailing fairway depths (shallow water resistance). In fact, waterways in the Rhine corridor are characterised by much higher

[43] The D-Rail analysis of the economic impact of derailment argues that the cost of disruptions is difficult to estimate and ranges between the 15% and 146% of the direct costs (infrastructure and rolling stock); the latter is the value presented by ERA (European Railway Agency).
[44] D-Rail (2011): Development of the Future Rail Freight System to Reduce the Occurrences and Impact of Derailment, D1.2 Report on Derailment Economic Impact Assessment, cofinanced by the European Seventh Framework Programme.

nautical requirements; in certain periods of the year low-water levels can significantly reduce the loading factor of inland waterway vessels.

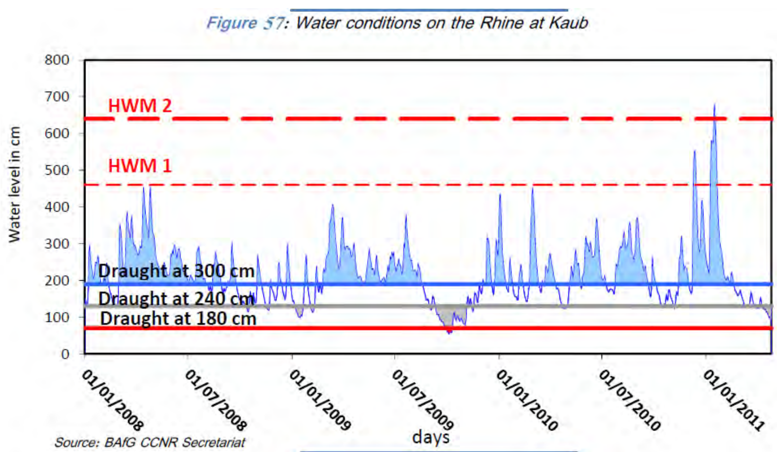
In addition the vessels utilisation rate (payload versus loading capacity and the share of empty sailing) leads to fluctuating transport volumes and an increase of the costs per tonne cargo transported (see also Impact of environmental conditions). This puts off potential customers, who are generally interested in reliable logistics operations and predictable prices. Accidents have the same effect on the inland waterway demand.

Compared to direct road haulage, the costs of transhipment and pre-and-end haulage usually add up to 50% of the door-to-door transport costs. This depends basically on the location of origin/destination. In fact if the shipper or customer is located directly near the river/canal (from 20 to 40 kilometres), pre-and-end haulage can be avoided, resulting in much lower door-to-door costs. Finally, the removal of bottlenecks (technical limitations) could further steer the market to this specific mode. One example is the potential for three-layer containers increasing the bridge heights on the Neckar to more than seven meters.

Impact of environmental conditions

The supply capacity in the Rhine-Alpine Corridor is affected by the low water levels usually in the spring and November (Figure 39). Low water levels (TNO, 2010[45]) have two direct consequences: higher costs and the lower reliability of the mode (limiting the demand). The higher costs occur from the lower draught of ships affecting the vessel capacity; this capacity limitation increases the total throughput times or leads to re-routing affecting severely the transportation costs; EC (2012) indicated a maximum increase of 50−60% whereas TNO (2012) showed that on (annual) average 86% of the feasible trips does not result to additional changes and only 1% results to additional costs of 100%. Both studies mention that there is modal shift to rail or road due to the low water levels. TNO (2010) specifically mentions that from the total of non-feasible trips (7% of the total annual trips) 88% shifts to rail and 12% to road.

Figure 39: Water conditions in the Rhine (2010)



Source: EC (2012)

Safety impact

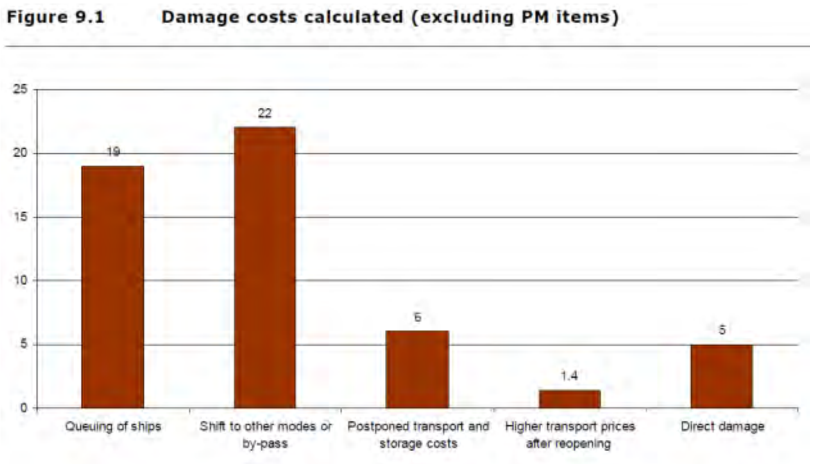
The blockage of the Rhine in 2011 has a significant impact on the transportation of goods in the Rhine. NEA (2011b) prepared a thorough analysis on the costs – from a

[45] TNO (2010): Logistic solution for dealing with the consequences of climate change for inland shipping, Knowledge for Climate, TNO, Mobility and Logistics.

European perspective- of this accident. The closure of the Rhine not only added a high amount of societal and economic costs, it also created reliability issues for the inland waterways.

Relating to damage costs the effect of this accident in total costs 50-55 million euros. The highest costs were estimated for shifting to other modes (22 million euros) and from queuing of ships (19 million euros). The report also mentions that most of the costs were allocated to shippers and operators.

Figure 40: Closure of River Rhine – Damage costs



Source: NEA (2011b)

It is expected that an accident of this calibre should have a strong impact on traffic. To this end, the availability of other modes is important to ensure the transportation of goods and passengers as well as the improvement of communication services (IT-technology) for accident notification and prevention.

4.3.5.3 Capacity for ports (sea and inland waterways)

Expectations for German inland ports

According to Planco (2013), the ports in Germany are expected to increase their multimodal services. Duisburg for example, is expected to accommodate 1,148 (ship) and 2,089 (train), in total summing up to 3,237 thousand TEUs, Düsseldorf 911 (respectively 442 and 469) thousand TEUs, Mannheim 844 (respectively 493 and 351) thousand TEUs. The study indicated that efficient inland waterway transport largely depends on the operating conditions at seaports. High-cost services and schedule deviations in ports reduce the competitiveness of the mode. On the other hand, the capacity limitations in the inland waterways decreased reliability effecting also on the sea ports demand. The study suggested a joint, harmonised action from terminal operators and shipping companies so as to eliminate the bottlenecks in the seaports from inland waterways operating irregularities.

The potential limited handling capacity is also a conclusion from HaCon (2012); the study indicated the necessary handling capacity in 2025 based on the 2007-2025 German projections. Duisburg, Karlsruhe, Frankfurt, Mannheim, Köln and Koblenz were all terminals expected to accommodate from 180 thousand to almost 600 thousand TEUS, whereas in 2008 their handling was within the 70 thousand to 190 thousand TEUS. For the inland waterway-road hubs, the study indicates that the main capacity limitations are expected for Duisburg (almost 250 thousand TEUs), Frankfurt (more than 280 thousand TEUs), Karlsruhe (more than 220 thousand TEUs), Mannheim (more than 200 thousand TEUs) and Düsseldorf and Köln (both more than 100 thousand TEUs). The same study furthermore mentions that the main capacity problems will occur by 2025, due to the increasing volumes and the use of larger vessels in combination to shuttle services to small/medium terminals (which will request the transhipment from larger to smaller containers.

Expectations for ZARA ports

Planco (2013) compared the baseline German prognosis (up to 2025) with the capacity figures for the ZARA ports. Based on their analysis, Antwerpen with a total capacity of 32.4 million TEUs, Rotterdam with 27.6 million TEUs, Zeebrugge with 5.3 million TEUs should not expect a severe capacity deficiency. The study pointed out that the major capacity issue would be for the port of Amsterdam, which should expect circa 3 million TEUs in 2025, when its capacity handling is 1.5 million TEUs.

Expectations for Dutch ports

The CPB (2007) presented the potential capacity issues for the ports in the region of Amsterdam. In 2007, the study indicated that the total transit time was 180 to 200 minutes depending on the type of ship. The study pointed out that congestion problems should be expected with a throughput of circa 90 million tonnes in the ports. This would increase the ports' waiting times by on average 15 minutes and for bulk carriers up to 85 minutes. The study also showed that in case throughput increases further to 100 million tonnes in the Amsterdam-region ports, then an increase in transit times of large ships on average 2.5 hours should be expected (meaning, 4 hours transit time compared to the as-is situation). In most analysed scenarios, the study anticipated congestion problems in the ports; more specifically, the threshold for maximum capacity without additional increase of waiting times will be already reached by 2019. The study suggests that a new lock is necessary to avoid further congestion. Moreover, a new lock would improve the scale of shipping. The study, besides improving the infrastructure also suggests alternative measures, such as tariffs to regulate the growing demand.

Gille (2012) analysed the CPB scenarios for the Rijnmond-Drechtsteden region (Figure 41). More specifically, the study assessed the impact of the number of locks in the Rotterdam port on costs and travel times, extrapolating the high growth and low growth scenarios for vessels. As depicted below, the number of vessels is expected to grow on average by 1.2%-1.8% p.a. depending on the region[46] for the high scenario, whereas for the low, the study expects a marginal growth up to 0.2% p.a. by 2050.

Figure 41: Rijnmond-Drechtsteden seagoing vessel projections

Passage section	2010	2050-GE	Annual growth	2050-LG	Annual growth
Nieuwe Waterweg	57.504	87.802	1,4%	60.076	0,1%
Calandkanaal	13.587	19.327	1,2%	14.513	0,2%
Nieuwe Maas	4.673	8.082	1,8%	4.993	0,2%
Hartelsluis/kering	1.040	1.768	1,8%	1.111	0,2%
Oude Maas	5.713	9.850	1,8%	6.103	0,2%

Source: Port of Rotterdam, Ecorys

The study concluded that increasing the number of locks will accommodate the traffic regardless the weather conditions, however, it will significantly increase the travel times and costs.

The Port of Genova handles around 50 million tonnes yearly representing 10% of the total cargo throughput of all Italian ports. Genoa is also the main Italian container port gateway, with a throughput of around 2 million TEU per year in 2013. According to the Master Plan of Port of Genoa the container throughput is predicted to grow up to 4 million TEU in 2025.

Urban growth

A general factor for further consideration is the development of urban populated areas in the Rhine-Alpine region. Rhine-Alpine covers densely populated areas and it is observed that the development of inland ports and logistics centres is increasingly under pressure from housing, recreation and other functions. A solution to this problem would be, for example, to incorporate industry, business and logistics activities around the terminal and along waterways; this could increase the competitiveness of inland waterway transport even more as costs for pre- and post-haulage can be minimised (NEA, 2011).

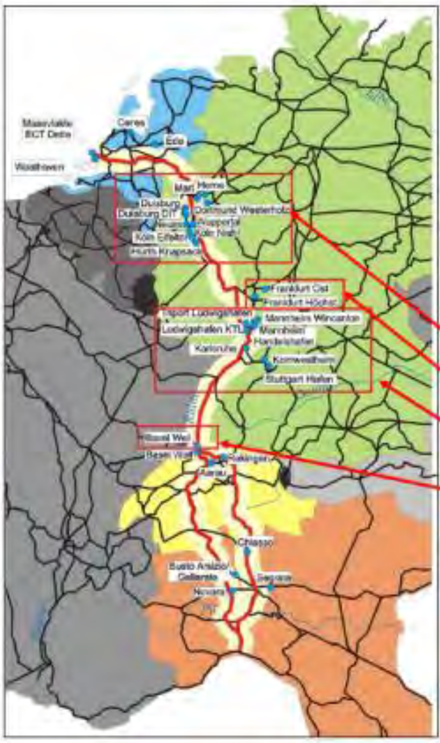
4.3.5.4 Supply analysis for rail-road terminals

The Panteia (2007) study on the rail terminals for the Rotterdam-Genoa freight corridor (Figure 42) indicated the future capacity bottlenecks by 2015 and 2020. The study showed that, in 2007, only in two cases: Rhine Neckar and in the Swiss territory, the capacity was close to its limits. The study moreover analysed the rail capacity, given known extension plans for the corridor; the outcomes were alarming, depicting by 2015, an over-utilisation of most terminals – with the exception of the Netherlands and the Rhine Main, and by 2020 and over-utilisation of all terminals.

In fact, the aggregated volumes of all relevant terminals on the corridor are expected to increase until 2015 about 85% and until 2020 even about 165% due to the expected high rail volumes. Even though, the projected volumes reflect the pre-recession projected figures, they still point out that in many cases the capacity utilisation was more than 70% and even by not reaching the expected volumes, the current capacity would still have coping difficulties.

[46] This is due to the fact that every port basin accommodates different type of cargo; the highest growth is expected for terminals with containerised cargo.

Figure 42: Terminal utilisation rates for Rotterdam-Genoa (2007)



Capacity utilisation of the terminals on the corridor Rotterdam – Genoa 2007 [in %]

Countries (number of terminals)	Capacity utilisation (%) 2007
Netherlands (4)	**64**
Rhine-Ruhr (11)	77
Rhine-Main (2)	37
Rhine-Neckar (7)	85
Upper-Rhine (1)	81
Germany (21)	**76**
Switzerland (3)	**97**
Italy (4)	**62**
total corridor (32)	**71**

Current and forecasted utilisation rates (2007, 2015, 2020) in the terminals on the corridor under consideration of known extension plans

Countries (number of terminals)	2007 Capacity utilisation rate (%)	2015 Capacity utilisation rate (%)	2020 Capacity utilisation rate (%)
NL (4)	**64**	**84**	**111**
Rhine-Ruhr (11)	77	112	150
Rhine-Main (2)	37	70	105
Rhine-Neckar (7)	85	106	143
Upper-Rhine (1)	81	96	122
D (21)	**76**	**106**	**142**
CH (3)	**97**	**105**	**105**
I (4)	**62**	**85**	**123**
total corridor (32)	**71**	**97**	**129**

Source: Panteia (2007)

The Panteia study on terminals identifies a clear capacity problem. More specifically, container terminal operators and customers indicate the negative effect of rail capacity shortage close to terminals potentially taking up space intended for the parking of cars or locomotives at competitive prices.

For rail, the study furthermore mentions that in Italy, as longer trains cannot be accommodated, a future capacity problem can be foreseen. Also in Duisburg/Cologne/Bonn/Frankfurt/Mainz/Mannheim/Ludwigshafen/Karlsruhe/Basel the length of loading track at the terminals is a limiting factor. Capacity deficiencies in terminals are also observed in Geleen/Gelsenkirchen in the Antwerpen –Italy corridor. Due to the current terminal capacity limitations, in Germany and Italy the development of new services is seen with scepticism.

HaCon (2012) brought together the future demand (based on the 2007-2025 projections) and the capacity handling of rail-road terminals. The study pointed out that there could be –following that scenario growth- severe capacity limitations. The main rail-road hubs expected to encounter capacity problems are: Duisburg (lacking 800 thousand TEUs), Mannheim (lacking 720 thousand TEUs) and Köln (lacking 475 thousand TEUs). For non-German hubs, the main issue is identified for Basel (lacking 165 thousand TEUs).

For the freight corridor between the Netherlands and Genoa in the short term additional capacity is required for the terminals in the Ruhr area (Duisburg, Mannheim, Köln). This can be moderated through cooperation and sharing capacity, indicating that administrative measures can improve the efficiency of existing capacity.

The area around Milano requires also an extension of the existing terminal capacity. In 2007, the occupation of the terminals was 85% (Figure 42). In 2015, this capacity figure will be translated into 680,000 TEUs and despite the fact that the capacity of Novara and Segrate is increased, this measure alone will not be sufficient to facilitate growth.

Rail terminals growth

According to RFC (2012) the intermodal handling capacity will double within the next 10 years. Maasvlakte 2 is the main driver of this development. Most terminals in the corridor aim to increase their capacity as well as support their multimodal services (Figure 43).

Figure 43: Future developments in the corridor terminals

Location	Project	Status (2010) Capacity	1st step (2015) Capacity	2nd step (2020) Capacity
Rotterdam	Maasvlakte 2			
Duisburg	New hub	220.000	320.000	520.000
Köln-Eifeltor	Re-building 3rd module	270.000	370.000	470.000
Frankfurt-Ost	Upgrade 3rd crane	60.000	120.000	160.000
Kornwestheim	Re-building 2nd module	200.000	250.000	300.000
Mannheim	Mega-Hub Rhein-Neckar	100.000	100.000 Extension KTL and Wincanton	100.000 Mega Hub (DB Netz)
Basel	New 2nd module	150.000	250.000	300.000
Limmattal	Gateway Limmatal		5 tracks > 700m	
Genoa	Voltri Mare		2 new tracks electrification	
Genoa	Voltri Mare		New module, operative track length > 1.000m	
Total [TEU]		1.020.000	1.410.000	2.000.000

Source: Rail Freight Corridor Rhine-Alpine, Progress Report (2012)

Based on the analysis (of 19 terminals along the corridor) a strong discrepancy among the operating hours was noticed; some terminal facilities opened only 50 hours per week, whereas the biggest terminal facility offers its service 24/7 (168 hours per week). This could be due to the correlation of the handling capacity [TEU] and the opening hours. Overall, based on the sample of 19 terminals, 11 (equal to 57%) were open for 84 hours per week (50%) or even longer. Transferred to a daily basis, an opening time of 16 hours (5 work days/week), 14 hours (6 work days/week) or 12 hours (7 work days/week) was offered to the clients.

HaCon (2012) looked at the capacity limitations in the road-rail German ports up to 2025, based on the BWVI (2007) projections; more specifically the study estimated given the expected demand the gap between existing and future needed capacity in thousand intermodal loading units (ILUs).

As it can be observed in Table 29, in many cases the capacity needs are more than 100%, i.e. it is necessary at least to double the capacity in order to cope with the future demand. In the case of Frankfurt, there is a limited need for additional capacity whereas for Duisburg the capacity should be almost triple to cover the prospective demand. Finally, in the cases of Karlsruhe and Koblenz, there is no need for additional capacity.

Table 29: Future capacity needs for the German rail-road terminals

Rail-road terminals	2008 capacity (in 1,000 ILUs)	2025 capacity needs (in 1,000 ILUs)	Variation (in 1,000 ILUs and %)
Basel	150	315	165 (110%)
Duisburg	460	1,260	800 (174%)
Frankfurt	199	266	67 (34%)
Karlsruhe	247	215	-32 (-13%)
Köln	494	969	475 (96%)
Mannheim/ Ludwigshafen	500	1,220	720 (144%)
Neuss/ Düsseldorf	270	561	291 (108%)
Koblenz	50	25	-25 (-50%)

Source: HaCon (2012)

4.3.5.5 Supply analysis for road

Panteia (2014) indicates several capacity bottlenecks in the Rotterdam-Genoa route. Severe bottlenecks are expected around urban nodes due to the increasing urbanisation and motorisation rates. A further analysis was conducted based on the ETISplus (2010) data. More specifically, the average road intensity was estimated based on the average daily traffic counts (daily average value) and the number of lanes and their maximum capacity on the corridor links. The Figure 44 below presents the findings of this analysis. The traffic count data use the following national sources:

- Federale Overheidsdienst Mobiliteit en Vervoer, Verkeerstellingen, 2009 for Belgium
- Setra, Recensement de la circulation sur les routes nationales et autoroutes. Donnees de l'année 2010 for France
- Bundersanstalt fuer Strassenwesen (BASt), Manuelle Strassenverkehrszalhlueng 2010
- Rijkswaterstaat, Ministerie van Infrastruktuur en Milieu, 2010

There was no traffic count data reported for Italy.

Overall, most of the road network presents a more than 50% capacity utilisation, including the non-urban links. Only in the cases of Switzerland and Belgium the capacity utilisation is less than 50% (represented in green in the figure below).

The highest utilisation points are -as expected- the ones around the urban nodes, where congestion is present. More specifically, the capacity utilisation of 90% or higher (up to 125%) was observed around Basel, Köln and Dusseldorf. In addition, utilisation rates between 75% and 90% around Karlsruhe, Darmstadt and Frankfurt as well as between Düsseldorf and Köln for Germany and in Rotterdam for the Netherlands.

The other links present an utilisation rate below 75%. Here, it should be noted that as this analysis considers the average daily traffic counts, the utilisation around peak hours should be expected to be higher, especially around the urban nodes.

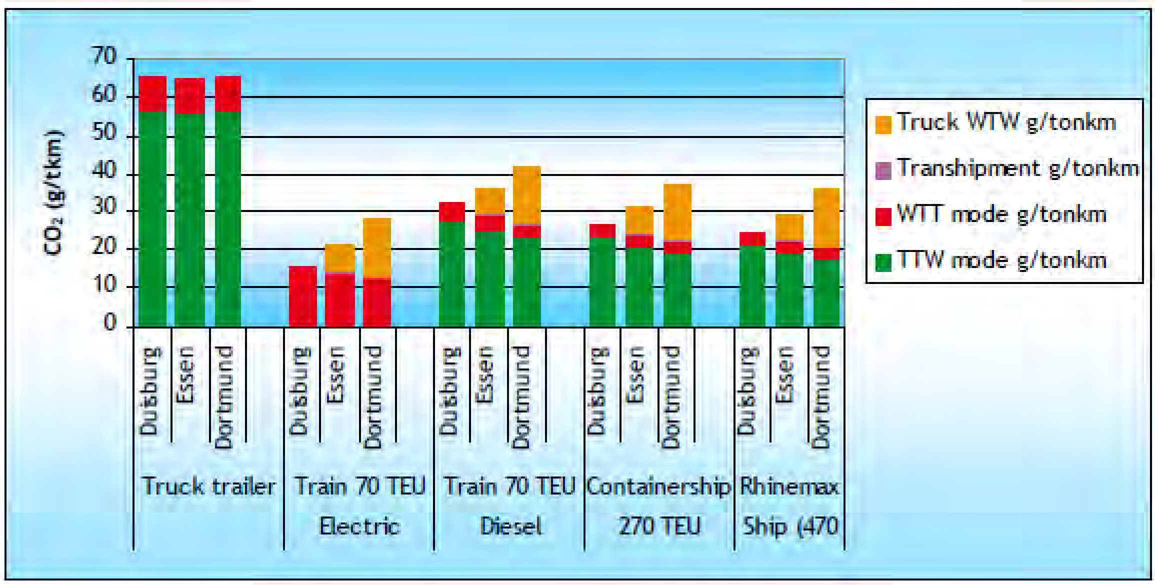
Figure 44: Road intensity on the Rhine-Alpine Corridor

Source: Panteia, ETISplus (2010)

4.3.6 Environmental impacts

NEA (2011) measured the difference in CO_2 emissions per tonne-kilometre for containerised transport between Rotterdam and Duisburg using various modes (2009 data). Even though this analysis covers a specific type of transportation, it is still very insightful especially for assessing the difference between road and other modes. Figure 45 demonstrates this difference; road is the most CO_2-emitting mode. The study further mentions that, for the given example, inland waterways can contribute to savings in CO_2 emissions of 43% to 63% per tonne-kilometre for a door-to-door chain, based on inland waterways for the main haul.

Figure 45: The CO_2 comparison for Rotterdam-Duisburg



Source: NEA (2011)

As all rail services are electrified, the main intervention point for rail is the source of electricity. The use of LNG instead of diesel could further improve the performance of inland waterway transport in the corridor[47]. Finally, road could promote alternatively fuelled vehicles for long-distance trips together with refuelling facilities.

[47] For the successful deployment of LNG, the depth of the Rhine should be increased to 2.8 m at low tide decisive from Krefeld tot Koblenz (Panteia, 2014)

4.3.7 Scenarios for a multimodal Rhine-Alpine Corridor

In order to depict the potential effect of changes on the corridor sections, the multimodal TMS looks in the transport performance of the relevant sections and its future potential. This is performed via a scenario analysis using the NEAC10 model. The base year of the analysis was 2010 using ETISplus data and networks. The baseline (no policy) forecast used GDP/GVA assumptions have been estimated for 2030 and 2050, based upon the EU Energy, Transport and GHG Emissions "Trends to 2050" Reference Scenario 2013. Finally, the "compliance" to TEN-T standards scenarios was defined considering the additional to baseline assumptions:

- Seamless interoperable railway
  - Electrification of the whole network
  - New UIC gauge links in the network
  - Use of 740m trains
  - ERTMS full deployment and double tracks
- Road tolling
- Increase in number of drivers' breaks
- Single Window for maritime transport,
- LNG fuel for ships

Here we should note that the development of the scenarios was performed for the whole European network, and not solely for the Rhine-Alpine Corridor. In this way, it was possible to address the impact of various measures at EU-level and the effect on the Rhine-Alpine Corridor simultaneously.

The following table presents the translation of measures into modelling assumptions and their geographical scope:

Table 30: Modelling assumptions of the "Compliance" 2050 scenario

Measure	Modelling assumption/ Change in the modelling parameters	Geographical scope
(1) Seamless interoperable corridor	Improvement in efficiency and reliability of rail services (net effect is cost reduction per km and reduction of border crossing times)	Whole European network
Electrification of the whole network	Identify in the network newly electrified links	
UIC gauge links	Identify in the network new UIC gauge links	
740m trains	Rail cost reduction	
ERTMS	Supply-side measure – additional paths in network, but no change in costs	
Single/ double track	Supply-side measure – additional paths in network, but no change in costs	
22.5 tonnes	No additional effect	
(2) Road measures	Increase of operating costs and times	
Tolling	Increase in road costs per km on Core Network links	Whole European network
Increase in number of drivers' breaks	Increase in road journey time	RALP
(3) Water transport measures	Various effects	
Single Window for maritime	Fixed cost reduction per ship arrival	
LNG fuel for ships	Variable cost increase per tonne-kilometre for maritime transport	
Seine-Escaut CEMT V connection	Reduction in costs for IWT in France and Belgium	NS MED, RALP, impact on the whole network

Source: Panteia

The "compliance" scenario assumes that all these changes/ additions take place by 2030 and by 2050 to their full potential. For example, rail is fully electrified or 740m trains are operational in the whole network.

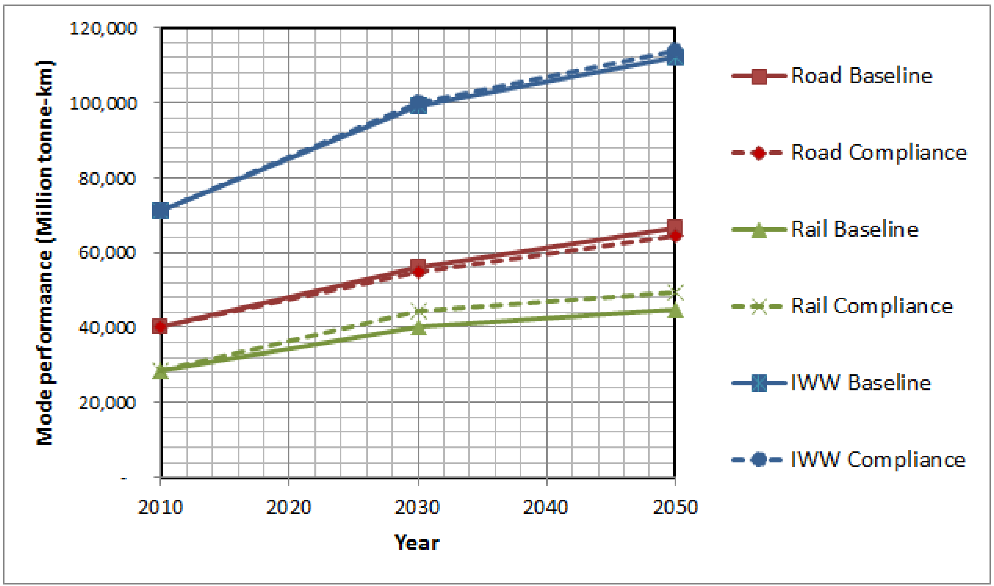
The outcomes of the five model runs from the NEAC10 model (2010, 2030 Baseline, 2030 Compliance, 2050 Baseline and 2050 Compliance) are presented in tonne-km, measuring the difference in transport performance for the Rhine-Alpine Corridor sections, based on the corridor alignment. The analysis is not expanded to other regions or additional links as the purpose of the scenarios is to indicate the current and prospective transport performance on the corridor links. The analysis comprises the import and export flows, transit flows as well as domestic flows covering all market perspectives. The results are presented in the form of:

- Tables (total, import/ export and transit tonne-km for the RALP alignment);
- Maps (total tonnes in the Rhine-Alpine alignment sections).

Mode performance for the Rhine-Alpine

The study uses the tonne-km indicator for the changes in the modal shares among the scenarios as well as the market segments. The figure below depicts the demand and transport performance per mode for the five model runs per mode. Whereas road is expected to decrease by 2030 and 2050 in the Compliance scenario, the other modes are expected to demonstrate an upward trend; the highest growth is expected for rail followed by the inland waterways.

Figure 46: Mode performance per scenario



Source: Panteia

As it can be shown, in the Baseline scenario, road demonstrates the highest growth trend, followed by a slightly lower growth for rail and inland waterways. This is consistent with the various literature-based scenarios, which anticipate the highest growth to be for road. When applying the various policy interventions, rail demonstrates a faster growth than the other modes; by 2030 it is projected to growth by 55% (instead of 41% without the interventions) and by 2050 by 74% (instead of 57%). This is mainly due to the expected decrease in travel costs and times, which make rail a more attractive option for hinterland transport. The growth in tonne-km is similar as that estimated tonne-km is on link level.

The total demand (all modes combined) is also expected to become larger in the Compliance scenario; this is mainly due to the rail growth the difference in the rail projections). This is because the lower costs and times as well as the higher level of service act as incentives for attracting more demand on the corridor. Table 31 shows the annual average growth rates for each mode on the corridor. One can observe the faster growth for the time period 2010-2030 and the lower pace growth between 2030 and 2050. This is mainly due to the socioeconomic assumptions; the EU reference scenarios expect a faster economic growth from 2010 to 2030 and then a lower growth up to 2050. The faster economic growth also reflects the supply side expectations with most interventions already implemented on the corridor by then. This is shown in the similar growth trends for the Baseline and Compliance scenarios in the 2030-2050 time period. The individual mode performances also depend on the types of commodities allocated to them; these also follow different trends for the 2010-2030 and 2030-2050 time periods. The example for rail is characteristic for the corridor. Rail expects the highest performance, growing more than 2% annually for the 2010-2030 period. This is due to the specific growth of economic factors which affect the demand for coal, building material and manufactured items (for the latter there is strong competition with inland waterways). By 2050, the demand for coal and building material increases marginally. This affects the growth rate for rail depicting limited growth (11% in total for the Baseline scenario and 12% for the Compliance scenario). At the same time, commodities transported by road (such as perishable goods) and inland waterways (manufactured items and fuel products) have a slow but continuous growth; this is demonstrated in the smaller growth rates discrepancy.

Table 31: Mode performance on the Rhine-Alpine links

Million tonne-km	Pa growth (2010-2030 Baseline)	Pa growth (2010-2030 Compliance)	Pa growth (2030-2050 Baseline)	Pa growth (2030-2050 Compliance)
Road	1.68%	1.53%	0.83%	0.83%
Rail	1.72%	2.23%	0.54%	0.56%
IWW	1.67%	1.74%	0.63%	0.64%
Million tonne-km	**Relative growth (2010-2030 Baseline)**	**Relative growth (2010-2030 Compliance)**	**Relative growth (2030-2050 Baseline)**	**Relative growth (2030-2050 Compliance)**
Road	40%	36%	18%	18%
Rail	41%	55%	11%	12%
IWW	39%	41%	13%	14%

Source: Panteia

The corridor model runs also differentiated at link level on the market segments, and specifically, domestic, imports, exports and transit traffic. Table 32 shows a potential growth of 2% for transit traffic in the corridor, occupying more than a quarter of the total corridor demand with rail being the mode with the highest share of transit traffic. At the same time, due to the modest economic growth predictions in the corridor countries, imports and exports maintain the same market share; both of them represent the largest segment of the demand with more than 50% of the market; this percentage is strongly dependent on the imports and exports performance for inland waterways. Finally, for the same reasons, domestic transport also remains at more or less the same levels. As expected road is the most representative mode for domestic transport, covering in total more than two thirds of the domestic market.

Table 32: Market segments on the corridor alignment

Market	2010	2030 Baseline	2030 Compliance	2050 Baseline	2050 Compliance
% Transit	25.9%	27.3%	27.9%	27.9%	28.4%
% Imports/ Exports	52.6%	52.0%	51.7%	51.6%	51.3%
% Domestic	21.5%	20.7%	20.5%	20.5%	20.3%

Source: Panteia

The following Table 33 presents the modal split for tonne-km for the years 2010, 2030 and 2050. The tonne performance in the corridor is depicted in the maps section. In this way, it is possible to have a clear overview of the transported tonnes (in map form) as well as the mode performance (in figures).

Table 33 shows that for the corridor sections[48], the sovereign mode is inland waterways (almost 51%), followed by road (28.8) and lastly by rail (20.4%) in 2010. Whereas the shares do not change significantly for the Baseline scenario in 2030 and 2050, the relatively stronger position for rail is shown by the increase in its share and the consequent shift from road and - to a lesser extent- from inland waterways. As rail grows at a slower pace in the 2030-2050 time period, its share is slightly decreasing, however, it remains higher than its 2010 value.

Table 33: Modal split for the corridor alignment

Modal split in tonne-km	2010	2030 Baseline	2030 Compliance	2050 Baseline	2050 Compliance
Road	28.8%	28.8%	27.4%	29.7%	28.3%
Rail	20.4%	20.5%	22.2%	20.0%	21.7%
IWW	50.8%	50.7%	50.3%	50.3%	50.0%

Source: Panteia

Conclusion from the scenarios

The five scenario runs in NEAC10 showed the potential growth for demand and the mode performance. The demand growth follows the economic growth assumptions for the corridor countries: faster for the 2010-2030 time period and slower for the 2030-2050 period. Furthermore, the model reacts to additional policy measures (targeting supply characteristics for all modes). The impact of the measures on the corridor is mainly reflected on rail; the mode is expected to increase its share and its volumes especially by 2030. The inland waterways maintain their strong position in the corridor and road slightly decreases. Market-wise, the transit volumes expect the highest growth in their share (more than 25%). Together with the imports and export volumes, this share amounts to more than 75%, demonstrating the significance of international traffic on the corridor.

The following section presenting the maps (current and prospective demand) also demonstrates the growth on the corridor links and confirms the capacity limitations mentioned in the supply analysis of the TMS.

Rhine-Alpine total performance analysis and scenario expectations

The following maps present the tonne-kilometre per mode and per Corridor section for the three runs (2010, 2030 baseline and 2030 compliance, the respective 2050 maps are presented in the Annex 13). The maps present the major flows per mode in the corridor based on the corridor alignment. Furthermore, they present the absolute differences between the 2050 baseline and 2050 compliance scenarios.

The legend for each map specifies the ranges for the demand on a specific link in tonnes. For visualisation purposes, the ranges per mode remain the same (except from the last one, which represents the upper bound for the flows). In this way, it is possible to observe where the highest growth is expected. Moreover, the brackets next to the ranges define the number of links belonging to the specific range. These are also a quick indicator of growth as an increase/ decrease in this value demonstrates a positive/ negative growth in the number of links within a specific range. For example, in 2010, the rail network showed a total of 25 links with demand of more than 40 million tonnes; this number in 2050 baseline is projected to 46 and in

[48] This analysis is based on the corridor alignment. This covers the corridor sections in Belgium, Germany, Italy, the Netherlands and Switzerland for the rail and road networks and for the inland waterays, Germany, France, the Netherlands and Switzerland.

2050 compliance scenario to 52 links. Finally, the maps present the total network for each mode:

- For rail, the ETISplus network is used;
- For road the TENtec network and;
- For inland waterways the PLATINA network.

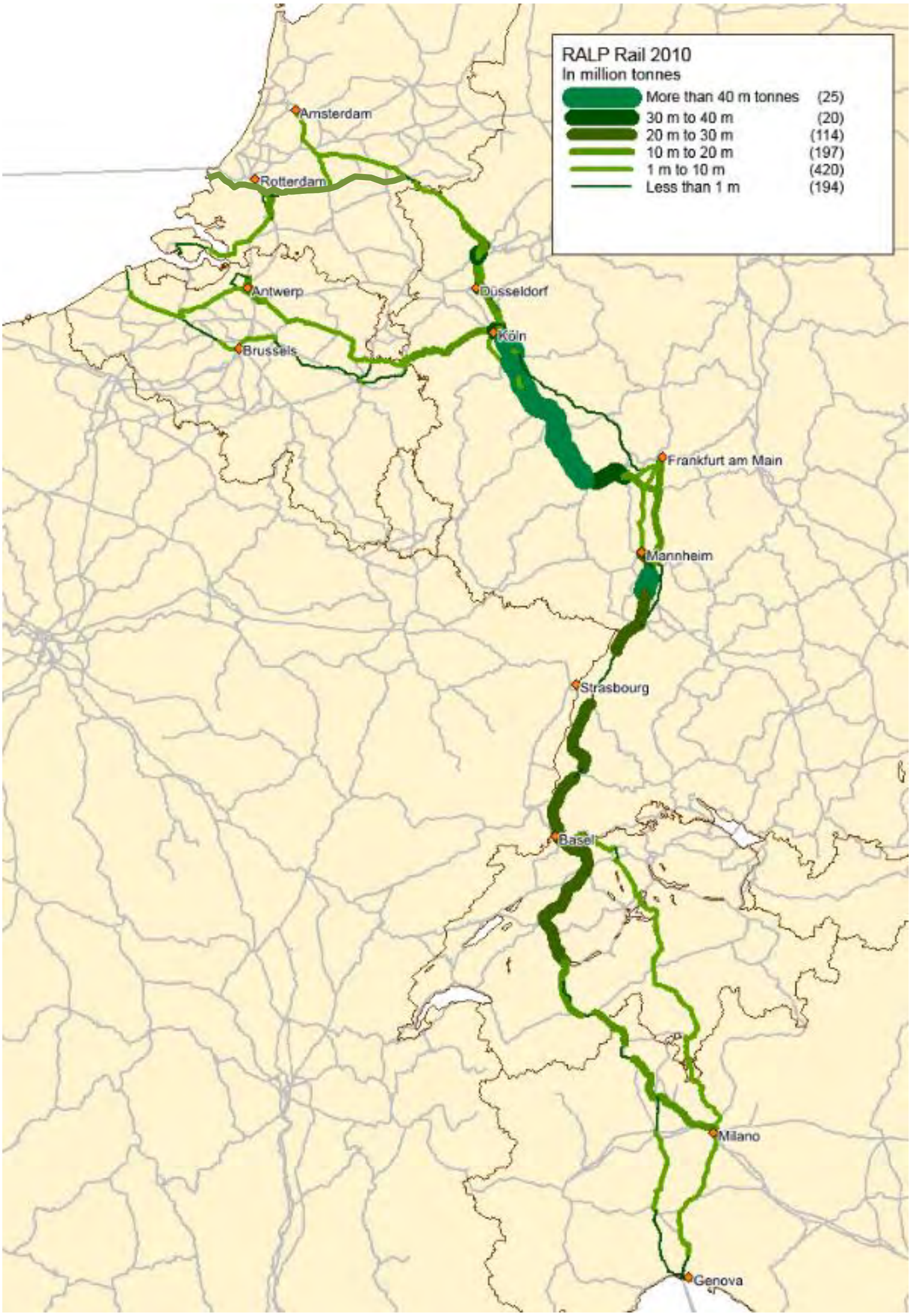
For rail, the main flows are depicted in the German territory in 2010, and specifically in the area close to Köln, Frankfurt and Mannheim, followed by a strong presence through Switzerland and Italy. In the 2030 Baseline scenario as well as the Compliance scenarios, additionally to the growth around the abovementioned areas, an increase is expected around Stuttgart, Karlsruhe and Freiburg. Furthermore, the links which cross Switzerland through Bern and up to Milano as well as from Antwerpen to Köln and around Rotterdam also expect a high growth. This is an important conclusion for the study as for supply analysis of the TMS these nodes expect to a large extent over-utilisation of both the network as well as their terminal capacity.

For inland waterways the links from Rotterdam, following the Rhine to Duisburg and then to Frankfurt are the busiest ones in the network. The present analysis does not cover inland waterways in Belgium as it is not part of the RALP alignment. However, the PLATINA map demonstrates the significance of the Belgian inland waterway transport to the total traffic presenting 2013 figures for Belgium. By 2030, the corridor links are expected to demonstrate the highest growth, with the addition of the link from Amsterdam to Utrecht and Nijmegen. The later denotes a potential capacity problem in the Netherlands (related to the lock of Amsterdam and the high throughput times). Finally, the inland waterway ports in Germany are also expected to have potential capacity issues from the growing demand.

The road network demonstrates a more evenly distributed flow, with the exception of the traffic around urban nodes. In 2030 for both the baseline and the Compliance scenarios, this situation is expected to aggravate as the demand will be increasing to a large extent in the whole network. Next to the network limitations causing congestion around urban nodes, the capacity of rail-road terminals could also be affected by this growth.

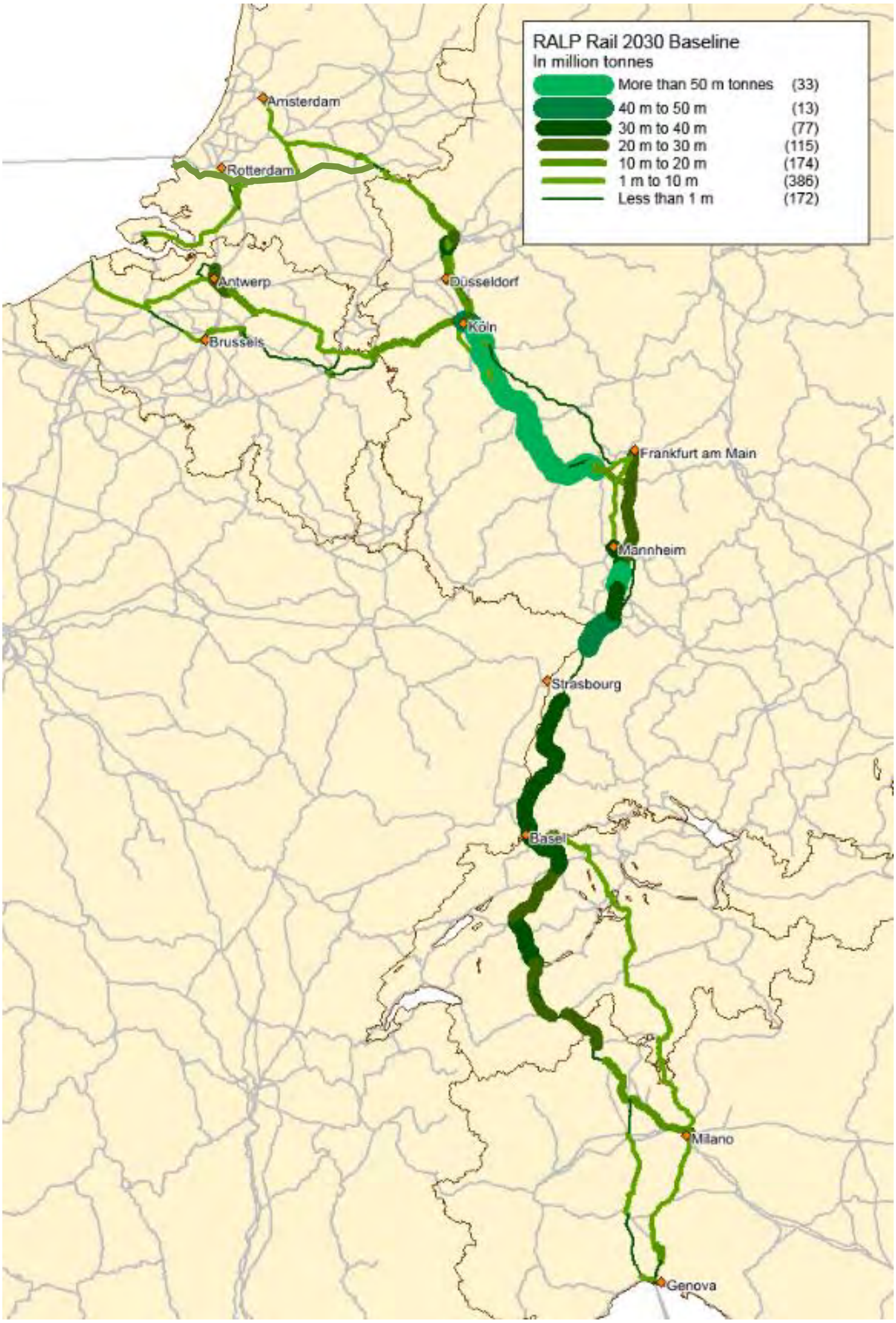
The absolute differences between the baseline and Compliance scenarios are also demonstrated in maps. In general, the maps demonstrate for 2030, the growth in rail in the compliance scenario with the consequent decline in road and inland waterways (highlighted by the negative ranges). For road, this decline is demonstrated, for example, around Brussels and Liège, or close to Zürich. For inland waterways the main affected by the policy intervention sections are around Rotterdam and from Duisburg to Köln. As expected these demonstrate an increasing share of rail, taking over the inland waterway traffic. Rail is also growing sharper around Milan.

Figure 47: Rail performance on the corridor (2010)



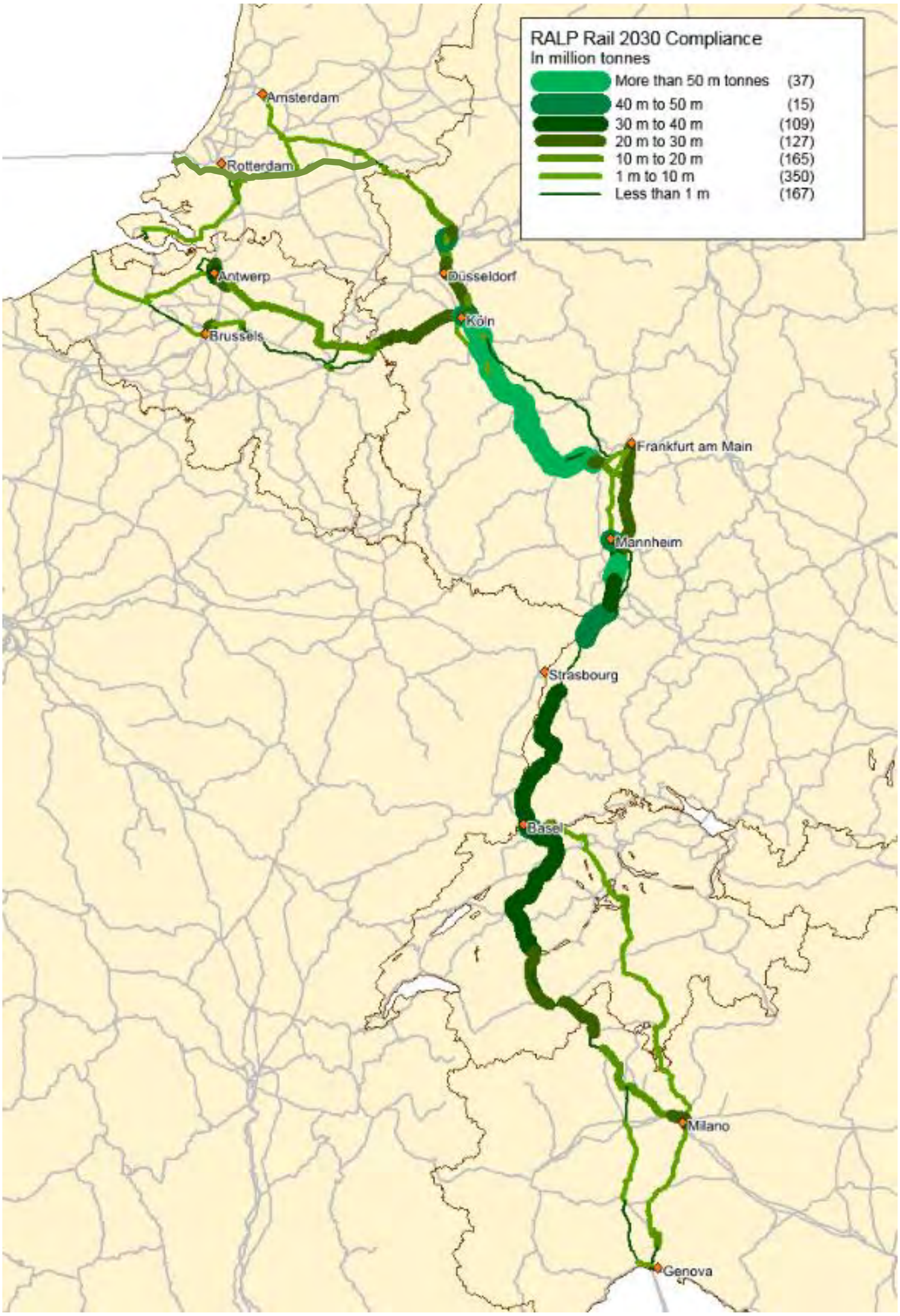
Source: Panteia, ETISplus

Figure 48: Rail performance on the corridor (2030 Baseline)



Source: Panteia, ETISplus (2010 basis), ETISplus network alignment

Figure 49: Rail performance on the corridor (2030 Compliance)

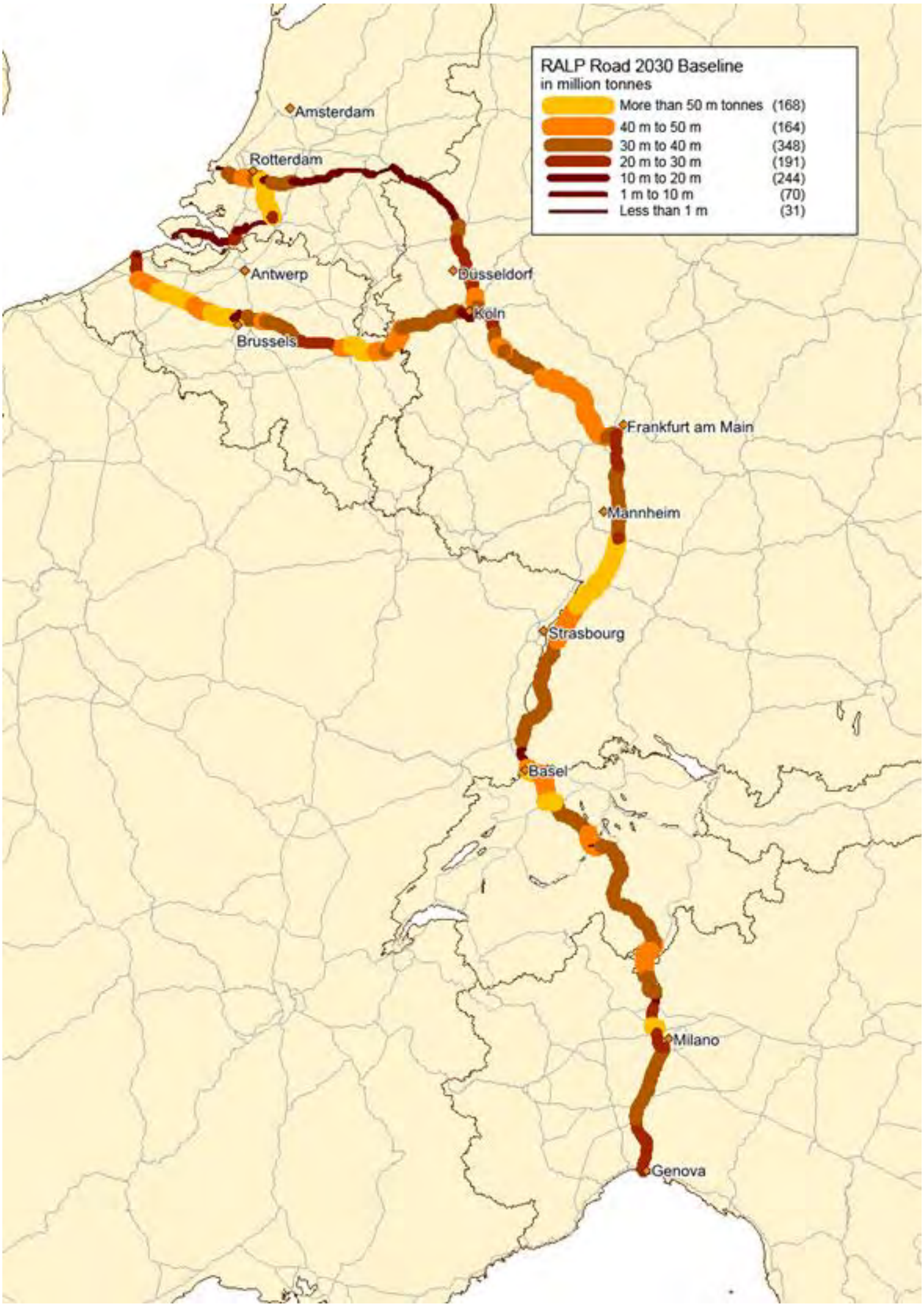


Source: Panteia, ETISplus (2010 basis), ETISplus network alignment

Figure 50: Road performance on the corridor (2010)

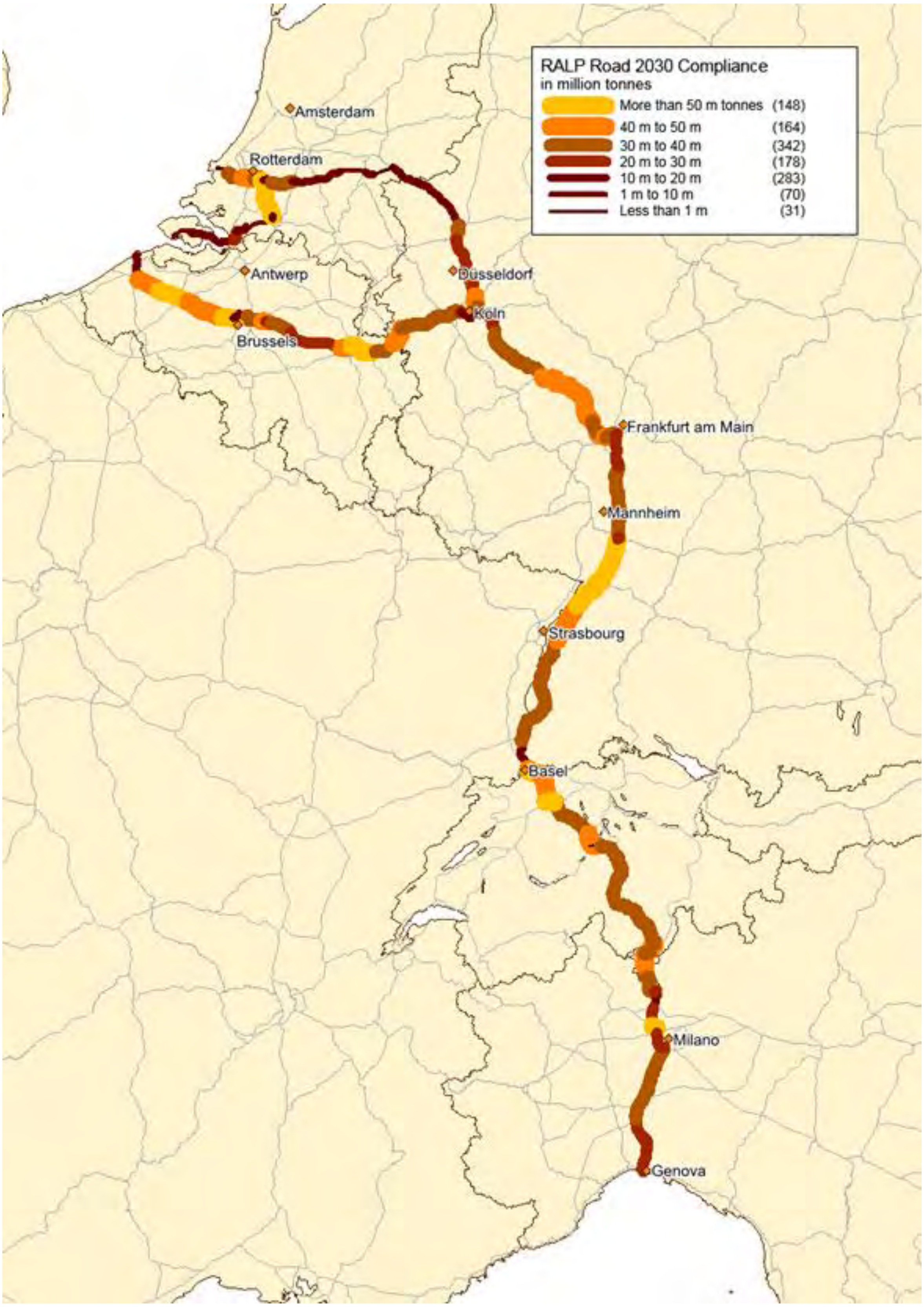
Source: Panteia, ETISplus (2010 basis, TENtec network alignment)

Figure 51: Road performance on the corridor (2030)



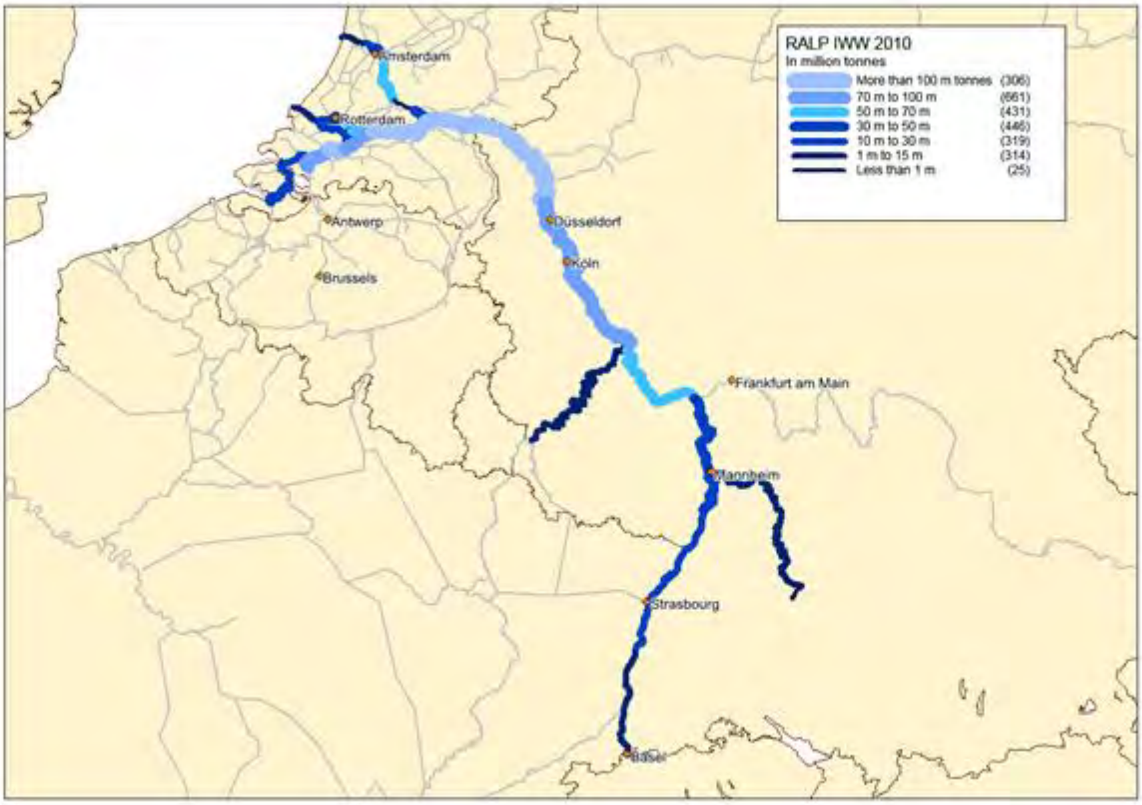
Source: Panteia, ETISplus (2010 basis, TENtec network alignment)

Figure 52: Road performance on the corridor (2030 Compliance)



Source: Panteia, ETISplus (2010 basis, TENtec network alignment)

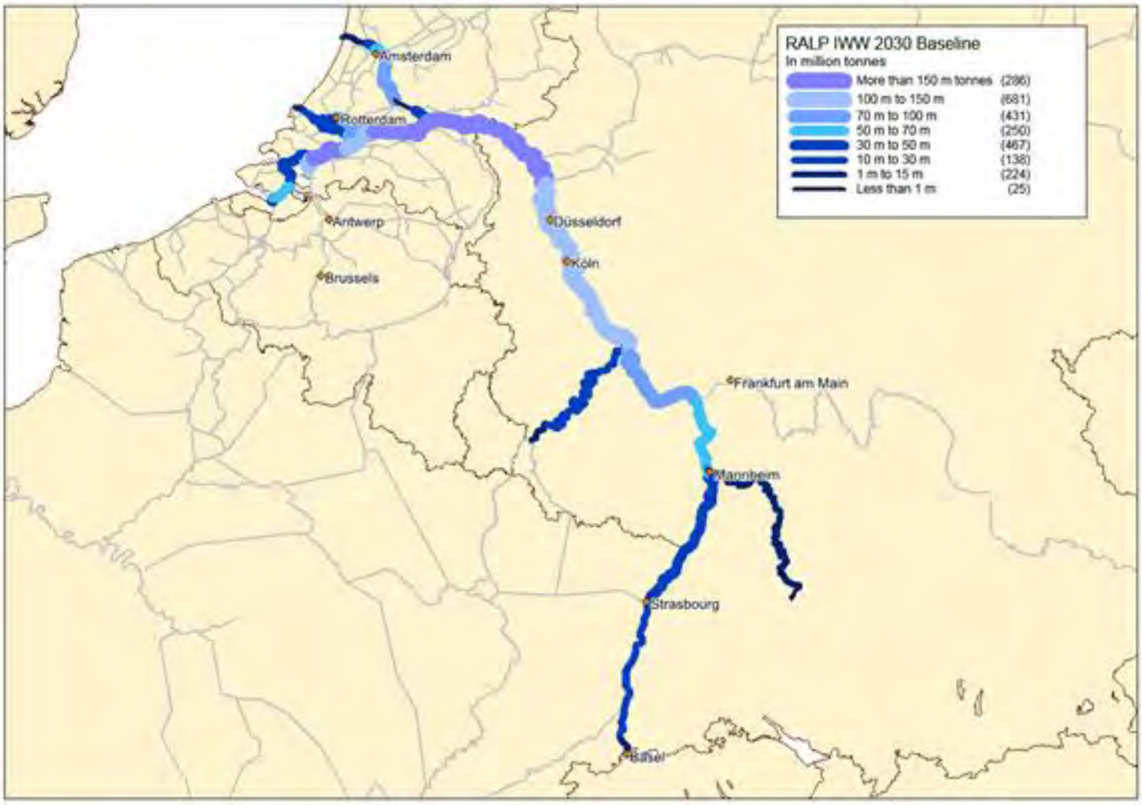
Figure 53: Inland waterways performance on the corridor (2010)[49]



Source: Panteia, ETISplus (2010), PLATINA network alignment

[49] BE IWW traffic flows are not presented on this map as strictly the BE IWW network does not belong to the alignment of the Rhine-Alpine Corridor

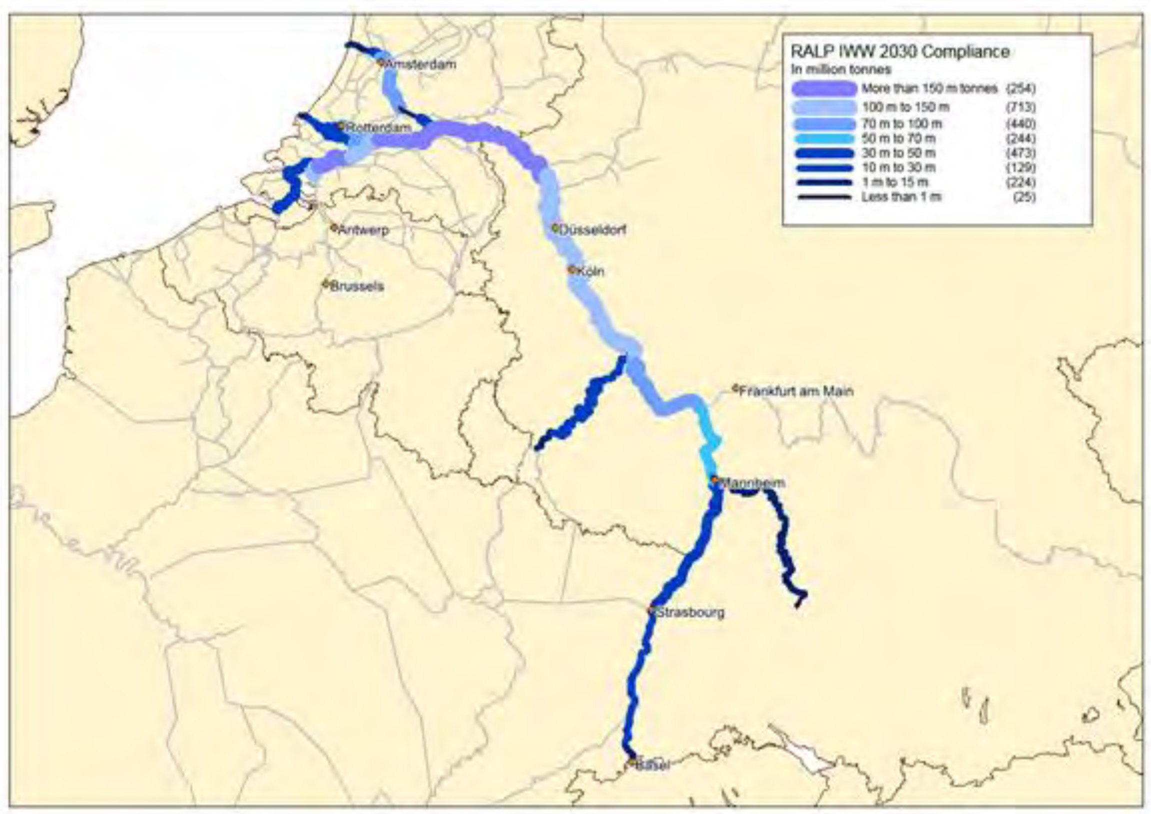
Figure 54: Inland waterways performance on the corridor (2030 Baseline)[50]



Source: Panteia, ETISplus (2010 basis), PLATINA network alignment

[50] BE IWW traffic flows are not presented on this map as strictly the BE IWW network does not belong to the alignment of the Rhine-Alpine Corridor

Figure 55: Inland waterways performance on the corridor (2030 Compliance)[51]



Source: Panteia, ETISplus (2010 basis), PLATINA network alignment

4.3.8 SWOT analysis for the TMS

This section presents the Strengths – Weaknesses – Opportunities – Threats (SWOT) analysis for a multimodal Rhine-Alpine Corridor, presenting conclusions from the supply as well as the demand analysis. Input to the following tables was derived from the reviewed scenarios (projections), market and supply characteristics studies (supply analysis) as well as the technical parameters for the Rhine-Alpine network and the objectives analysis (presented in the following section).

The following Table 34 presents the SWOT analysis for rail and rail-road terminals.

[51] BE IWW traffic flows are not presented on this map as strictly the BE IWW network does not belong to the alignment of the Rhine-Alpine Corridor

Table 34: SWOT analysis for the Rhine-Alpine Corridor (rail)

Strengths	**Weaknesses**
• Lower costs (per tonne) compared to road could steer long-distance trips to rail • Higher capacity than road • Multimodal services are faster in most countries • Sustainable solution • Intra-modal competition improves the productivity of the freight rail market and stimulates new market activities • Definition of international pre-arranged freight train paths • Flexibility in the definition of reserve capacity for ad hoc requests • Strong international demand in the corridor ports increasing the flows entering and exiting the corridor • The whole Corridor is electrified • Corridor one-stop-shop	• Physical bottlenecks and missing links in the rail network • Punctuality and reliability are still weak elements (due to works/ weather conditions) • Logistics processes less transparent • Technical parameters for the rail network are not optimised • Fragmented volumes and empty wagons • Limited capacity in number of trains per day (depending on day/ month) for specific sections • Capacity limitations due to high passenger demand as well as infrastructure-related issues (weather conditions/works in the corridor)Customs/administrative barriers (varying processing times in borders) • ERTMS currently at 12% • No possibility of unrestricted operation of 740m trains in all parts of the corridor (especially Italy) • Limited maximum speed and low average speed • Limited multimodal links to ports
Opportunities	**Threats**
• Growing demand in the corridor (especially for transit activities, consequently increasing the demand in the corridor) • Shift to long-distance transport • Growth in containerised transport • ERTMS deployment • Improve technical parameters (including speed and punctuality) to make rail more competitive for long distance trips • Capacity growth for specific section with current/ forecasted bottlenecks • Higher fuel costs have a high impact on road operating costs • New multimodal sites are implemented • Port plans promoting multimodality to increase the share of rail next to inland waterways • Longer trains can lower the costs for transportation of automotive or combined traffic (NSTR9) • New services due to intra-modal competition • Improve the interface between terminal operators and IMs • Communication and cooperation among all the rail operation parties/harmonised methods, processes and tools commonly defined by IMs from all corridors • Further implementation of "One Stop Shop" applying harmonised concepts for international capacity allocation on every freight corridor • Increase PAPs in the corridor (currently 48/day)	• Financial issues due to the economic crisis limiting the investment on rail/ providing less subsidies for rail • Capacity issues in main stretches; currently present in specific sections (e.g. Upper Rhine working on full capacity) and a projected over-utilisation for the whole of the Rhine-Alpine Corridor • High competition from inland waterways for shared commodities due to terminal capacity, barge capacity and low costs • Larger trucks taking over the long distance share for rail • Noise regulation impeding the growth for rail freight services • Energy policies favouring renewable energy sources

Source: Panteia

Table 35: SWOT analysis for the Rhine-Alpine Corridor (road)

Strengths	Weaknesses
• Higher cost effectiveness due to extended loading capacity of trucks • High flexibility • Seamless transport chain • High transparency on the transport chain • High density of road network (alternative routes) • Short timing cycle for innovation	• Low safety level (high number of accidents) • Traffic congestions during peak hours (especially in and around urban nodes) • Aging of road infrastructure; need for upgrade (especially in Germany) • Low number of parking spots • Driving restrictions • Low transport volume per truck (compared to e.g. barge or train) • Driving bans (weekend/national holidays)
Opportunities	**Threats**

• Corridor-wide implementation of efficient ITS systems
• Integration of intermodal transport, logistics chains, last mile connections
• Urban consolidation/distribution centres
• Innovative solutions for fuel technologies
• Growing urbanisation
	• Rising competition of rail
	    ○ 740m trains
	    ○ ERTMS
	    ○ upgrade of loading gauges
	• new constructions (e.g. Rhein-Ruhr-Express) and upgrades of existing lines (e.g. Zevenaar – Oberhausen) allow for higher capacity and enhance rail transport quality in general
	• Need for compliance with TEN-T standards until 2030
	• Rising public awareness against road transport (noise pollution, environmental pollution)
	• High/unstable conventional fuel prices
	• Policy promoting non-road transport modes
	• Emissions policy affecting the fleet competition

Source: Panteia

Table 36: SWOT analysis for the Rhine-Alpine Corridor (IWW, inland ports and seaports)

Strengths	**Weaknesses**
• Freight transport sovereignty for the cross-border flows between Germany, Netherlands and Belgium • Strong link of sea ports and inland ports • Shift to long-distance transport • Growth in containerised transport • Low costs (per tonne) • High terminal capacity • Relatively low noise emission • CEMT at class IV (accommodating 1000-1,500t vessels) in the whole network • The other technical parameters for inland waterways already reach their optimal level • No congestion on network, limited interference between freight and passenger transport • Container market developed	• Physical bottlenecks and missing links in the waterway network • Technical limitations (number of locks and other measures) increasing the average processing time in ports • Similarly to rail, no alternative routes • Punctuality and reliability • Areas (Upper Rhine) where low water levels can significantly reduce vessel capacities • lack of cooperation between operators and with other modes, • limited awareness among potential customers as well as among responsible (regional) authorities • exhaust gases (NOx and particulate matter)
Opportunities	**Threats**
• RIS deployment • Growing demand in the corridor (especially for transit activities, consequently increasing the demand in the corridor) • Shift to long-distance transport • Growth in containerised transport • Further increase of road freight transport costs and congestion of roads • Capacity growth for specific section with current/ forecasted bottlenecks • Defragmentation of flows increasing the average utilisation rates for vessels • Potential of the use of alternative fuels; in particular LNG	• Traditional markets like steel industry, petrochemical industry and agri-bulk market are expected to marginally grow • Improvements in other modes • Urban sprawl taking over limiting the area of inland waterways

Source: Panteia

Road transport

Road is not a priority in terms of required new or upgraded infrastructure for the multimodal corridor; in fact for passenger demand, road already covers most traffic in the corridor, whereas for freight, it is placed second. The road related cargo is expected to increase in the coming years, and therefore does not pose any threat on the total transported volumes. Moreover, from the national and regional forecasts, road remains at a key position also in the future and none of the studies anticipates a significant decline in its modal share.

Road is, in terms of technical characteristics, well evolved in the corridor. However, there has been limited information publicly available.

The main threats for road transport would be an increase in fuel costs, directly having an impact on operation costs and the impact of non-road policies; these however, mainly affect the urban modes. Another important conclusion for road is the impact of congestion (especially during the peak hours) in the urban areas. Due to increasing urbanisation trends, it is expected that the passenger and freight traffic around urban areas will follow a rising trend. This could influence the international flows as well. However, it is rather uncertain to speculate on this trend as it depends on various external parameters.

Improving alternative-fuelled infrastructure for long-distance travel could improve the road environmental profile and therefore attract further demand.

Additional multimodal aspects

There is a high potential on multimodal services in the corridor due to a significant presence of multimodal hubs (sea-rail, sea-rail-inland waterways, rail-road). The further improvement of multimodal connections, making a seamless transition between modes could further improve the multimodal aspect. Information technologies could have a strong impact on this; real-time information systems, optimal multimodal routing, multimodal planning platforms could all contribute to this end.

Around the urban nodes, there is also an increasing interest for last-mile operations and multimodal distribution centres. These centres could alleviate the traffic flows between the city centre and the consolidation centre by consolidating the flows and manage the traffic up to their usage of non-road modes. They could also support various operations similarly to ports.

4.4 Objectives of the Core Network Corridor

The transformation of the European transport system in a coherent network requires a combination of initiatives at all levels for each transport mode. As restricting mobility is not considered to be an option, the implementation of this network should increase the competitiveness of transport in Europe, through measures enabling global reductions of external and internal costs and the increasing use of more sustainable transports.

This section introduces the core objectives of the Rhine–Alpine Corridor. These objectives, together with a performance evaluation of the CNC in terms of quality and sustainability, aim at establishing the basis for the programme of implementation measures in the Rhine-Alpine Corridor.

Indeed, measuring the performance of the Core Network Corridor is a key strategic activity in the evaluation process of the strengths and especially the weaknesses of the corridor, since it can significantly influence the decision making of transport policies, programmes and projects.

Member States and network operators need to agree on defining common policies enabling financial investments and complementarity in the development of the various transport modes in the corridors. A governance structure will be created for each corridor to lead and manage according to its defined policy and objectives.

The framework of performance measurement is composed by objectives, criteria and indicators. The measurement is done regarding the pre-defined objectives for the corridor, while the criteria used to measure performance are related to the expected outcomes. The indicators evaluate the level of performance for each criterion.

In this section, the regulation on Union guidelines for the development of the trans-European transport network and repealing Decision (11 December 2013) has been studied to identify and introduce the general and particular European policy objectives.

After identifying the European objectives for the corridor, Key Performance Indicators (KPI) are determined in order to measure the performance of the Rhine-Alpine Corridor against these set objectives. Different time steps until 2050 are considered.

4.4.1 General objectives

"The trans-European transport network shall strengthen the social, economic and territorial cohesion of the Union and contribute to the creation of a single European transport area".

This global objective can be declined in four main topics:

Territorial and structural cohesion

The Core Network must ensure accessibility and connectivity of all regions of the European Union. This can be achieved by implementing a reduction of infrastructure quality gaps between Member States and by providing a balanced coverage for all European regions reflecting their specific situations. This implies the creation of new segments and the modernisation of restricting links in the existing network.

In addition, for both passenger and freight traffic, interconnections between transport infrastructure for long-distance traffic and regional or local traffic must be created or improved. The cohesion at the scale of the corridor should be handled by a multinational and a multimodal operator.

Efficiency between different networks

The removal of bottlenecks or obstacles, the capacity improvement of saturated segments and the bridging of missing links within Member States' territories and between them must be a priority for the European network. The needed level of efficiency must be gained by easy interconnection and interoperability between national transport networks (concerning particularly the opening of national rail markets, especially for freight), and through the optimal integration of intermodality between all transport mode for both passengers and freight logistic chains. This last point involves the necessary development of the capacity of multimodal platforms at specific nodes.

These measures shall be accompanied by the promotion of economically efficient and high-quality transport, by an efficient use of the potential of the new and existing infrastructure, by a rationale use of energy and resources, and by a cost-efficient application of innovative technological and operational concepts.

The global European transport network has to include main traffic corridors with high efficiency concerning volumes of freight and passengers transferred.

Tools improving traffic management, administrative procedures and information systems already exist (for example ITS, SESAR, ERTMS, SafeSeaNet, RIS). Their use leads to a relevant and intelligent management of the different networks by operators, to better projections of mobility requirements and to an optimisation of flows.

Transport sustainability

All transport modes must be developed in view of addressing concerns regarding sustainability and economic efficiency. They shall contribute to the reduction of greenhouse gas emissions, to the use of low-carbon and clean transport alternatives, to the development sustainable propulsion systems, to enhancing fuel security, to the reduction of external costs (especially traffic incidents and accidents) and to the protection of the environment.

Long distance transport needs to be sustainably developed, in particular general public transports for passengers as well as fluvial and rail transport for freight. Maritime transports and motorways of the sea shall also be promoted by the Union.

Finally, to complete budgets devoted to transport from Members States and operators, policies based on the application of "user pays" and "polluter pays" principles offer fair and reliable means of financing the management, the maintenance and the future investments of the networks.

Increasing the benefits for the users

The European transport network must answer to the mobility and transport needs of its users. Its service has to ensure safety, security and high-quality standards for both passenger and freight transport. Quality, efficiency and sustainability have to be included in the establishment of infrastructure requirements, particularly through high commercial speeds and reliable travel times.

In case of disasters or emergencies, solutions to insure mobility needs and accessibility to rescue services shall be planned.

Finally, accessibility for elderly people, persons of reduced mobility and disabled passengers must be taken into account.

4.4.2 Multimodal objectives

The Member States shall ensure (1315/2013 art. 28) that:

- transport modes are connected to each other at freight terminals, passenger stations, inland ports, airports and maritime ports, in order to allow multimodal transport of passengers and freight;
- freight terminals and logistic platforms, maritime ports and airports handling cargo are equipped for the provision of information flows within this infrastructure and between the transport modes along the logistic chain. Such systems are in particular providing real-time information on available infrastructure capacity, traffic flows and positioning, tracking and tracing, thus ensuring safety and security throughout multimodal journeys;
- continuous passenger traffic across the comprehensive network is facilitated through appropriate equipment and the availability of telematics applications in railway stations, coach stations, airports and maritime ports.

Freight terminals shall be equipped with cranes, conveyors and other devices for moving freight between different transport modes and for the positioning and storage of freight.

Priorities for multimodal transport infrastructure development (1315/2013 Art. 29) are:

- providing an effective interconnection and integration of the infrastructure of the comprehensive network, including through access infrastructure where necessary and through freight terminals and logistic platforms;
- removing the main technical and administrative barriers to multimodal transport;
- developing a smooth flow of information between the transport modes and enabling multimodal and single-mode services to be provided across the trans-European transport system.

4.4.3 Mode-specific objectives

4.4.3.1 Railway objectives

Technical aspects of railway infrastructure of the Core Network must fulfil several requirements until 2030 to reach a satisfying degree of standardisation. Member States shall ensure that the railway infrastructure is:

- equipped with ERTMS, which includes the European Train Control System (ETCS) and GSM-R, the GSM mobile communications standard for railway operations. This is of high importance as the European Train Control System (ETCS) guarantees a common standard that enables trains to cross national borders and in some countries enhances safety. ERTMS has also been designed to be the most performant train control system in the world. It therefore brings considerable benefits in addition to interoperability:
    - Increased capacity on existing lines and a greater ability to respond to growing transport demands: as a continuous communication-based signalling system, ERTMS reduces the headway between trains enabling up to 40% more capacity on currently existing infrastructure, if a national continuous communication-based signalling system does not already exist;
    - Higher speeds: ERTMS allows for a maximum speed currently up to 350 km/h (if the rail track was designed for such speed);

    - Higher reliability rates: in some countries, ERTMS may significantly increase reliability and punctuality, which are crucial for both passenger and freight transport;
    - Lower production costs: one proven a harmonised system is easier to install, maintain and manufacture making railway systems more competitive;
    - Reduced maintenance costs: with ERTMS level 2, trackside signalling is no longer required, which considerably reduces maintenance costs;
    - An opened supply market: customers will be able to purchase equipment for installation anywhere in Europe and all suppliers will be able to bid for any opportunity. Trackside and on-board equipment may be made by any of the six ERTMS suppliers, which makes the supply market more competitive;
    - Reduced contract lead time due to the significant reduction of process engineering;
    - Simplified approval process in Europe and greatly reduced certification costs traditionally associated with the introduction of new systems;
    - Depending on the existing national systems in some countries, improved safety for passengers
- benefitting from measures promoting the interoperability of the comprehensive network;
- fully electrified to the extent necessary for electric train operations, concerning both line tracks and sidings. This would implement a continuity in the networks functioning and management;
- connected to multimodal nodes, and especially inland ports that must be equipped for the last railway mile (which is currently not systematically the case), and inland terminals that should be able to host 740m electrified trains.

To complete these requirements, a global enhancement is also necessary to ensure the proper development of freight railway transport infrastructure. This includes meeting several minimum parameters (axle load of 22.5 t, a line speed of 100 km/h and a train length of 740 m).

As electrification and 1435 mm nominal track gauge standards are already implemented among the corridor, there remain four main priorities for railway infrastructure development:

- The reduction of the noise and vibration impacts. This objective should be achieved through measures for rolling stock, infrastructure characteristics and noise protection barriers;
- The implementation of seamless transport beyond national borders, by increasing the interoperability between national networks;
- The safety of level crossings, ensuring reliability of the network on exposed sections;
- The interconnection between railway transport and maritime or inland ports infrastructures. Equipment for the last railway mile on inland terminals that should be able to host 740m electrified trains.

4.4.3.2 Road objectives

Several requirements are mentioned in the road Core Network by 2030. In this context, the following measures must be ensured by Member States:

- Roads have to be either express roads or motorways, designed for motor traffic and enabling efficient long distance transit;
- Road networks must provide ITS and tolling systems compatible with other systems to guarantee interoperability on the network;
- The safety of road transport must be ensured and monitored both on roads sections and on parking areas;
- Alternative clean fuels and thereto dedicated infrastructure must be improved and become more accessible.

Four priorities can be listed concerning the road infrastructure development:

- Appropriate measures must be implemented to increase and promote road safety. Current objectives involve to reduce road casualties by 2020 by half and to drop it to zero by 2050;
- New technologies and innovations concerning especially motors and fuels must enable sustainable and low-emission road traffic. This aims at reducing greenhouse gas emissions minimum to 60% by 2050;
- The use of information, management and communication systems shall increase safety, mitigate congestion and reduce pollutant emissions on road networks;
- A sufficient number of parking areas with a satisfying degree of safety must be created, especially for commercial and freight transport.

4.4.3.3 Maritime infrastructure and inland waterway objectives

Maritime ports and inland waterways networks present several main requirements that should be ensured by member States:

- Inland waterways must present a minimum of class IV, to provide an adequate capacity of transport;
- Inland waterways should have a continuous bridge clearance;
- Inland waterways should be maintained to enable both a good navigation status and a respect of the environment;
- Inland waterways to be equipped with River Information Services (RIS);
- The interconnection between maritime ports, inland ports and railway lines, roads and inland waterways (when possible) has to be improved, especially to develop the various options and choices for freight transport.

The following priorities (1315/2013 Art. 16, 23) must be taken into account for maritime ports and inland waterways:

- Inland waterways belonging to the Rhine-Alpine Corridor are very well developed. They fulfil the objectives of class IV gauges. However, there remain draught limitation on the Rhine and a bridge located in Strasbourg reduces the number of layers of containers from 4 to 3 in the Upper Rhine. When possible and relevant, the creation of new waterways to extend this network and develop its offer shall be undertaken;
- The modernisation of the infrastructure capacity for transport operations in both maritime and inland ports areas must be completed;

- Connect inland port infrastructure to rail and road transport infrastructure;
- The interconnection between maritime ports and inland waterways is a fundamental component of the Core Network. This would develop the efficiency and promote sustainable waterway transport;
- Modernisation and expansion of capacity of infrastructure necessary for transport operations within the inland and the seaport area;
- By the year 2030, core maritime ports should make alternative clean fuels available for maritime transport to reduce CO2 emissions from maritime bunker fuels (by 40% until 2050);
- Alternative fuel availability including LNG and Onshore;
- The implementation of River Information Services concerning inland waterways can be done at a regional, national level and multinational level (basin level). In ports, it is essential to provide a relevant quality of service, with the equipment of VTMIS (VTS), SafeSeaNet (SSN) systems, e-Maritime services and e-Navigation services;
- Power Supply (OPS[52]) of ships in the harbour must be foreseen. The minimum infrastructure coverage requirement for LNG for inland waterway transport shall be implemented in 2025 for maritime ports and 2030 for Core network inland ports (European directive on alternative fuels).
- Promotion of waterways of the sea and sustainable inland waterway transport.

CCNR has also defined priorities in its strategic document: "Vision 2018 for sustainable navigation". Objectives concerning Rhine navigation are listed here-under:

- Safety and reliability: positioning inland navigation as a safe mode and reliability of river transport services
- Training and qualification: need for a qualified work force in the long term
- Fuel consumption and emissions of greenhouse gases: make a significant contribution to combat global warming by reducing its consumption and its emission
- Emissions of pollutants into the air and into the water: reduction of emission caused by propulsion and optimisation of the management of cargo residues
- Change in environmental conditions: guarantee reliability and performance in case of changes in environmental conditions
- Logistics chains: consolidation of logistics chains using corridors
- Application of the reference social conditions : promote attractiveness of jobs in inland navigation
- Information: greater availability of relevant, reliable information on waterways as transport system

[52] Onshore power supply means that the vessels can shut down the engines whilst moored and can connect to shoreside power to run all the functions on board. The environmental benefits of OPS are considerable. Carbon dioxide emissions are reduced substantially thanks to the fact that alternative energy sources are used, such as wind power, and emissions of sulphur dioxide and nitrogen oxide are reduced to a minimum. OPS also results in a quieter port environment and a better working environment on board ship.

4.4.3.4 Air transport

Air transport present several main requirements that should be ensured by Member States:

- Any airport has at least one terminal open to all operators;
- Infrastructure for air traffic management permits the implementation of Single European Sky;
- Availability of clean fuels.

The following priorities must be taken into account for air transport:

- Increase air capacity;
- Support the implementation of Single European Sky;
- Improve multimodal interconnections (rail links for instance);
- Improve sustainability

4.4.4 Corridor specific objectives

After having identified the main drivers determining the necessary corridor developments and the general objectives specified in the sections above, this chapter introduces specific objectives providing an evaluation framework to address the clusters of critical issues in the Rhine-Alpine Corridor. These objectives reflect the quality and sustainability requirements of society and of the transport infrastructure users and managers.

SO 1: Improve capacity and remove bottlenecks

As Rhine-Alpine Corridor is the main backbone for logistics flow in Western Europe, it appears important to tackle its lack of capacity for linear infrastructure as well as seaports, inland ports and railroad terminals. Capacity improvements can be done on infrastructure gauges, speed and reliability.

Related KPI: Rail speed, ERTMS, RIS, rail gauge, train length, IWW gauges, IWW reliability, Part of express road and motorways, ports connection to IWW, inland port capacity, Railroad terminals capacity.

SO 2: Implement missing links

Implementing the missing links between nodes should be implemented among the corridor in order to facilitate the flows in the transport network, mainly the rail connections to airports.

Related KPI: Rail connections to airport

SO 3: Improve cross-border sections

Cross-border sections can be the central points for European Transport Network bottlenecks as national infrastructure managers only focus on their national network and as the discrepancies between national networks induces bottlenecks.

Related KPI: Modal share of cross-border rail for passenger traffics, modal share of cross-border passenger and freight traffics.

SO 4: Interoperability / Compliance with TEN-T standards

This objective evaluates the long-distance aspect of the network. The European transport network necessitates cooperation between each of the Member States, networks owners and service providers concerned by the corridor to guarantee the best quality of service for both passengers and freight.

Legal regulations, traffic control, operational procedures and practices, rolling stock standards, rail electrification or track widths constitute many aspects requiring interoperability and harmonisation between the different networks.

Related KPI: ERTMS, track gauge, IWW gauges, interoperability of tolling systems

SO 5: Develop multimodality

Multimodality development is a main objective of European regulation. This should be especially the case for Rhine-Alpine Corridor as it hosts the Rhine inland ports and main north range seaports.

Related KPI: Modal share of rail for cross-border passenger traffics, modal share of cross-border passenger and freight traffics, Inland port capacity and connections, Railroad terminals capacity and connections, Airport connections, Seaports connections.

SO 6: Improve last mile connection

The corridor lacks of optimized last mile connections to host electrified long trains in various terminals. Rail and IWW connections Seaports needs improvements in order to upgrade capacity and reliability of the corridor network.

Related KPI: Inland port connections, Railroad terminals connections, Seaports connections.

SO 7: Tackle Externalities / Sustainability / Innovation

The safety of a network represents the state of being safe for its users. This parameter is particularly illustrated by the number of accidents or incidents assessed on the entire network or on its considered sections.

Pollutant emissions and noise are serious consequences of transport networks. They depend on the transport mode, the number of kilometres travelled and the characteristics of the circulating vehicles. The more people interfere with the network, the more impact it creates.

- Emissions: traffic emits a number of harmful substances degrading critically the air quality. The characteristics of these emissions depend on fuel usage, type of fuel, speed, driving cycle or road gradient.
- Noise: rail, road and aviation are major sources of noise annoyance that have an immediate impact both on people living or working and on the environment close to the corresponding networks.

The climate change parameter evaluates the CO2 emissions of the transport field by mode and by type of gas. Considering the fact that worldwide transport is second in the ranking of single sources of greenhouse gas emissions in 2000, this parameter represents an important issue in the evaluation of the transport activity.

As stated here-above, availability of clean fuels and promotion of innovation are specific objectives to develop.

Related KPI: availability of clean fuels, modal share, ERTMS, parking areas every 100km

SO 8: Consider impacts on urban areas

Urban nodes along the corridors are often close to logistic nodes such as inland ports for instance. The interface between traffics and impacts of logistics areas on urban areas have to be monitored closely to tend to better living places.

Related KPI: None

4.4.5 Key Performance Indicators

Based on the identification of corridor-specific objectives, related Key Performance Indicators (KPIs) are identified in view of measuring the performance of the Rhine-Alpine Corridor against the defined set objectives. Key Performance Indicators are built to be strategic operational tools for the European Commission to evaluate and monitor the evolution of the defined objectives on the corridors.

TEN-T standards (regulations 1315 & 1316/2013) already offer a solid basis to build coherent, comparable and quantitative objectives which are applicable to all corridors.

These objectives are listed in the Table 37 below.

Table 37: Objectives for the Core Network Corridor as imposed by the TEN-T standards

Rail: (non-isolated networks) Electrification ERTMS Track Gauge: 1,435mm *Specific for Freight* Line speed: 100km/h Train Length: 740m Axle Load: 22.5t	**Inland Waterways:** **-** CEMT IV (1,000-1,500t vessel) Length: 80/85m Beam: 9.5m Draught: 2.5m Height: 5.25m - Availability of clean fuels
Road: Express road or Motorway Parking areas every 100km. Availability of clean fuels. Interoperable tolling.	**Ports/maritime**: Rail connection Waterway connection – where possible Availability of clean fuels Promoting MOS (short sea connections)
Airports: Availability of clean fuels Connection to rail network (heavy or urban) Connection to road network	**Road/Rail Terminals:** - Indication of capacity. ______________________________ **Inland ports** - Indication of capacity.

Source: Stratec

However, despite the variety and modal coverage of objectives already in the EU-Regulations 1315 and 1316/2013, the Contractor consortium proposes to discuss and agree upon including additional objectives into the work plan. These are related to two fields of concern, the performance of transport services along the corridor and the implementation of pre-identified and other projects that will become part of the work plan:

- Objectives relating to the performance of transport services :
  - Modal share of rail and IWW for freight transport
  - Modal share of rail for passenger transport

- Objectives related to the implementation pre-identified projects (and other projects agreed upon in the work plan)

4.4.5.1 Monitoring of the implementation plan

The purpose of this chapter is to monitor the characteristics and the solving of the critical issues of Rhine-Alpine Corridor.

Infrastructure characteristics have been collected and then provided to European Commission in order to fill the TENtec data system. TENtec system has been built in order to stock, to visualize, to analyse and also to monitor the infrastructure among the corridor. Indeed, TENtec system enables changes for every node and link of TEN-T network. It will be possible to update data following implementation of projects and in this manner track the evolution of the corridor. As TENtec data is a reliable and a common database to all corridors, Key Performance Indicators can be built on its basis to have a proper monitoring. KPIs that have been specifically identified for Rhine-Alpine Corridor with their current score and the objectives for 2030 and 2050 timeframes are presented hereunder. For the category "interoperability/TEN-T requirements", the latter were not part of the analysis as almost every KPI is related to this parameter. Regarding the implementation plan section, no analysis was so far evaluated, as the reference has yet to be defined (e.g. project value in €, concerned km, etc.)

Table 38: KPI implementation until 2050

Mode	Corridor category adressed								Key Performance Indicator (KPI)	Type	Current	Objective	
	Cross-border	Capacity	Missing link	Interoperability	Multimodality	Last mile	Externalities	Urban areas				2030	2050
Rail				X					Electrification/1,435mm	Passenger/freight	100%	100%	
	X			X					ERTMS	Passenger/freight	12%	100%	
				X					Line speed >100 km/h	Freight	93%	100%	
				X					Axle load	Freight	97%	100%	
	X	X		X					Train length	Freight	72%	100%	
Inland waterways		X		X					CEMT class IV	Freight	100%		
		X		X					CEMT class V	Freight	100%		
		X		X					CEMT class VI	Freight	71%		
		X		X					Draught (min. 2.5m)	Freight	82%		
		X		X					Height (min. 5.25m)	Freight	97%		
		X		X					Height (min. 7.1m)	Freight	57%		
		X		X					Height (min. 9m)	Freight	47%		
		X							Share of double locks	Freight	75%		
							X		Reliability	Freight	84%		
	X			X					RIS implementation	Freight	59%		
Road		X	X						Express road or motorway	Passenger/freight	98%	100%	
		X					X		Parking areas every 100km	Passenger/freight	100%	100%	
							X		Availability of clean fuels	Passenger/freight	84%	100%	
	X			X					Interoperability of tolling systems	Freight	69%	100%	
Airport			X		X	X			Connection to rail network	Passenger/freight	50%		100%
							X		Availability of clean fuels	Passenger/freight	N/A	100%	
Seaports			X		X	X			Connection to rail network	Freight	100%		
		X							Waterway gauge IV connection	Freight	86%		
		X							Waterway gauge V connection	Freight	57%		
							X		Availability of clean fuels	Freight	N/A		
Inland ports		X							Class IV connection	Freight	100%		
		X							Class V connection	Freight	N/A		
					X	X			Connection to rail network	Freight	100%		
							X		Availability of clean fuels	Freight	N/A		
		X			X				Multimodal transhipment capacity	Freight	N/A		
RRT		X			X				Multimodal transhipment capacity	Freight	N/A		
Multimodality	X		X		X		X		Modal share of rail and IWW (Cross-border)	Freight	66%		
	X		X		X		X		Modal share of rail (Cross-border)	Passenger	9%		
Implementation plan									Core projects implementation	Passenger/freight	0%	100%	
									Comprehensive projects implementation	Passenger/freight	0%		100%

Source: Stratec

4.5 Implementation

4.5.1 Programme of measures

The programme of measures is another step for the formulation of the corridor development plan. Within this chapter, the core results of the previous chapters will be summarised, consolidated and condensed. Necessary measures for the improvement of the transport infrastructure will be derived by bringing together

- The results of the transport market study, defining quantitative requirements;
- The corridor objectives, which are defining qualitative requirements from the point of view of the TEN-T policy and transport market stakeholders, mirrored against the current corridor characteristics.

The programme of measures delivers a comprehensive overview on necessary activities to promote the efficient development of the corridor Core Network by 2030 in accordance with the new Regulation considering the relevance and importance for the Rhine-Alpine Corridor.

4.5.1.1 Programme of measures Rail

In the past, national rail networks have developed different technical specifications. To reach a certain degree of standardisation and to improve the interoperability throughout Europe and in particular throughout the Core Network corridors is one of today's big challenges. Technical aspects of railway infrastructure of the Core Network must fulfil several requirements, and thus call for a variety of appropriate measures to improve the railway Core Network.

- Deployment of ERTMS/Signalling, which is one of the requirements of the regulation and a common standard to enhance cross-border interoperability, increase capacity, enhance safety, allow higher speeds, etc. It includes:
  - European Train Control System (ETCS), a signalling, control and train protection system designed to replace the many incompatible safety systems currently used by European railways;
  - GSM-R, the GSM mobile communications standard for railway operations.
- Measures concerning passenger lines only:
  - To prepare rail line for high speed trains
  - To remove missing links from/to well developed sections/lines
- New construction:
  - New construction of rail tracks, e.g. to remove bottlenecks due to high gradients, missing links (e.g. interconnections to ports, airports), etc.;
  - New construction of tunnels.
- Noise and vibration reduction, can be achieved by measures concerning
  - Rolling stock (at the source): new rolling stock with low-noise brakes, retrofitting existing rolling stock with low-noise brakes, wheel-absorbers
  - Infrastructure characteristics: track maintenance for the surface of the rail (rail grinding), track absorbers;
  - Noise protection barriers: protection walls, soundproof windows at affected households, facade insulation.
- Removal of level crossings, for reasons of safety, punctuality and capacity.

- Upgrade of existing lines, in order to remove capacity bottlenecks and thus increase the overall capacity; to avoid high gradients, mitigate profile limitations (e.g. upgrade to P400), allow high-speed trains, heavy freight trains (up to axle load of 22.5 t) or long freight trains (length of up to 740 m, as required by the TEN-T Regulation), shorten transit times; by e.g.:
  - Rehabilitation of railway lines: railway tracks, railway sleepers, points, electrification, electricity poles, bridges and tunnels, crushed rock, etc.;
  - Building of additional tracks to existing ones, for e.g. the use as passing tracks, opposite tracks, etc.;
- Upgrade of nodes, shunting yards and junctions, in order to remove capacity bottlenecks, maximum train length limitations, etc.:
  - Rehabilitation of nodes, shunting yards: tracks, points, railway sleepers, rail brakes, upgrade of hump technology / train formation systems, signals;
  - Building of additional tracks: passing tracks, sidings.

4.5.1.2 Programme of measures Road

To go in line with the general objectives of the TEN-T Regulation 1316/2013, the Core Network shall enable the accessibility and connectivity of all regions. Road plays a major role in setting up this objective by providing interconnections between transport infrastructure of long-distance traffic and regional or local traffic. As the roads on the corridor have to be either express roads or motorways, this goal can be further developed by e.g. the modernisation of restricting links in the existing network. Safety of road transport is another main objective of the regulation. This implies measures for the modernisation of the road network, of e.g. outdated road sections, bridges, parking areas, etc. To reduce for instance the air pollution and enable sustainable and low-emission road traffic, improving the use of clean fuels is another main topic for road.

- Environmental friendly measures:
  - Improvement of use of clean fuels by sufficient access to clean (alternative) fuels: further development of the infrastructure, thus enabling an adequate network of recharging or refuelling facilities
- Extension of lorry parking spaces. On many sections on the motorways along the corridor there is a lack of sufficient parking spaces for trucks. Sufficient parking spaces are urgent for safety reasons (many trucks parking on entrances or exits of motorway rest areas), compliance with laws and other regulations, and social factors as just the need for recovering when travelling long distances:
  - New construction of parking areas, directly at motorways or near motorways:
  - Reconstruction; e.g. mixed use of parking spaces for passenger cars by trucks at special times (e.g. during night);
  - Extension of existing parking areas:
  - Deployment of telematics systems for a more efficient use of existing parking areas, the development of certain parking procedures, e.g. parking in a row, or for giving pre-information via internet or navigation systems.

- New construction of motorways, e.g. to remove bottlenecks in form of missing links;
- Road traffic safety:
  - Use of information, management and communication systems, e.g. modern traffic light systems;
  - Video installations on road sections or parking areas to assure and monitor the safety of road transport;
  - Rehabilitation of existing lines with regard to e.g. width of traffic lanes, hard shoulders, and radius; improved markings (raised rip markings, rumble strips, etc.).
- Rehabilitation of existing lines:
  - Rehabilitation of road lanes;
  - Rehabilitation or replacement of bridges and tunnels. Many bridges and tunnels are outdated and not able to cope with today's traffic; rehabilitation of e.g. road surface, expansion joints, balustrades, safety installations.
- Upgrade of existing lines:
  - Extension of road lanes (additional lanes) to increase capacity;
  - Expansion of road lanes (e.g. width of traffic lanes, hard shoulders for the use as traffic lane in peak times).
- Upgrade of road network in urban nodes:
  - Optimisation/rerouting of ring roads, single traffic nodes or links with the existing network.

4.5.1.3 Programme of measures IWW

For inland waterways, there is a set of strategic requirements defined by the regulation. They shall be maintained so as to preserve good navigation status, while respecting the applicable environmental law and thus protecting the environment and of biodiversity.

- Environmental friendly measures:
  - LNG, to reduce levels of oxide (NOx, SOx) and carbon dioxide emissions; Improvement of access to LNG: development of sufficient bunker stations in the ports for the use of LNG directly as clean fuel.
- Measures concerning locks to increase capacity of inland waterway:
  - Building of new locks;
  - Building of new chambers;
  - Expansion of lock chambers (in numbers or size).
- Mooring places:
  - Increasing capacity of mooring places to allow bigger vessels;
  - Increasing number of mooring places
- Multimodal interconnections:
  - Closing of missing links to improve the interconnection between maritime ports and inland waterways/ports.

- River information services (RIS), the electronic management of inland waterways, optimise traffic and transport processes (cost-effective and environmentally friendly logistics operations) and interoperability issues:
    - Deployment of River Information Services (RIS).
- Upgrade of existing waterways. Inland waterways on the corridor shall have the minimum technical characteristics of those laid down for a class IV waterway, which allows a passage of a vessel or a pushed train of craft 80 to 85 m long and 9.50 m wide. Nevertheless, inland waterways should be maintained to enable both a good navigation status but also respect the environment:
    - Fairway adjustments (in depth/draught and width) for more reliable and safer inland waterway transports, or to increase the capacity and efficiency of inland waterway navigations, e.g. to allow vessels with higher draughts or enable encounter traffics;
    - Building or adjustments of bridges, in order to have a sufficient and continuous bridge clearance, which is important for container transport for instance;
    - Upgrade or rehabilitation of tunnels (under inland waterways) due to age.

4.5.1.4 Programme of measures Ports

For measures concerning ports we refer to both inland and seaports. Some measures mentioned below are also listed under measures for inland waterways, as the regulations defines that inland ports are listed under category inland waterways, and that the port related transport infrastructure includes the infrastructure necessary for transport operations within the port area. Thus some measures may be suitable for both categories.

As inland waterways itself, also ports are maintained so as to preserve good navigation status, while respecting the applicable environmental law and thus protecting the environment and of biodiversity.

- Environmental friendly measures:
    - Improvement of use of LNG, to reduce levels of oxide (NOx, SOx) and carbon dioxide emissions; enabling sufficient access to LNG: development of sufficient bunker stations in the ports for the use of LNG directly as clean fuel;
    - Onshore power supply of ships in the ports;
    - Appropriated facilities in ports infrastructure to ensure a sustainable and clean management for ship generated waste.
- Measures concerning locks to increase capacity:
    - Building of new locks;
    - Building of new chambers;
    - Expansion of lock chambers (in numbers or size).
- Mooring places:
    - Increasing capacity of mooring places to allow bigger vessels;
    - Increasing number of mooring places.
- Multimodal interconnections:

    - Upgrading rail and road access;
    - Establishing rail access when missing;
    - Interconnection of maritime ports with inland waterways.
- River information services (RIS), the electronic management of inland waterways, in order to optimise traffic and transport processes (cost-effective and environmentally friendly logistics operations), and interoperability issues:
    - Deployment of River Information Services (RIS).

4.5.1.5 Programme of measures Airports

Airports are part of the air transport infrastructure as per definition. The regulation defines also several priorities for airports, such as supporting the implementation of the Single European Sky or the improvement of rail and road connections (multimodality), taking the mitigation of the environmental impact from aviation into account. In compliance with those priorities, which are aiming at a safe and efficient utilisation of airspace, and the requirements on airport infrastructure, the following measures were defined:

- Airport capacity enhancement:
    - Building of new runways, terminals.
- Multimodal interconnections:
    - Upgrading rail (e.g. for high speed connections) and road access;
    - Establishing rail access (missing links).
- Implementation of air navigation systems:
    - Air traffic management systems to permit the implementation of the Single European Sky, in particular those deploying the SESAR system.

4.5.1.6 Programme of measures Rail/Road Terminals

Intermodal terminals are a key component to ensure road-competitive intermodal transport services throughout Europe since it has to ensure an efficient and safe interchange between road, rail and other transport modes (inland waterway, short sea shipping including ferries).

In some European countries the terminals differentiate between the ownership of the terminal infrastructure- and superstructure on the one hand, and the operation and management on the other hand. The ownership corresponds to the ownership of the land itself, typical infrastructures such as the rail tracks, and superstructures such as gantry cranes or reach stackers. The management is dealing with the daily operation of the terminal which might be done by the owner itself or a dedicated operational company. However, the common understanding of (intermodal) Rail-Road terminals is based on the following principles:

- Principle of non-discriminative access to terminals;
- Rail-side access for all licensed railway undertakings and other applicants (pursuant to Directive 2011/14/EC [repealed by Directive 34/2012], Annex II no. 2 letters a) to h));
- Road-side access for all operators;
- Transparent capacity allocation and pricing;

- Bundling of different cargoes (maritime container, continental cargoes), and market segments (international and domestic relations) and thus improved capacity utilisation.

Intermodal terminals are fulfilling an interface position in the intermodal supply chain. The next Figure 56 shows both the so-called basic functions, which are related to the pure rail/road transhipment and any intermodal terminal is required to match, and additional services, which a terminal operator may or may not offer depending on the local demand for them. There is a smooth transition between the different functions and whether they are required from the intermodal terminal operator or whether they are offered from other parties in the supply chain (e.g. intermodal operators, trucking companies, or other).

Figure 56: Basic functions and additional services of Rail-Road Terminals

Source: KombiConsult analysis

The capacity of a terminal is determined by a couple of factors, which cannot all be influenced by the terminal manager. The primary influences are the position of the terminal within the rail and road network, the size and shape of the real estate, the length of the handling tracks, and the number and capabilities of the handling equipment. In recent years a modular shape of terminals has been developed which is made of:

- Single – or better double-sided rail access, where signalling and train control allows for direct entry with momentum and direct departure of the train by the main line traction unit;
- Three to five "train long" (length can vary between countries) handling or transhipment tracks, with;
- Rail-mounted gantry cranes (RMG) or reach stackers in less demanding cases;
- Two to three interim storage or buffer lanes;
- One loading and one driving lane for the trucks;
- Road side access to qualified roads with

- Check-in / check-out area (gate) and sufficient parking space;
- Terminal management and information system.

One can discuss if the existing and to be built transhipment tracks have to have a usable length of 740 m to be consistent with the targeted value for the permitted train length on the Trans-European core rail network by 2030 (see Article 39, number 2 lit a) ii of EU-Regulation 1315/2013) or not. On the one hand it would be desirable if the "full" train could enter the terminal without further manipulation and if the terminal tracks could have the same length, though. On the other hand not each and every train will use the full length and the terminals tracks may be linked via a reception siding that allows to split the train into groups suitable for the maximum permitted handling track length. At this stage it can be recommended that least new built terminals should argue carefully if their handling tracks are below the target value of 740 m.

One typical module of that kind should be able to handle about 120-150,000 loading units p.a. (rail-in and rail-out handlings). While a doubling or even trebling could improve the capacity accordingly.

Other factors are rather of an operational kind and can partly be directly influenced by the terminal manager. Such factors are e.g.

- Market share of continental and maritime loading units;
- Use of gateway transports;
- Share and duration of interim storage of loading units;
- Terminal opening and working hours per day;
- Rail handling track flow factor, determining the use of tracks for a train per day.

Indications on the improvement measures on the terminals capacity and operational efficiency other than building pure infrastructure (e.g. multiple use of the tracks, bonus-malus-systems, etc.) can be obtained from the DIOMIS study performed by KombiConsult for the International Union of Railways (UIC)[53] or the good practices summarized in the framework of the AGORA project by the European Terminal Interest Group AGORA[54].

[53] http://diomis.uic.org/spip.php?article11
[54] http://www.intermodal-terminals.eu/content/e3/e18/e128/index_eng.html

4.5.2 Implementation plan

4.5.2.1 Development of the project list

The project list includes in total 175 projects of which 145 are on the Core Network, and 30 projects are located in Switzerland. In addition, several proposed rail-related network-wide infrastructure upgrade programmes have been reported by DB Netz for the upgrade of sidings for 740m long trains, the upgrade/modernisation and capacity enhancement of bridges and the upgrade/modernisation of electronic lockings for the stabilisation and insurance of capacity. These projects have not been integrated into the work plan as specific projects, because they focus on more general goals than on specific measures. Information on concrete location, costs and financing sources have been specified so far. Hence, they are mentioned in this report, but have not been included in the list of project and in the subsequent analyses.

The project list includes all identified projects and measures for the improvement of the Rhine-Alpine Corridor. On key element for the development of the project list was the ongoing process of identification of projects during the entire study which itself is based on the pre-identified projects (TENT-regulation and Corridor Description[55]) as well as the corridor characteristics. Another core part for the list of project was the involvement of stakeholders in the Corridor Fora and the bilateral coordination with the involved countries (Member States and Switzerland (MoT and infrastructure managers) and finally approved by the Member States in October 2014.

In a next step, the projects have been grouped into projects categories according the in preceding steps evaluated clusters of critical issues (cp. Figure 60):

- Capacity/physical bottlenecks;
- Missing link;
- Interoperability / Compliance with TEN-T standards;
- Multimodality;
- Last mile connection;
- Externalities / Sustainability / Innovation;
- Urban areas.

As most projects can be assigned to multiple categories, a main category relevant for each project has been identified. The allocation of categories to the projects is shown in Annex 8 (x = main category / o = additional relevant category). The maximum number of categories per project is 3 (plus border-crossing, if relevant).

Regarding cross-border issues, it was decided to carry out a separated procedure, as a lot of projects are related to cross-border bottlenecks. The applied cross-border sectioning was defined by the European Commission[56].

[55] Annex 1 to Tender Specifications
[56] Email from the European Commission (Menno van der Kamp), 06 November 2014

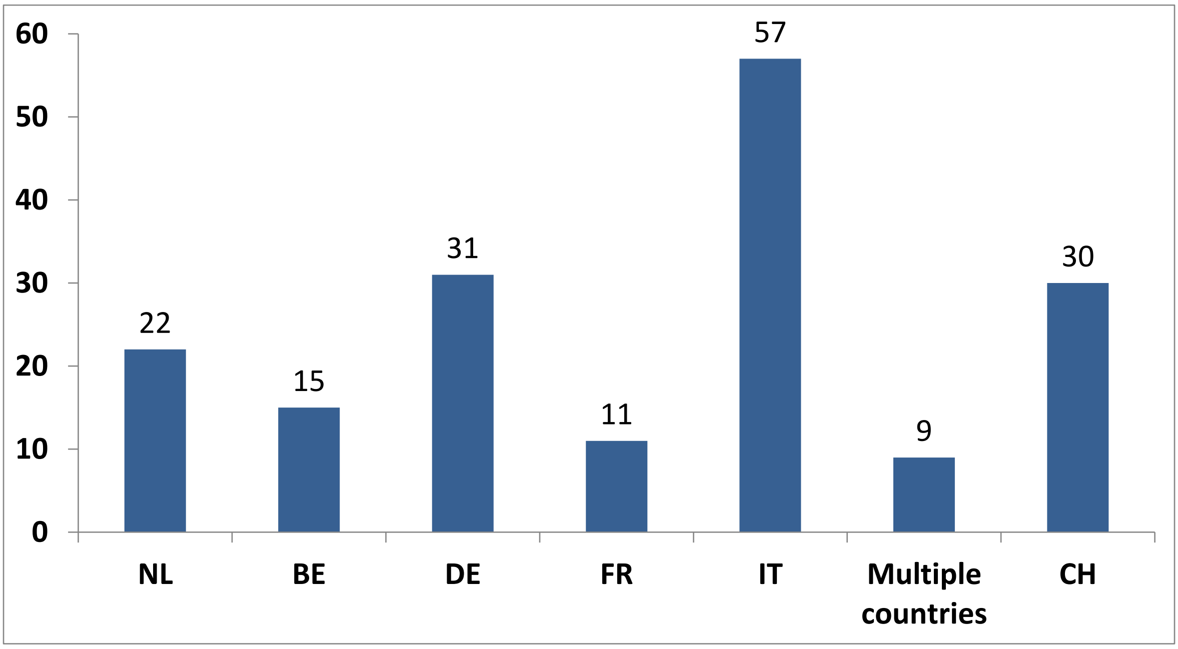
The implementation plan in general provides a description of the relevant projects per transport mode and multimodal nodes. For the allocation of projects, the following methodology has been applied:

- for each transport mode (rail, road, and inland waterways) and relevant multimodal nodes (inland ports, seaports, airports and rail-road terminals), a separate implementation plan has been elaborated;
- projects for the upgrading/enhancement for either rail or road infrastructure of inland ports and seaports are assigned to "Inland port" or "Seaport" respectively;
- projects for the upgrading/enhancement of the rail and road infrastructure of airports are assigned to "Airport";
- lock projects in the inland ports or seaports are assigned to "Inland port" or "Seaport" respectively, lock projects along the inland waterways are assigned to "IWW";
- projects are clustered according their planned finalisation by 2020, by 2030 and later than 2030 (8 projects with a finalisation by 2014 are currently verified regarding their current implementation status – if necessary, these projects will be removed from the list);
- ERTMS projects and RIS projects are part of the implementation plan, although a separate deployment plan for either of them has been elaborated (cp. chapter 4.5.3 for ERTMS and 4.5.4 for RIS)

4.5.2.2 Overview on the general structure of projects

The following Figure 57 to Figure 63 provide an overall description of the general structure of the identified projects. Figure 57 and Figure 58 respectively show the structure per country (175 projects including Switzerland) and the structure per transport mode (145 projects without Switzerland).

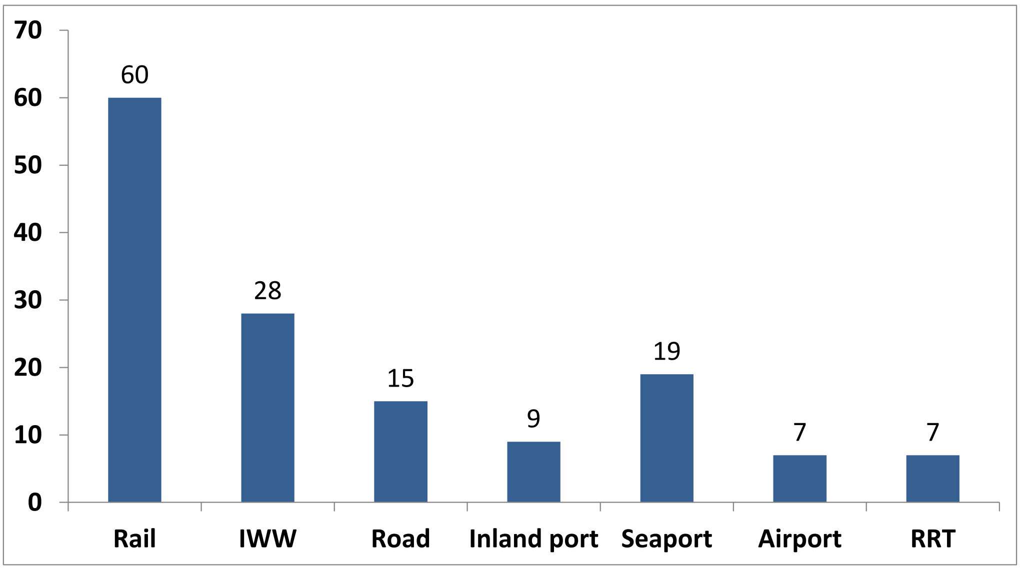
Figure 57: Number of projects per country



Source: HaCon analysis

Analysing the projects per country (including Swiss projects), it becomes obvious that Italy (33%) has by far assigned the most projects (57 in total). Following Italy, Germany (18%) has the second highest share. The Netherlands (13%), Belgium (9%) and France (6%) only account for 47 projects in total. Additionally, there are 9 projects (5%) concerning multiple countries. Swiss projects have a share of 17%.

Figure 58: Number of projects per mode

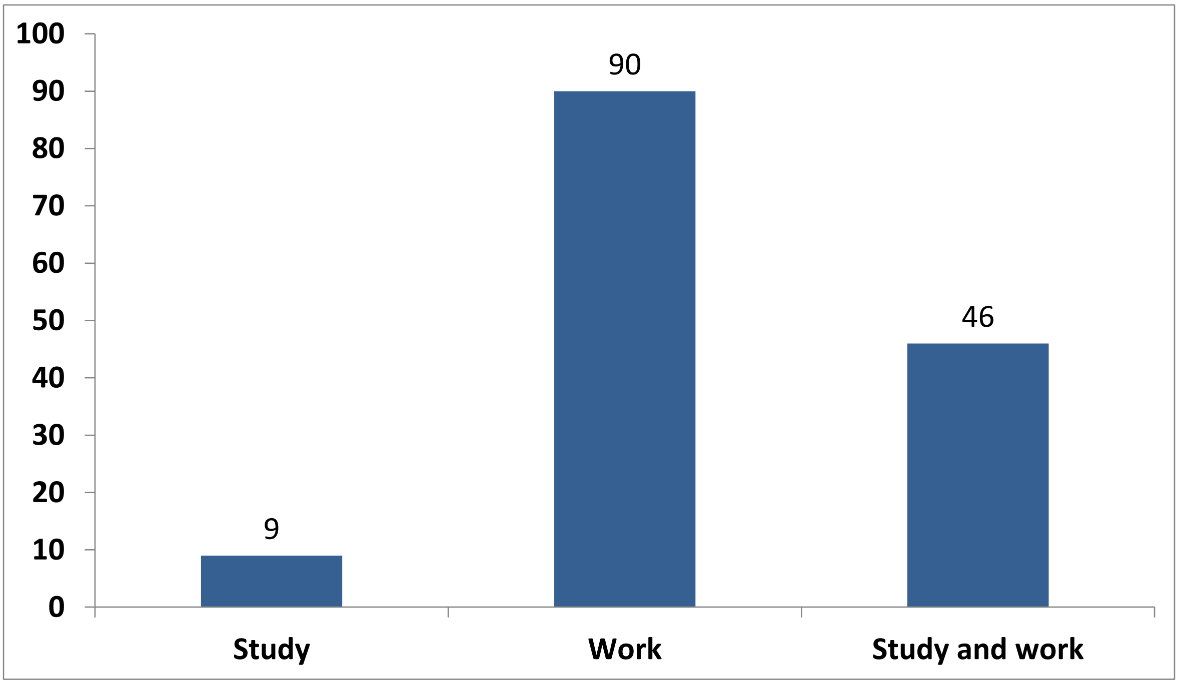


Source: HaCon analysis

With regard to the respective transport modes, the vast majority of the projects are related to rail (41%), followed by inland waterway (19%), seaports (13%) and road (10%). Inland ports, airports and RRT together have a share of 16% (without Swiss projects). Based on the modal share of IWW on the corridor (cp. chapter 4.3) compared to rail, the inland waterway projects are quantitatively under-represented.

The following Figure 59 shows a clustering of projects into "study", "works" and "study and work".

Figure 59: Clustering of projects according "study" and "works"

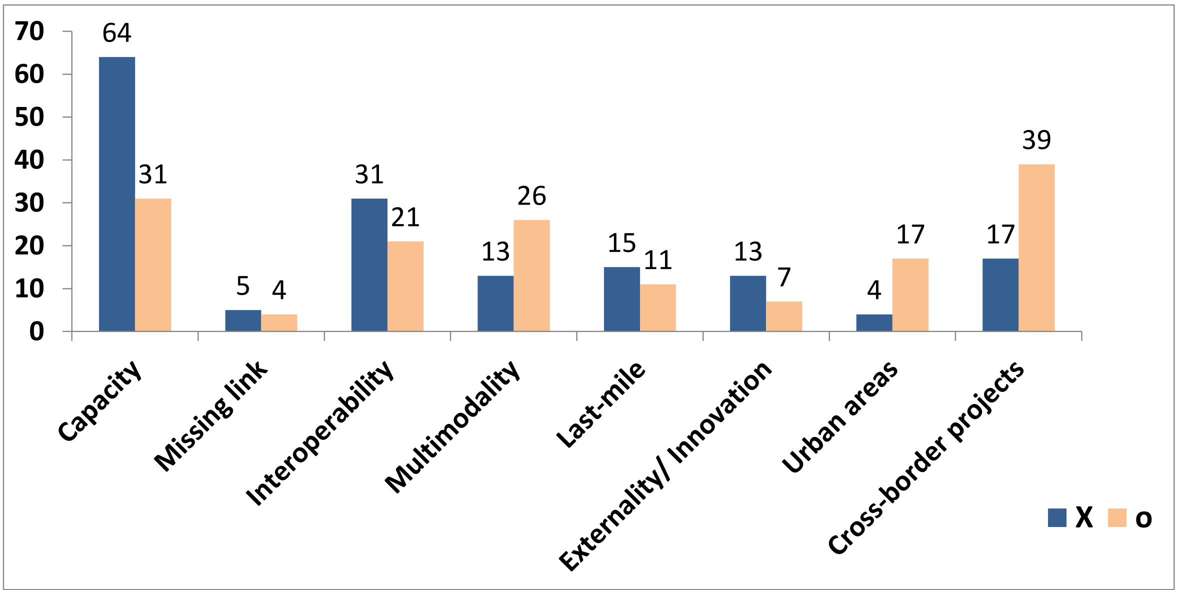


Source: HaCon analysis

The overwhelming majority of projects (62%) are "works", more precisely infrastructure-related projects e.g. for the upgrade, rehabilitation of existing infrastructure, the building of new traffic infrastructure or the implementation of traffic information systems. Only 9 projects (6%) are pure studies, while 46 projects (32%) are combining both studies and works such as the study and the works on a new container terminal and a logistics zone in Ottmarsheim (both combined in one project).

Figure 60 provides an overall picture of the project categories, differentiating between main categories (blue column) and additional relevant category (red column). As already described before, a main category relevant for each project has been identified, but most of the projects can be assigned to more than one category (maximum number of 3 plus border-crossing, if relevant – cp. Annex 8).

Figure 60: Categorisation of projects



Source: HaCon analysis

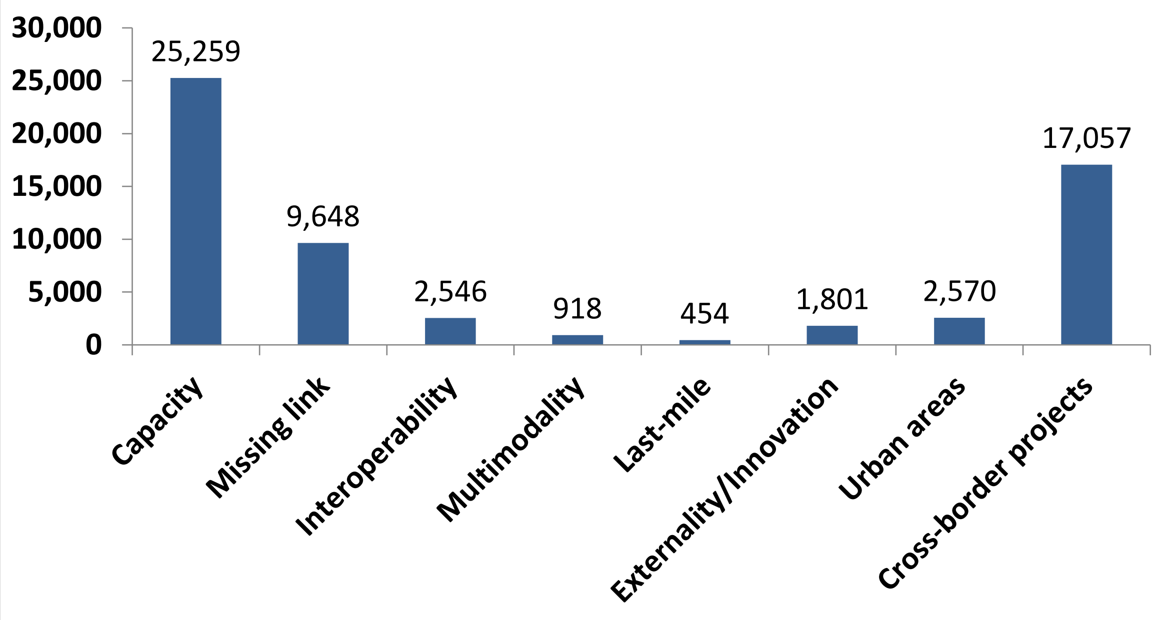
Looking at the main concern of the projects, most of them can be allocated to measures enhancing the removal of capacity issues and physical bottlenecks. 64 projects (44%) are mainly addressing this type of measure, whereas 31 are also relevant for this category. Following that, projects enhancing the interoperability have a share of 21% (31 projects). Projects related to last-mile measures and projects concerning externalities and innovation both have a share of around 10% each. It can also be stated that a lot of projects (21) are concerning the implementing/facilitating of TEN-T transport infrastructure in urban nodes, but only a small percentage of these projects is mainly addressed to this category. Looking at the concerned measures in total, missing links have the lowest share with only 9 projects allocated to this category.

56 projects can be allocated to the from the EC recommended cross-border sectioning. However, the overwhelming majority of these 56 projects (namely 39) is only partially related to cross-border issues. This is amongst others due to the fact that there is a different sectioning for freight and passenger, thus a lot of projects are fully relevant to the freight border section but only partially for passenger (e.g. Chiasso-Milano). Out of the remaining 17 pure cross-border projects, 11 projects are concerning inland waterways/ports in France along the Rhine. This is reasoned by the fact that the entire Rhine section between Karlsruhe and Basel is regarded as cross-border relevant, thus making every French inland waterway project cross-border relevant. IWW projects are eligible for CEF funding for bottlenecks and cross-border sections, both with a funding rate of 40%. The separation into cross-border projects for IWW therefore is less important, than for the other modes (in particular rail) where the funding rates deviate.

The following Figure 61 to Figure 62 present an overview on the project volume (for 19 projects no data was available) regarding the respective project category and transport mode, respectively.

It has to be stated, that the financial data described on the following pages refer only to the projects, for which cost data was available.

Figure 61: Project volume regarding project categories (in M Euro)



Source: HaCon analysis

Looking at the Figure 61, it becomes obvious that projects concerning capacity/physical bottlenecks account for the highest project cost in total (€25,259 M). This is reasoned by the fact that, with 64 projects mainly assigned to this category, capacity measures also have the highest share quantitatively.

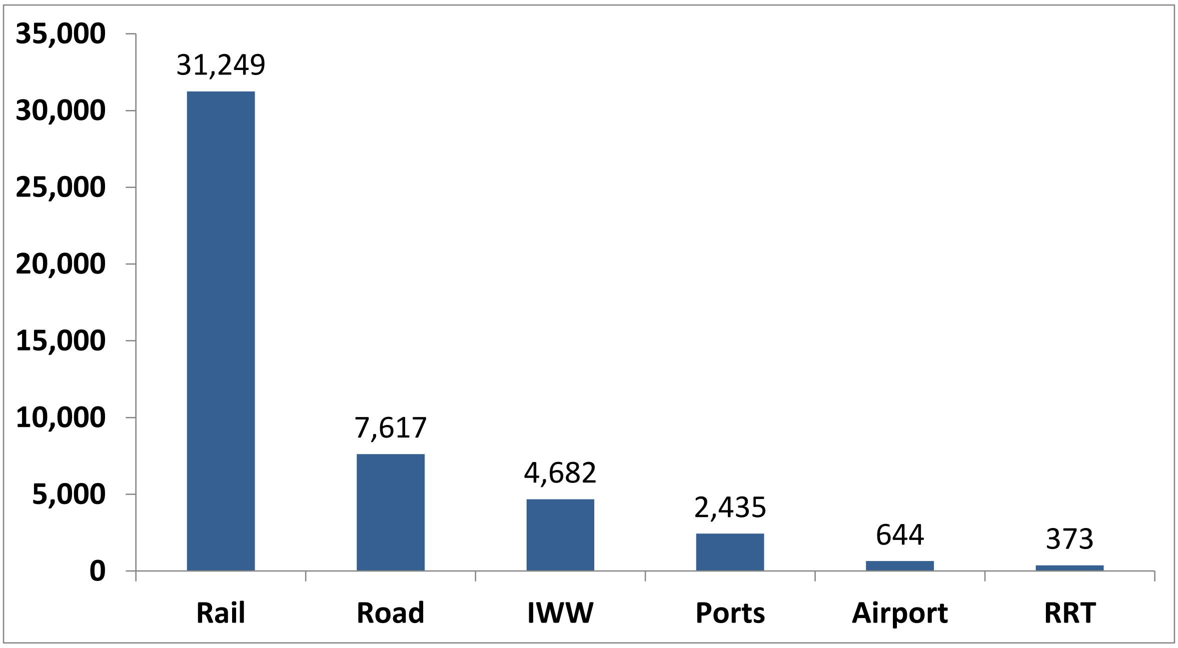
The second most cost-intensive category however, namely missing link, has only 5 assigned projects (cp. Figure 60). This leads to the assumption that missing link projects are the most expensive measures on average. A reason for that might be that a missing link issue requires a new construction measure (e.g. the Genova-Tortona line, cp. Table 40), which obviously accounts for a higher project volume than an upgrade of an existing line.

Following missing links, interoperability and urban areas measures almost share an even cost volume (around €2,600 M), although interoperability has 31 allocated projects, whereas measures concerning the implementing/facilitating of TEN-T infrastructure in urban areas only have 4 projects attached to it. Analogue to the above, interoperability measures seldom include new constructions. They rather focus on upgrades of existing infrastructure and/or studies about e.g. the implementation of RIS (cp. Table 51) or other traffic management systems.

Finally, the least cost-intensive measure categories are externalities/innovation (€1,801 M), multimodality (€918 M) and last-mile (€454 M).

With €17,057 M, roughly 40% of the entire project volumes concerns cross-border sections/bottlenecks.

Figure 62: Project volume regarding transport modes (in M Euro)

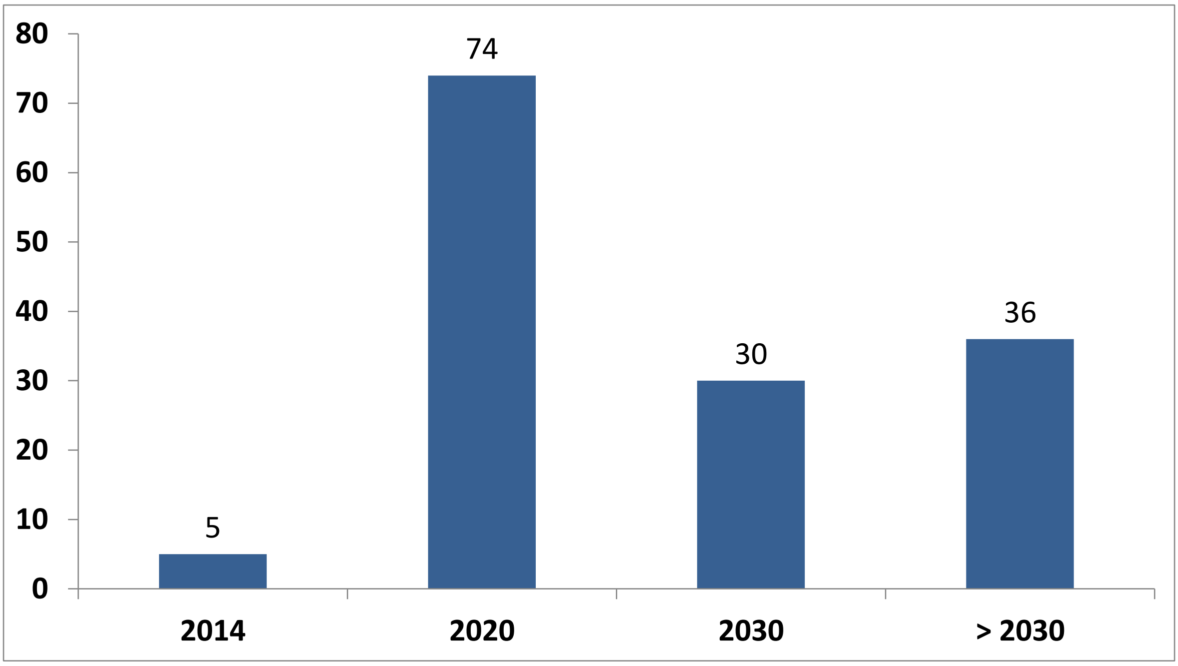


Source: HaCon analysis

Rail accounts for the highest project volume by far (66%). With a similar share, road (16%) and inland waterway (10%) follow. Ports, airports and RRT projects only account for in total 7% of the entire project costs.

Figure 63 provides an overview on the planned finalisation periods (until 2020, until 2030 and later than 2030) of the projects. 8 projects with a planned finalisation by 2014 are currently being verified regarding their status (finished by 2014/postponed). Projects with no available information on the finalisation have been assigned to the cluster (>2030).

Figure 63: Number of projects clustered according implementation date



Source: HaCon analysis

In summary, projects with an expected realisation date have the lion's share with 51%, followed by 36 projects (25%) with an implementation date after 2030. Finally, projects which shall be concluded between 2020 and 2030 account for roughly 20% of the total projects. Out of the 36 projects which are expected to be finished beyond 2030, 28 (82%) have no available data on the implementation date at all.

4.5.2.3 Implementation plan rail

The relevant rail Core Network on the Rhine-Alpine Corridor is pictured in the Annex 1.

The identified projects for rail are listed in the following Table 39 to Table 44 according the main project categories.

Rail projects for the removal of capacity issues and bottlenecks are summarised in the following Table 39.

Table 39: Rail projects mainly enhancing the removal of capacity issues and bottlenecks

No.	Costs (M €)	CC	Location	CB	Study or Works	Description of project	Timing
5	157 – 420	NL	Rotterdam Port (europort) - Zwijndrecht		Study	Caland railway bridge, upgrade, new construction or diverting route (incl. study and works)	2015-2020
10	68.8	BE	Brussels-Denderleeuw (L50A)		Works	Increase in capacity of the Brussels - Denderleeuw line: building of 3rd and 4th tracks	2014-2017
26	402	IT	Milan: Rho-Gallarate		Study and works	The project involves the installation of a fourth track, alongside the railway line between the stations of Rho and Parabiago. The upgrading of the railway link allows to increase the current capacity.	2014-2020

27	30	IT	Chiasso-Milano	part	Study and works	Technology upgrade regarding headways for additional capacity, needed for the traffic increase forecasted by an IT-CH forecast	2016
28	70	IT	Parabiago-Gallarate		Study and works	Technology upgrade regarding headways for capacity increase	until 2020
29	n/a	IT	Genoa-Milan; Genoa-Novara		Study and works	Speed upgrade (infrastructure and technology) in order to reduce travel time between the main urban nodes.	until 2020
34	371	IT	Novara - Oleggio	part	Study and works	2nd track Vignale - Oleggio	until 2020
36	300	IT	Genoa-Milan		Study and works	Upgrade to 4 tracks on link Milano Rogoredo - Pieve Emanuele	until 2020
50	160	IT	Genoa - Milan; Genoa - Novara; Novara - Domodossola ; Milano - Chiasso	part	Study and works	Removal of critical rail crossings on various sections	until 2020
9	289	BE	Brussels railways		Works	Capacity increase of the North-South Junction in Brussels	2014-2025
11	463	BE	Ghent - Zeebrugge		Works	Increase in capacity of the Ghent-Zeebrugge line: creation of 3rd and 4th track between Ghent and Brugge and a third tracks between Brugge and Dudzele and various extension works (ports of Zeebrugge and Ghent)	2014-2025
12	2,012	DE	(Amsterdam)-Zevenaar-Emmerich-Oberhausen (1. stage)	part	Works	Upgrade of existing line (third track)	2005-2023
32	600	IT	Tortona - Voghera		Study and works	Upgrade to 4 tracks	until 2025
35	164	IT	Oleggio - Arona	part	Study and works	2nd track	until 2030
51	600	IT	Genoa - Milan		Study and works	Upgrade to 4 tracks on link Pavia - Pieve Emanuele	until 2025
54	n/a	IT	Rho - Gallarate		Study and works	Stations and headway upgrades for capacity increase	2025/2030
2	20	NL	Utrecht - Arnhem		Works	PHS (Programme High-Frequent Rail Services) to increase the capacity/reliability on the section Driebergen-Zeist;Ede	start before 2020
3	234	NL	Utrecht - Arnhem - German border	part	Works	Improve the conventional line capacity	2009 - unknown
4	703	NL	Meteren		Works	Building Meteren Boog to connect the Betuweroute with existing network to intensify rail freight on the Betuweroute	start before 2020
15	2,000	DE	Düsseldorf-Duisburg a. nodes Rhein-Ruhr-Express		Works	Resolution of physical bottlenecks (passenger) and upgrade of nodes	unknown
18	6,172	DE	Karlsruhe-Offenburg-Freiburg-Basel (1.stage)	part	Works	New line and upgrade of existing line (third and fourth track)	started-unknown
19	n/a	DE	Karlsruhe-Offenburg-Freiburg-Basel (2.stage)	part	Works	New line and upgrade of existing line (third and fourth track)	unknown

56	326	IT	Rho - Gallarate		Study and works	Upgrade to 3 tracks on the railway line between the stations of Parabiago and Gallarate, and completion of "Y link" ("Raccordo Y") in Busto Arsizio. The project aims to improve rail service to Malpensa Airport and along the rail line Rho-Gallarate.	after 2030
57	1,412	IT	Chiasso - Milano	part	Study and works	Upgrade to 4 tracks on the railway line between the stations of Chiasso and Monza. The project allows an increase of capacity, in view of the expected traffic from Gotthard tunnel.	after 2030

Source: Information from national Ministries of Transport and infrastructure managers

Altogether, 24 Projects have been identified.

The three projects with the highest volume are all located in Germany. The most expensive one (€6,000 M) is the new line and the upgrade of the existing line between Karlsruhe – Basel (1.stage). Here, the implementation date is not known. The second is the upgrade of the existing line (construction of a third track) between Zevenaar and Oberhausen with €2,012 M. This first stage of the project is expected to be finished in 2023. Both these projects are already ongoing. Finally, there is the planned "Rhein-Ruhr-Express" between Düsseldorf and Duisburg, with a planned project volume of €2,000 M. The time period is still not known.

Regarding the project costs (for capacity measures) in general, Germany has the lion's share with €10,184 M, followed by Italy with €4,435 M, The Netherlands (€957 M) and finally Belgium with a total project volume of €820 M.

Looking at the quantity of rail projects concerning the solution of capacity and physical bottlenecks, Italy has the lion's share with 13 projects (54%). The majority of these Italian projects (7) is expected to be concluded by 2020 latest.

Concerning the location of the projects, almost every Italian Core Network section is covered by at least one project, whereas especially Dutch and Belgian projects are assigned to only a small part of their Core Network.

For the planning horizon, there is an almost even share between the implementation periods 2014-2020 (9 projects), 2020-2030 (7) and beyond 2030/no available information (8).

Rail projects for the resolution of missing links are displayed in Table 40.

Table 40: Rail projects mainly concerning missing link links

No.	Costs (M €)	CC	Location	CB	Study or Works	Description of project	Timing
25	6,197	IT	Genoa-Tortona		Works	"High speed railway link "Terzo valico dei Giovi" - The new "Terzo Valico dei Giovi" line runs between Liguria and Piedmont, through twelve municipalities in the provinces of Genoa and Alessandria. It is approximately 53 kilometres long, including 39 km of tunnels, and also has 14 km of interconnections with the existing rail network, for a total of 67 km of new infrastructure.	2011-2025
22	2,183	DE	NBS Rhein/Main - Rhein/Neckar		Works	Construction of a high-speed passenger line	unknown

Source: Information from national Ministries of Transport and infrastructure managers

In contrast to the 24 projects concerning the solution of physical and capacity bottlenecks for rail, there are only 2 projects regarding missing links. However, both projects account for more than €8,000 M in total, which gives the missing link-projects the lion's share for average project volume for all categories. Moreover, the "Terzo valico dei Giovi" line between Genoa and Tortona accounts for the highest total costs, concerning all modes and all project categories for the Member States. While this project's implementation date is set for 2025, the timing period for the other project, the NBS Rhein/Main – Rhein/Neckar line between Frankfurt and Mannheim, is still unknown.

Rail projects with a main focus on interoperability issues and compliance with TEN-T standards are displayed in Table 41.

Table 41: Rail projects mainly concerning interoperability

No.	Costs (M €)	CC	Location	CB	Study or work	Description of project	Timing
24	642	IT	Genoa		Works	The proposed Action is the Global Project "Voltri-Brignole Infrastructural Upgrading", aiming at improving the Genoa railway node by separating the metropolitan and regional rail system from long-distance traffic flows and enhancing intermodality by improving the freight service connection with the maritime trade traffic.	2012-2020
33	21	IT	Chiasso - Milano Smistamento	part	Study and works	Upgrade power supply	until 2020
37	n/a	IT	Milano-Tortona-Genova; Genova - Novara; Domodossola-Milano; Luino-Novara; Domodossola-Novara	part	Study and works	Upgrading current technological system (headway and interlocking) in order to increase the affordability and allow the ERTMS deployment/upgrading	until 2020
39	30	IT	Novara - Domodossola ; Milano - Chiasso	part	Study and works	Upgrade for 740m on railway access to the Simplon tunnel and the Gotthard tunnel (Phase 1)	until 2016
40	70	IT	Novara - Domodossola ; Milano - Chiasso	part	Study and works	Upgrade for 740m on railway access to the Simplon tunnel and the Gotthard tunnel (Phase2)	until 2020
41	100	IT	Genova-Arquata-Novara; Genova-Tortona		Study and works	Upgrade for 740m	until 2020
42	40	IT	Chiasso - Milano	part	Study and works	Upgrade to PC80 loading gauge on railway access to the Gotthard tunnel	until 2016
43	120	IT	Luino-Novara/Milano		Study and works	Upgrade to PC80 loading gauge on railway access to the Simplon pass	until 2020
44	40	IT	Genova-Arquata-Novara/Milano		Study and works	Upgrade to PC45 loading gauge on Genova - Arquata - Tortona - Alessandria links	until 2020
46	55	IT	Milano - Chiasso; Tortona - Milano; Genoa - Tortona; Domodossola-Novara	part	Works	ERTMS deployment phase 1	until 2020
58	159	NL, DE	Border "NL/DE" - Duisburg	part	Works	Resolution of physical bottlenecks, actions concerning rail cross-border sections, actions enhancing rail interoperability and interventions concerning compliance with Core Network standards on train length (740m), development of traffic management systems	2007-2015

59	1.7	NL, BE, DE, CH, IT	Rotterdam - Genoa	part	Study	Preparatory studies for the implementation of additional measures on ERTMS Corridor Rotterdam-Genoa and ERTMS Corridor Antwerp-Basel-Lyon	2011-2014
6	225	NL	Vlissingen - Moerdijk; Utrecht – Arnhem – Zevenaar; Utrecht - Geldermalsen	part	Works	ERTMS deployment	2014-2030
8	935	BE	Belgian railways	part	Works	ETCS deployment on Core Network	2014-2022
30	n/a	IT	Genoa-Milan; Milan-Chiasso; Genoa-Novara; Novara-Domodossola	part	Study and works	Upgrading regarding command and control systems in the stations and other traffic management systems (no ERTMS)	until 2025
31	n/a	IT	Genoa-Milan; Milan-Chiasso; Genoa-Novara; Novara-Domodossola	part	Study and works	Implementation of the technical standards (defined by STI): completion of interventions realised until 2020	until 2030
47	100	IT	Genoa - Novara; Sesto Calende - Milano	part	Works	ERTMS deployment phase 2	until 2025/ 2030
52	112	IT	Milano-Tortona; Novara-Alessandria		Study and works	Upgrade for 740m	until 2025
53	n/a	IT	Genoa - Milan; Genoa - Novara		Study and works	"Upgrade to PC80 loading gauge on railway access to the tunnel foreseen by ""Terzo Valico"" project including accessibility to the port of Genoa.	until 2025
1	431	NL	Amsterdam		Works	Increase capacity /reliability of railway station Amsterdam Central for both rail freight and rail passenger transport	unknown
13	n/a	DE	Zevenaar-Oberhausen (existing line)	part	Works	Development of traffic management system (ERTMS)	unknown
14	284	DE	Basel-Oberhausen	part	Works	ERTMS Implementation Emmerich-Basel	2013-unknown
20	n/a	DE	Knoten Basel Bad Bf (existing line)	x	Works	Development of traffic management system (ERTMS)	unknown
60	100	IT, CH	Simplon pass	X	Study	The study is aimed at defining solutions to make rail infrastructure compliant with TEN-T standards in terms of loading gauge, train length and gradient	2018-open

Source: Information from national Ministries of Transport and infrastructure managers

For rail measures mainly belonging to the category interoperability and compliance with TEN-T standards, in total 24 projects have been identified. Looking at the projects with a planned finalisation until 2020, it becomes obvious that almost every project (10 out of 13) is Italian. These projects mainly concern 740m upgrades of the existing network lines as well as loading gauge PC45 / PC80 upgrades. Additionally, there are both preparatory measures (project No. 37) as well as deployment measures (project No. 46) for ERTMS until 2020. The other three projects all concern multiple countries and are support studies and works, respectively. Looking at the time horizon 2020-2030, there is a similar picture; 4 out of 6 projects belong to Italy, there is one project for The Netherlands and one for Belgium, both regarding ERTMS implementation. With costs of €935 M, the latter accounts for the highest project volume of all rail projects concerning interoperability/TEN-T requirements. Finally, there are three German projects, all concerning ERTMS, which time period is not yet defined.

Rail projects with a main focus on last-mile issues are shown in Table 42. This project concerns the upgrading of the Campasso station in the Genoa node.

Table 42: Rail projects mainly concerning last-mile issues

No.	Costs (M €)	CC	Location	CB	Study or work	Description of project	Timing
49	26	IT	Genoa node		Study and Works	Upgrading of Genoa Campasso station. The station is functional for the rail connection to the port of Genoa	until 2020

Source: Information from national Ministries of Transport and infrastructure managers

Table 43 shows the rail projects with a main focus on the category "externalities and innovation":

Table 43: Rail projects mainly concerning Externalities/Innovation

No.	Costs (M €)	CC	Location	CB	Study or work	Description of project	Timing
45	100	IT	Novara - Domodossola ; Milano - Chiasso	part	Study and works	Infrastructures upgrade aimed at rail noise reduction and resolution of interference with road access to the Alpine passes.	until 2020
48	100	IT	Genoa - Milan; Genoa - Novara; Novara - Domodossola; Milano - Chiasso	part	Works	Interventions on various stations aimed at enhancing the quality of service and accessibility	until 2020
7	329	BE	Belgian railways	part	Works	Removal of level crossings	2014-2025
23	152	DE	German Rail Network		Works	Noise reduction upgrade of rail vehicles (noised-reduced brakes "LL-Sohle")	2012-2021
16	n/a	DE	Duisburg-Moers, Düsseldorf, Haan-Leichlingen, Hürth, Köln, Mühlheim-Oberhausen		Works	Noise reduction measures	unknown

Source: Information from national Ministries of Transport and infrastructure managers

Altogether, 6 projects have been identified; all distributed more or less even between the Member States: there is one project for The Netherlands, one for Belgium, one for Germany and two for Italy. The most cost-intensive project (€431 M) is the increase of capacity/reliability of the railway station Amsterdam Central for both rail freight and rail passenger transport. For Germany, both projects tackle the noise pollution, especially around urban nodes in the Ruhr area.

Rail projects for the facilitating of urban nodes are displayed in Table 44.

Table 44: Rail projects mainly concerning urban nodes

No.	Costs (M €)	CC	Location	CB	Study or Works	Description of project	Timing
17	911	DE	Frankfurt/Main Stadion (2. stage)		Works	Upgrading and new construction of two additional tracks	2008-2014

38	444	IT	Milano Node		Works	Node upgrade (node technologies, traffic management)	until 2020
55	493	IT	Novara Node		Study and works	Completions Vignale and Novara Boschetto station and intervention on Novara Central station.	until 2030
21	160	DE	Mannheim (2.stage)		Works	Additional platform, upgrade of station infrastructure	unknown

Source: Information from national Ministries of Transport and infrastructure managers

There are only 4 projects mainly concerning the facilitating/implementing of TEN-T infrastructure in urban nodes. Two projects are located in Germany, the other two in Italy. The project with the highest cost volume accounts for costs of €911 M and concerns the second stage of upgrading and new construction of two additional tracks in Frankfurt/Main Stadion (core passenger node).

Table 45: Proposed rail projects to meet TEN-T compliance and to solve additional critical issues

No.	CC	Location	CB	Study or Works	Description of project	Timing
3000	NL	Connection Vlissingen port area		Works	Upgrade line to allow freight speed of >100 km/h	until 2030
3001	NL	Vlissingen port area		Works	Upgrade line for axle load of 22.5t	until 2030
3002	BE	Berneau - Visè - German border	part	Works	Upgrade line to allow freight speed of >100 km/h on the entire line	until 2030
3003	DE	Oberhausen - Köln (passenger line); Köln-Koblenz (passenger line); Köln - Frankfurt - Groß Gerau - Mannheim - Heidelberg - Karlsruhe; Hergenrath - Köln	part	Works	ERTMS deployment	until 2030
3011	BE	Belgian rail network	part	Works	Upgrade network to allow regular 740m operation	unknown
3012	DE	German rail network	part	Works	Prolongation of sidings for 740m trains	unknown
3013	DE	German rail network	part	Works	Upgrade and modernisation as well as capacity enhancement of bridges	unknown
3014	DE	German rail network	part	Works	Upgrade and modernisation as well as stabilisation and insuring of capacity for electronical interlockings	unknown

Source: TEN-T compliance analysis and input from Member States

For rail, there is need for four measures to meet all TEN-T requirements until 2030. Two projects concern the Vlissingen area, where both the freight line speed has to be upgraded to more than 100km/h as well as a necessary line upgrade to allow an axle load of 22.5t. The line speed issue also applies to the Belgian section Berneau – Visé – German border (Botzelaer border). For Germany, there is currently no planned ERTMS implementation until 2030 for all Rhine-Alpine Core Network corridor lines not belonging to the ERTMS Corridor A (cp. chapter 4.5.3). This concerns especially the section Aachen-Visé and Liège – Köln, as these lines cannot be entirely operated using ERTMS. On the Belgian side, there is ERTMS level 2 already in operation. The other measures to be taken are on one hand an upgrade of the Belgian and the German rail network to allow a regular operation of 740m trains. Although there is a 100% compliance already regarding 740m, longer trains still affect the regular schedule. On the other hand, the German rail network shall be upgraded and modernised regarding both rail bridges for capacity enhancement and electronical interlockings to stabilise and ensure capacity.

4.5.2.4 Implementation plan road

The relevant road Core Network of the Rhine-Alpine Corridor is pictured in the Annex 1. The identified projects for road are listed in the following Table 46 to Table 49 according the main project categories. Road projects for the removal of capacity issues are summarised in the following Table 46.

Table 46: Road projects mainly concerning capacity issues

No.	Costs (M €)	CC	Location	CB	Study or Works	Description of project	Timing
62	2,031	NL	Rotterdam		Works	Maasvlakte-Vaanplein; A15 motorway upgrade, Including Botlek bridge	2011-2015
65	93	DE	A3/A4/A44/A5	part	Works	Capacity expansion of lorry parking positions	2014-2020
64	183	BE	Brussels		Study and works	Optimisation of the Brussels Ring road	2012-2022
66	240	DE	A1: Köln-Leverkusen (8 lanes)		Works	Upgrade to 8 lanes	2017-2023
67	180	DE	A1: Köln-Leverkusen (Rhine bridge)		Works	Construction of a replacement bridge for the currently over-utilised A1 Rhine bridge near Leverkusen (first part 2017-2020; second part 2020-2023)	2017-2023
68	250	DE	A1: Leverkusen (8 lanes)		Works	Upgrade to 8 lanes	2019-2023
69	202	DE	A3: Köln-Leverkusen (8 lanes)		Works	AS Köln-Mühlheim - AS Leverkusen (2015-2018): upgrade to 8 lanes AS Leverkusen - AK Leverkusen (2019-2023): upgrade to 8 lanes	2015-2023
70	5.8	DE	A5/A6: Walldorf (bridge)		Works	Upgrade of the bridge	2018-unknown
71	2	DE	A5:Heidelberg (bridge)		Works	Upgrade of the bridge	2016-unknown
72	20	DE	A5: Weil am Rhein (bridge)	x	Works	Upgrade of the bridge	2016-unknown
73	35	IT	IT-CH Border	x	Study and works	The proposed action aims at mitigating the congestion of the road access to the Simplon pass from Italy (SS 33 del Sempione) by the implementation of a new layout of the area	open

75	3,266	IT	Genoa		Study and works	Gronda of Genova: Design and construction of a new orbital motorway aimed at separating long-distance traffic flows from urban traffic. Project is expected to reduce congestion as well as to enhance accessibility to both urban node and seaport.	2013-2025

Source: Information from national Ministries of Transport and infrastructure managers

In total, 12 projects have been identified.

The project with the highest volume is located in Italy (€3,265 M), namely the design and construction of a new motorway at separating long-distance traffic flows from urban traffic. The project has already started and is planned to be implemented in 2025.

Although there is only one Dutch project, The Netherlands have second highest accumulated project costs with €2,031 M, followed by Germany with €993 M, Belgium with €183 M and finally Italy with €35 M.

With 8 out of the 12 projects (67%), Germany has by far the highest quantitative share. The other Member States, namely The Netherlands, Belgium and Italy, have only a small share (Italy with two project, The Netherlands and Belgium with one project each). Almost all the German projects concern upgrades of existing infrastructure, more precisely the extension of lanes on motorways and upgrade of currently over-utilised bridges. Furthermore, most of the projects (58%) are related to cross-border sections, in particular to measures in and around the Köln area.

For 4 projects, the implementation date is not known.

Road projects relating to the resolution of missing links are shown in Table 47

Table 47: Road projects mainly concerning missing links

No.	Costs (M €)	CC	Location	CB	Study or Works	Description of project	Timing
61	276	NL	Rotterdam - Duisburg	part	Works	A50, More lanes, extra bridge, improved junction A15	2011-2015
63	822	NL	Rotterdam - Duisburg	part	Works	Extend A15 motorway (missing link south of Arnhem)	2016-2019

Source: Information from national Ministries of Transport and infrastructure managers

Only two road measures are concerning missing links. Nevertheless, the missing link projects account for in total almost €1,000 M. Similar to the rail projects, the average cost of the missing link projects is way higher than for the capacity measures.

Both projects concern the section Rotterdam – Duisburg and are planned to be finalised before 2020. Especially the A15 motorway extension south of Arnhem (€822 M) is of high importance, as there is currently no direct Core Network connection from the A15 to the German Road Core Network.

The only road project mainly concerning last-mile issues, namely the maintenance works on the SS36 around the Milano Node, is displayed in Table 48.

Table 48: Road projects mainly concerning last-mile issues

No.	Costs (M €)	CC	Location	CB	Study or work	Description of project	Timing
74	11.6	IT	Milano node		Study and Works	Maintenance works on SS36. This road ensures the last-mile connection to Malpensa.	2014-2020

Source: Information from national Ministries of Transport and infrastructure managers

Table 49 shows projects concerning the facilitating/implementing of TEN-T infrastructure in road networks.

Table 49: Proposed road projects to meet TEN-T compliance and to solve additional critical issues

No.	CC	Location	CB	Study or Works	Description of project	Timing
3004	BE	Belgian road network	part	Works	Availability of clean fuels	until 2030
3006	IT	Italian road network	part	Works	Availability of clean fuels	until 2030
3007	IT	Italian road network	part	Works	Use of tolling system	until 2030
3005	DE	Düsseldorf		Works	Solve road capacity bottleneck and peak hour traffic congestions in and around Düsseldorf	unknown

Source: TEN-T compliance analysis and corridor characteristics

There are in total three projects necessary to meet all the TEN-T requirements until 2030. Two of them concern the availability of clean fuels in Belgium and Italy, respectively. The other project is also Italian and is about the usage of a tolling system (or an alternative). None of these projects can be directly located, they concern the entire road network where the respective requirement has not been fulfilled so far.

As stated in the corridor characteristics (cp. chapter 4.2), there are capacity bottlenecks for road as well as traffic congestions, especially during peak hours near urban nodes. In Düsseldorf, these issues have yet to be tackled by a project. As this project does not concern the TEN-T requirements, there is no given latest implementation date.

4.5.2.5 Implementation plan IWW

The relevant waterway Core Network on the Rhine-Alpine Corridor comprises the Rhine, the Neckar and the Moselle (only for Germany and Luxembourg). Concerned countries are The Netherlands, Germany, Luxembourg, France and Switzerland. The Belgian waterway network is not part of the Rhine-Alpine Corridor. The inland waterway Core Network on the Rhine-Alpine Corridor is pictured in the Annex 1. The following Table 50 provides an overview of IWW projects mainly concerning capacity issues.

Table 50: IWW projects mainly concerning capacity issues

No.	Costs (M €)	CC	Location	CB	Study or Works	Description of project	Timing
76	5.4	NL	Amsterdam		Study	Phase 2 Implementation study to prepare the start of the PPP procurement to improve maritime access to the TEN-T network at Amsterdam	2013-2014
78	891	NL	Ijmuiden - Amsterdam		Works	Build a new lock (upgrading). New lock also needed to comply with large dimensions of vessels.	2015-2019
83	29	NL	Rotterdam - Gorinchem		Works	Increase the number of mooring locations	2016-2017
89	n/a	DE	Rhine (Bonn-Koblenz 2,5 m)		Works	Extend fairway depth	2019-2020
90	1,172	DE	Rhine (Iffezheim-Swiss border 3,5 m)	x	Works	Extend fairway depth	2019-2020
91	n/a	DE	Rhine (Koblenz-Iffezheim 2,1 m) (Kaub-Budenheim 1,9 m)	part	Works	Extend fairway depth	2019-2020
92	n/a	DE	Rhine (Krefeld-Bonn 2,8 m)		Works	Extend fairway depth	2019-2020
93	n/a	DE	Rhine (Lobith-Krefeld 2,8 m)		Works	Extend fairway depth	2019-2020
95	540	DE	Trier (Moselle)	x	Works	Second lock Trier	2011-2017
96	9	DE	Plochingen (Neckar)		Works	Landfilling of an unused harbour basin to create additional port areas	2016-2018
77	131	NL	Dordrecht - Emmerich	part	Works	Future vision Waal. Short term dredging to extend the dimensions. Finding a long term geological solution. Finally increasing the number of mooring places.	2006-2021
84	157	NL	Volkerak		Study and works	Options for increasing traffic throughput in Volkeraklock, Kreekaklock, and Krammerlock.	2014-2026
85	930	BE, NL	Terneuzen		Works	New lock in Terneuzen	2015-2021
94	830	DE	Neckar		Works	Upgrade locks for 135m barges	started-unknown
100	n/a	FR	Gambsheim (Rhine)	x	Works	Upgrading of Gambsheim locks, including the replacement of the control centre and the replacement of gates	open

Source: Information from national Ministries of Transport and infrastructure managers

In total, 15 inland waterway projects concerning capacity issues have been pointed out.

The most cost-intensive project is the extension of the fairway depth in the section between Iffezheim and the Swiss border with €1,172 M. There are in total five projects which are about the widening of the fairway depth along the German side of the Rhine, but the above mentioned is the only project which costs are known. Thus it could be estimated that the other four projects also have a relatively high project volume. Looking on the entity of these 15 projects, 40% of them have unknown costs.

The amount of projects per country is similar to the share of inland waterway kilometres belonging to the Rhine-Alpine Corridor for the respective Member State (cp. chapter 4.2.4.); Germany has the most assigned projects (8), 6 projects account for The Netherlands and finally 1 for France.

The majority of the projects, namely 10, are expected to be concluded by 2020 latest, 3 until 2030. For the other two projects, the implementation date is not available.

IWW projects mainly concerning interoperability issues are listed in Table 51.

Table 51: IWW projects mainly concerning interoperability

No.	Costs (M €)	CC	Location	CB	Study or work	Description of project	Timing
86	2.7	BE, NL	Westerscheldt River		Works	Implementation of RIS on the Westerscheldt River II	2012-2014
87	4.8	BE, NL	Westerscheldt River		Works	Implementation of RIS on the Westerscheldt River III	2013-2015
101	n/a	FR	Upper Rhine	x	Works	Development of traffic management system (RIS)	2015-2020
138	2.8	NL, BE, DE	The Netherlands, Belgium, Germany	part	Study	RIS enabled IWT corridor management	2013-2015
102	5	FR	Gambsheim (Rhine)	X	Works	CARING (Centre d'Alerte Rhénan d'Informations Nautiques de Gambsheim) reconstruction and Gambsheim subdivision	2014-2020
79	10	NL	Moerdijk		Study	Traffic management system Hollandsch Diep-Dordtsche Kil	2025-unknown

Source: Information from national Ministries of Transport and infrastructure managers

Although Germany has the distance-wise highest share on inland waterways (cp. chapter 4.2.4), the only interoperability focussed IWW project on the German Core Network is a study about RIS enabled IWT corridor management. The other 5 projects are located in France (2) and The Netherlands (respectively between Belgium and The Netherlands, at the Westerscheldt River). Compared to the other project categories, the inland waterway interoperability measures are of low cost intensity, the most expensive project accounts for only €10M (implementation of traffic management system in the Hollandsch Diep Dordtsche Kil).

4 out of 6 projects concern the RIS implementation. For one project, the finalisation date is not known; the other 5 projects are expected to end until 2020. 3 out of 6 projects are (partially) related to cross-border sections.

Table 52 presents an overview of IWW projects mainly relating to multimodality.

Table 52: IWW projects mainly concerning multimodality

No.	Costs (M €)	CC	Location	CB	Study or work	Description of project	Timing
81	162	NL	Dutch IWW Core Network	part	Works	Subsidy Quick Wins Binnenhavens. Subsidy to local goverment for Dutch ports to increase the modal share of IWT	2008-2015
97	5	DE	Plochingen (Neckar)		Works	Construction of a trimodal multifunctional area to also allow container handling	2015-2017
98	1.7	DE, FR, CH	Rhine	part	Works	Consolidation and strengthening of the Upper Rhine as a central hub for the TEN-T network	2012-2014

Source: Information from national Ministries of Transport and infrastructure managers

Out of the three inland waterway projects mainly concerning multimodality, the Dutch project "Subsidy Quick Wins Binnenhavens" accounts with €162 M by far for the highest project volume; in total, the multimodality projects cost about €169 M. All three projects are expected to be finished by 2020.

There is only one IWW project allocated to last-mile issues. Table 53 shows inland waterway projects with a main focus on the category "externalities and innovation".

Table 53: IWW projects mainly concerning externalities/innovation

No.	Costs (M €)	CC	Location	CB	Study or work	Description of project	Timing
80	80	NL	Dutch IWW Core Network	part	Study	LNG Masterplan for Rhine-Main-Danube	2013-2015
82	570	NL	Dutch IWW Core Network	part	Works	Verbeterprogramma Waterkwaliteit. Aimed at improving chemical and ecological quality of water, reducing water pollution	2009-2015
88	7.7	NL, DE	Rhine	part	Study	Vessel Traffic Management Centres of the Future RIS	2011-2014
99	1	FR	Upper Rhine	X	Works	Development of a common and unique information system (Port Community System) to optimise the use of all existing tools with a slot booking system for loading and unloading	2015-2020

Source: Information from national Ministries of Transport and infrastructure managers

Out of the 4 identified projects, the Dutch "Verbeterprogramma Waterkwaliteit" for the reduction of water pollution is by far the most cost-intensive project; it accounts for €570 M of in total €659 M (86%). Analogue to multimodal and last-mile inland waterway projects, all of the above mentioned measures have an implementation date of 2020 latest.

There is still an unsolved critical issue for inland waterway transport. The Bridge of Europe and the Railway Bridge in Strasbourg cause limitations to capacity. A project (Table 54) has been proposed to tackle this open issue, extended to the entire Upper Rhine region. An important driver that determines the train and IWW shares on the corridor is the Stripping and unstrapping of containers which is currently mainly or totally handled at the seaports. This service is produced in order to put goods on Europallets which is a standard for truck loading. The critical issue is that once the goods are on Europallets they have to be transported from the seaports to the destination only by truck. The consortium consider that a study on how to promote/induce the Stripping/unstrapping in inland ports besides of seaports should be done in order to determine if and how it will reduce the amount of trucks on the Rhine Alpine Corridor.

Table 54: Proposed IWW projects to solve critical issues

No.	CC	Location	CB	Study or Works	Description of project	Timing
3009	FR	Strasbourg - Basel	x	Study	Analyse the benefit of upgrading all Upper Rhine bridges to four layers	unknown
3014	EU	Rhine-Alpine corridor	x	Study	Cost benefit analysis of the improvement of the stripping unstrapping facilities of containers in inland ports (BE-DE-NL) in order to shift freight from road to IWW and rail along the whole corridor	unknown

Source: Corridor characteristics

4.5.2.6 Implementation plan ports

This chapter comprises the analysis regarding both inland ports and seaports. There are 7 core port nodes for The Netherlands, 6 for Belgium, 8 for Germany, 2 for France, 1 for Switzerland and 1 for Italy.

The following Table 55 presents the port projects that concern capacity issues.

Table 55: Port projects mainly concerning capacity issues

No.	Costs (M €)	CC	Location	CB	Study or Works	Description of project	Timing
111	7	FR	Mulhouse	x	Works	Development of a new port area in Mulhouse agglomeration (Île Napoléon)	2015-2020
112	65	NL	Ijmuiden - Amsterdam		Works	New location for transhipment; Northern Sea lock, Averijhavendepot.	2014-2017
114	290	NL	Rotterdam Port (europort) - Zwijndrecht		Works	Upgraded along port railway line (junctions and shunting yards).	2013-2020
116	382	BE	Antwerp		Works	New lock of Deurganckdok in Port of Antwerp	2011-2016
117	140	BE	Antwerp		Works	Renovation of the Royers lock in port of Antwerp	2016-2019
123	11.5	IT	Genoa		Study	Re-configuration of Maritime access to Sampierdarena Port Basin and the new Genoa Port Master Plan preparatory studies – the study aims at increasing the efficiency, capacity, safety and interoperability of the port of Genoa and consist of preparatory studies covering infrastructural, logistic and economic and strategic environmental analysis that will constitute the basis of the new Port Master Plan and the final design of the new Sampierdarena basin breakwater	2014-2016
127	140	IT	Genoa		Works	Upgrading of port container terminals (Ronco Canepa & Bettolo) - terminal expansion through land reclamation and port terminals upgrading also by ancillary infrastructure improvements.	2012-2016

128	22.5	IT	Genoa		Works	Port dredging plan - involves the deepening of the seabed from the mouth of the Levant until the water surface Multedo (750,000 cubic meters). The purpose of this extraordinary intervention is to allow the transit of larger ships, compatible with the existing and future berths and safety requirements	2015-2017
124	500	IT	Genoa		Works	Re-configuration of maritime access to Sampierdarena Port Basin – the new Sampierdarena basin breakwater works realisation	2017-2027
118	16	BE	Antwerp		Works	Construction of a new dock at Noordlandbrug, in order to have sufficient waiting capacity for barges	unknown
129	n/a	IT	Genoa		Works	New Porto Petroli offshore platform -Building of the new liquid bulk off-shore station for loading/unloading	open
130	30	IT	Genoa		Works	Voltri Terminal revamping - complementary works for part of the Voltri terminal operational improvements related to the dock load-bearing capacity, functional adaptation of the quay flooring to higher loads	open

Source: Information from national Ministries of Transport and infrastructure managers

For the category "port projects concerning capacity issues", 12 projects have been identified. Half of them concern the Port of Genoa (Italy), three the Port of Antwerpen in Belgium, two projects take place in The Netherlands and one is located in Mulhouse (France). There are no German port projects to enhance the capacity.

With €500 M, the most expensive project is the re-configuration of maritime access to the Sampierdarena Port Basin. The works will start in 2017; one year after the planned implementation date of the associated study (project No. 123). The vast majority of the projects (8 out of 12), including both Dutch and the French project, shall be finalised by 2020. For three projects, information on the time period is not available.

There is only one port project mainly concerning interoperability, namely the works on increasing the size of entry locks to the Port of Strasbourg in France. This project, which timing is unknown, is presented in Table 56.

Table 56: Port projects mainly concerning interoperability

No.	Costs (M €)	CC	Location	CB	Study or work	Description of project	Timing
107	7	FR	Strasbourg	x	Works	Increasing the size of entry locks to the port	2020 - unknown

Source: Information from national Ministries of Transport and infrastructure managers

The following Table 57 indicates the port projects which mainly focus on improving multimodality.

Table 57: Port projects mainly concerning multimodality

No.	Costs (M €)	CC	Location	CB	Study or work	Description of project	Timing
103	n/a	BE	Maas basin		Works	Building of a trimodal platform in Liège including a rail link in Chertal	2013-2015
108	61	FR	Strasbourg	x	Works	Study and work on a new terminal for empty containers to be shared with Kehl port (Germany) ; Development of a container terminal and development of the Lauterbourg container terminal	2015-2020
110	25	FR	Ottmarsheim	x	Study and works	Study and work on a new container terminal and a logistics zone in Ottmarsheim (Port of Mulhouse) shared with Basel and Weil am Rhein	2015-2020
104	0.7	DE	Düsseldorf Reisholz		Study	Study on infrastructure development	2014-2015
122	50	IT	Genoa		Works	"Rail Plan" interventions in the Sampierdarena port basin: "Fuorimuro" in-port freight yard upgrading and the "Dorsale Ferroviaria" (port railway backbone) completion; Doubling of rail tracks aimed at the connection between the new Ronco-Canepa terminal and the national rail network. Upgrading of the Voltri Terminal rail freight yard. Upgrading of the Campasso rail freight yard and related connection to the new Bettolo terminal and electrification of the rail tracks.	2015-2018

Source: Information from national Ministries of Transport and infrastructure managers

The locations of these four projects are widely spread along the corridor, involving three different Member States. Three projects include new construction or upgrade of a port container terminal; in the case of the French ports in Ottmarsheim and Strasbourg, they are shared with German and Swiss ports, respectively. All projects are to be concluded by 2020 latest.

The Table 58 below shows the port projects mainly concerning last-mile issues.

Table 58: Port projects mainly concerning last-mile issues

No.	Costs (M €)	CC	Location	CB	Study or work	Description of project	Timing
106	10	FR	Strasbourg	x	Works	North road access to the port of Strasbourg	2015-2020
114	5.5	BE	Ghent		Works	Infrastructure bottleneck, internal port rail infrastructure, development of multimodal terminal, port connection to inland network, interoperability maritime-inland-rail	2014-2016
121	50	IT	Genoa		Works	Improvement of road access to the port (Voltri and Sampierdarena area) – The intervention allows for improving and upgrading the road access and the connection between the toll house and the port, for reducing congestion and remove bottlenecks in relation to the conflicts between port and urban road traffic.	2015-2017

115	100	BE	Antwerp		Study and Works	Upgrading shunting yards and junctions; freight transport services	2014-2020
105	17	FR	Strasbourg	x	Works	Increasing capacity at the Port du Rhin station; upgrading rail access to the port; upgrading signaling and points equipments; rail access to the port from the German network	2015-2025
106	17	FR	Strasbourg	x	Works	Increasing capacity at the Port du Rhin station; Upgrading rail access to the port; Upgrading signaling and points equipments; Rail access to the port from the German network	2015-2025
119	224	BE	Antwerp		Works	Increase in the capacity of access to the port of Antwerp	2014-2025
109	n/a	FR	Strasbourg	x	Works	Improving rail capacity of the Lauterbourg-Woerth line; rail connection to Lauterbourg station	open

Source: Information from national Ministries of Transport and infrastructure managers

There are 7 projects identified. More than half of them are located in the Port of Strasbourg, two in Belgium (Ghent and Antwerp) and one in Italy (Port of Genoa). All of these measures are about improving their port infrastructure's accessibility to either the road or the rail network.

The following Table 59 is about port projects mainly concerning externalities/ innovation projects.

Table 59: Port projects mainly concerning externalities/innovation

No.	Costs (M €)	CC	Location	CB	Study or work	Description of project	Timing
120	11	IT	Genoa		Works	Electrification of the quays in Genova Voltri - Electricity supply to the ships via connection to the ground grid.	2015-2019
125	5	IT	Genoa		Study and Works	Pilot project on LNG ship and re-fuelling (1st step); study and pilot actions aiming at assessing and analyse the economic-safety-environmental-regulatory aspects and possible localisations of an LNG bunkering station in the Port of Genoa. Pilots will deal with real testing of LNG bunkering and storage in-port operations.	2015-2018
126	11	IT	Genoa		Works	New ecological platform – new waste reception facilities realization	2015-2017

Source: Information from national Ministries of Transport and infrastructure managers

All three projects take place in the Port of Genoa. They indicate the multiple approaches with which the Port of Genoa tackles the negative externalities of waterway transport. The projects concern on the one hand the electrification of the quays in Genova Voltri. On the other hand, there is the pilot project for a possible LNG bunkering station at the Port of Genoa. Finally, there is a planned new waste reception. The works for these three projects are expected to start at 2015 and end 2020 latest.

4.5.2.7 Implementation plan airports

For the Rhine-Alpine Corridor, there are 2 airports located in The Netherlands, 2 in Belgium, 3 for Germany, 2 in Switzerland and 4 in Italy (thereof 3 belonging to the Milano Node). For a detailed overview on the airport nodes and their volumes see chapter 1.3.2. The airport projects according to the project categories are described in Table 60 to Table 62.

Table 60: Airport projects mainly concerning missing links

No.	Costs (M €)	CC	Location	CB	Study or work	Description of project	Timing
136	170	IT	Bergamo		Study and works	Rail connection Bergamo-Milano – Railway link between the Orio al Serio Airport and Bergamo city. According to the feasibility study, two solutions are envisaged: extend the regional railway network and set-up a people moving system through a new tram line connected to the station.	open

Source: Information from national Ministries of Transport and infrastructure managers

With a project volume of €170, the only project assigned to a missing link issue is at the same time the most cost-intensive airport project for the entire corridor. It is about the study and the works on the rail connection of the Orio al Serio airport and Bergamo city. The timing is open.

There are two airport projects for multimodality. They are described in the Table 61 below.

Table 61: Airport projects mainly concerning multimodality

No.	Costs (M €)	CC	Location	CB	Study or work	Description of project	Timing
134	114	IT	Milano		Works	Rail connection between Terminal 1 and 2 – The project consists of the construction of the rail link between Terminal 1 and Terminal 2 of Malpensa.	2013-2015
135	225	IT	Milano Malpensa		Study and works	Connection tunnel terminal 1-satellite, people mover	2017-2020

Source: Information from national Ministries of Transport and infrastructure managers

Both projects are located in the Milano area, more precisely in Milano Malpensa Airport. They focus on the multimodal connection of the terminal 1 and are expected to be finalised until 2020. The projects have an accumulated project volume of €183 M.

The airport projects with focus on last-mile issues are pictured in the Table 62 below.

Table 62: Airport projects mainly concerning last-mile issues

No.	Costs (M €)	CC	Location	CB	Study or work	Description of project	Timing
131	64	BE	Brussels		Works	Diabolo project – rail connection of the Brussels airport with the international railway axes Frankfurt – Liège – Brussels - Paris	2014-2018
133	n/a	IT	Milan		Study and works	Accessibility from the north, rail connection: Simplon – Gotthard axis - The final design consists of a double-track main link between the Malpensa terminal and the existing line of Gallarate-Varese, and in two interconnections, each dual track.	until 2020
137	37	IT	Genoa Node		Study and works	Construction of a new railway passenger station to serve Genoa airport and of a cable car infrastructure to connect the new rail station with the airport passenger terminal. The project is part of the Airport Master Plan which aims at expanding the catchment area by improving accessibility and intermodal connections for passengers.	2017-2022
132	34	BE	Liège-Bierset Airport		Works	High speed rail connection and building of the Liège-Carex terminal	2015-unknown

Source: Information from national Ministries of Transport and infrastructure managers

Quantitatively, the last-mile projects are the main focus of airport projects (4 out of in total 8). These projects concentrate on improving/establishing a rail connection to the respective airport. Two projects are located in Belgium, two in Italy. For one of the projects, no data about the project volume is available.

There is need for one airport project to meet the TEN-T requirements. The Rotterdam The Hague Airport shall be connected to the rail network by 2030. The thus proposed project is depicted below (Table 63).

Table 63: Proposed airport projects to meet TEN-T requirements

No.	CC	Location	CB	Study or Works	Description of project	Timing
3008	NL	Rotterdam The Hague Airport		Works	Connect Rotterdam The Hague Airport to the rail network	until 2030

Source: TEN-T compliance analysis

4.5.2.8 Implementation plan rail-road terminals

There are 20 identified RRT nodes on the Rhine-Alpine Corridor (3 for The Netherlands, 1 for Belgium, 7 for Germany, 2 for France, 4 for Switzerland and 3 for Italy). A detailed overview of the terminals belonging to the Rhine-Alpine Corridor can be found in Table 6. Alternatively, Annex 10 provides a listing of the terminals belonging to the Rail Freight Corridor Rhine-Alpine infrastructure.

Regarding the RRT projects, there is only one project mainly concerning capacity issues. It is about boosting railway traffic from the ports of Genoa and Vado to the hinterland; planned implementation is 2017. This project is shown in the Table 64 below.

Table 64: RRT projects mainly concerning capacity issues

No.	Costs (M €)	CC	Location	CB	Study or work	Description of project	Timing
145	25	IT	Vado Ligure (Genoa node)		Study and works	The proposed action aims at boosting railway traffic from the ports of Genoa and Vado Ligure to the hinterland by enhancing modal shift capacity in the VIO intermodal centre of Vado Ligure. The action includes the construction of a new intermodal terminal and the improvement of the rail link between the multimodal node of Vado Ligure and the rail network.	2015-2017

Source: Information from national Ministries of Transport and infrastructure managers

In contrast to that, Table 65 pictures in total four RRT projects with focus on multimodality.

Table 65: RRT projects mainly concerning multimodality

No.	Costs (M €)	CC	Location	CB	Study or work	Description of project	Timing
142	50	IT	Milano Node		Study and works	Milano Smistamento terminal upgrade	until 2020
143	90	IT	Novara Node		Study and works	Novara Boschetto terminal upgrade	until 2020
141	43.5	DE	Duisburg (Rhein-Ruhr terminal)		Works	Construction of the intermodal hub Rhein-Ruhr	2010-unknown

Source: Information from national Ministries of Transport and infrastructure managers

Two projects are located in Italy, the other in Germany. The Italian projects have the highest share regarding project volume (€90 M and €50 M, respectively) and are both about general terminal upgrades. Planned implementation is until 2020. The end date of the Rhein-Ruhr intermodal hub construction is still unknown.

Table 66 below shows the RRT projects about last-mile issues.

Table 66: RRT projects mainly concerning last-mile issues

No.	Costs (M €)	CC	Location	CB	Study or work	Description of project	Timing
140	1.2–2	NL, BE, DE, CH, IT	Rotterdam - Genoa	part	Study and works	(National study on the) implementation of rail freight line systems connecting rail/road/water-terminals in the Rhine-Alpine Corridor	2015-2020
144	38	IT	Vado Ligure (Genoa node)		Study and works	The proposed action aims at ensuring the seamless freight flow through the multimodal centre of Vado Ligure, improving the control system and road accessibility. The action concerns the realisation of a new access system to the multimodal node of Vado, including the construction of: - Customs Gates - centralised control facilities (veterinary, sanitarian etc.) - new road connections between the VIO multimodal centre, the main road network and the port of Vado Ligure.	2015-2017

Source: Information from national Ministries of Transport and infrastructure managers

There are only two projects identified. One of which is a support study/support works, involving all countries on the corridor. The other is located in Vado Ligure (Genoa) and concerns the realisation of a new access system to the multimodal node of Vado. Both projects are planned to be finalised by 2020.

4.5.2.9 Summary of the implementation plan

The implementation plan was elaborated on one hand based on the identification of projects (which itself were the result of the pre-identified projects and the corridor characteristics); on the other hand, the implementation plan was influenced by involvement of stakeholders in the Corridor Fora as well as the bilateral coordination with the involved countries. The list of projects described in the implementation plan was finally approved the Member States in October 2014.

To tackle all the critical issues and bottlenecks described in the corridor characteristics (cp. chapter 4.2), the implementation plan foresees the realisation of in total 175 projects located in the Core Network of the Rhine-Alpine Corridor. 30 out of 175 projects are assigned to Switzerland and were thus analysed separately.

Out of the 145 projects located in the Core Network of the Member States, the overwhelming majority (60) is assigned to rail. Following are inland waterways (28), seaports (19) and road (15). Inland ports (9), airports (7) and rail-road terminals (7) only have a small share. For the detailed analysis of the respective transport modes, seaports and inland ports were exploited together. While doing that, it became obvious that most of the seaport projects (12 out of 28 for accumulated "port" projects) take place in and around the Port of Genoa, especially in the Sampierdarena port area. A similar situation can be found when analysing the airport projects: the majority of the projects (4 out of 7) are assigned to a Milano airport, namely 1 project for Milano Bergamo and 3 projects for Milano Malpensa. Germany has no allocated airport projects at all. Almost all airport projects aim at improving and/or establishing a rail connection.

Looking at the general allocation of projects to the respective Member State it becomes obvious that most projects are taking place in Italy (57). Germany has 31 assigned projects, The Netherlands 22, Belgium 15 and France 11. Additionally, there are 9 projects involving multiple countries. Most of the latter are support studies or works.

The available project cost information amount to a total volume of €47,615 M. This information should be handled with caution as for 19 projects, specific information on project costs is not available yet.

There are 5 projects with a planned implementation date of 2014. In general, most projects (74) are planned to be finalised by 2020 latest. This concerns especially inland ports, seaports and inland waterway, where 37 out of in total 55 are expected to finish before the end of 2020. For 30 projects there is no information about the year of implementation; they were regarded as "finished later than 2030".

All the projects were clustered according to the in the corridor characteristics defined categories of critical issues:

- Capacity/physical bottlenecks;
- Missing link;
- Interoperability/Compliance with TEN-T standards;
- Multimodality;
- Last mile connection;
- Externalities/Sustainability/Innovation;
- Urban areas.

In a separate analysis it was defined if a project is related to a cross-border section or a cross-border bottleneck. The applied cross-border sections were recommended by the European Commission.

Applying these sections, 56 projects were evaluated as cross-border relevant. However, the overwhelming majority of these 56 projects (namely 39) is only partially related to cross-border issues. This is amongst others due to the fact that there is a different sectioning for freight and passenger, thus a lot of projects are fully relevant to the freight border section but only partially for passenger (e.g. Chiasso-Milano). Out of the remaining 17 pure cross-border projects, 11 are concerning inland waterways/ports in France along the Rhine.

Due to the fact that most projects addressing more than one category (for instance the upgrade of the railway station Amsterdam Central to increase capacity and reliability for both rail freight and rail passenger transport), the category which is most relevant for the respective project was marked with a bold **x** in the project list. Additionally relevant categories were indicated with an "o".

Following that methodology, capacity has the lion's share of mainly assigned projects (64). Interoperability measures account for the second highest share (31). Missing link (5) and urban area (4) – related projects have the smallest part. Although the facilitating and implementing of TEN-T infrastructure around urban areas was only the main focus of four projects, this category was relevant for a total of 21 projects. This leads to the assumption that projects often took place around urban nodes (and thus including the implementation and facilitating of infrastructure), but had their main focus elsewhere. An example for that are the noise reduction measures for rail in and around urban nodes; this project is mainly addressing externalities/innovation. A similar situation can be found for multimodality, where only 13 projects are mainly addressing this category, but 26 were also regarded as additionally relevant for multimodal transport.

In a second step, the accumulated project volume per measure category was evaluated. Analogue to the above, capacity accounts for the highest costs (€25,259 M). The most expensive project for this category is the first stage of the new construction and upgrade of the existing line between Karlsruhe and Basel. Following that, however, missing link projects have the second highest share (€9,648 M), giving this category the highest project volume on average. Looking further into the respective missing link projects, it becomes obvious that a missing link bottleneck almost always has to be solved by new construction measures, meaning projects with a high cost intensity. In contrast to that are interoperability measures, which quantitatively accounted for 31 mainly relevant projects, but only have a share of €2,546 regarding the costs. This can be reasoned as a lot of interoperability projects are upgrades of existing lines, such as the upgrade for 740m along the Italian rail network. Another fact is that interoperability projects for one Member State are often separated if they concern a different section or a different time frame (e.g. there are 4 projects concerning 740m upgrades on Italian sections and also 4 about loading gauge upgrades; each project is located on a different part on the Italian corridor and/or has a different time frame). Cross-border relevant projects have a total cost volume of €17,057 M.

Looking into the mode-specific costs, it can be stated that rail has by far the highest share (€31,249 M). This can be reasoned on one side by the high amount of rail projects (62). On the other side, most rail projects involve "physical" works on existing and/or new infrastructure rather than studies or pilot projects (such as studies about LNG for ports). The second highest share has road (€7,617 M) and IWW (€4,682 M).

Despite the high quantity of Member State projects and the multitude of their specific improvement measures, there are still critical issues to be tackled and TEN-T requirements to be fulfilled (the latter until 2030). In order to do that, several projects were proposed by the consultants in order to solve these bottlenecks. These proposed measures concern especially the Vlissingen area (axle load and freight line speed), the German Core Network which does not belong to the ERTMS Corridor A (no planned ERTMS implementation), the entire Belgian and German rail network to allow for 740m trains on regular basis and the Italian road network (availability of clean fuels, use of tolling system). Other proposed projects to meet TEN-T requirements and solve critical issues were also added to the comprehensive project list in Annex 7.

4.5.2.10 Implementation plan Switzerland

Switzerland is the key country in the alpine transit. Its high development standard of infrastructure and the investments in new infrastructure and related technology enables reliable and high capacity transports via rail and road. With the Lötschberg base tunnel the western rail transit is almost completed. With the Gotthard and Ceneri base tunnels the eastern rail link will be vastly improved. The completed projects will increase rail capacity and simultaneously strengthen the rail proposition to shift road transports.

The implementation plan for Switzerland is separated from the other national transport mode specific lists. Since Switzerland is not an EU member state projects will not be financed under the Connecting Europe Facility. Furthermore Swiss projects are not considered in the global financial needs calculated for the TEN-T Rhine-Alpine Corridor.

30 Swiss projects are listed to complete the corridor overview on relevant projects.

7 road infrastructure projects are listed along the corridor. Three projects are located along the border crossing sections to Germany via Basel. Two projects are upgrade works along transit motorways and one project deals with the resolution of the cross

border bottleneck in the Swiss/Italy crossing between Bellinzona – Chiasso. All these projects are identified as core bottlenecks along the Swiss motorway network and receive funding through PEB2 (Second Programme Message for Bottleneck Resolution). Additionally the upcoming works of the Gotthard road tunnel is listed, which requires full rehabilitation around 2025. A second new tunnel is an option as is the full or partial closure of the tunnel for the duration of the project. The project is still under study and political discussion. The total cost estimations for the Swiss road projects amounts to about 3.2 billion €, excluding works on the Gotthard road tunnel.

23 rail projects have been identified in coordination with the Swiss transport ministry. Twelve of these projects will be realised before or in 2020.

Six projects address the removal of capacity bottlenecks. In Basel and the Simplon tunnel these projects directly relate to the improvement of cross-border transport. Five projects are aiming at the interoperability critical issues are related to the entire Swiss rail routes, benefitting the cross-border transport and rail transit.

The Gotthard base tunnel is set to be finalised in 2016, while for the Ceneri base tunnel the finalisation date is scheduled for 2019. Additionally, further infrastructure bottlenecks are planned to be resolved on core corridor lines. A special focus is placed on the implementation of ERTMS along the entire corridor rail lines, as well as allowing a 2 minute or a maximum of 3 minute headway on the corridor lines to increase the capacity on high occupancy sections. To further support shifting transports from road to rail an incremental part is to fully enable a 4m profile for trains on the transit routes and thus to support the transhipment of trucks. The projects are scheduled (e.g. the Bözberg tunnel upgrade) or in progress and will be finalised in 2020 on the sections from Basel via Bellinzona to Chiasso to adjust tunnels and bridges. Until 2025 the Swiss rail transit capacities will be further increased and bottlenecks removed. In the area of Basel-East, Bern, Lugano, Liestal, Münsingen and Bellinzona further projects are planned within the ZEB (Zukünftige Entwicklung der Bahninfrastruktur). Within this programme the timeline step after 2025 and 2030 include further projects relevant for the core rail corridor lines. For these projects concrete planning or funding is publically not yet accessible but they will involve sections feeding the base tunnels for a highly efficient rail transport via Switzerland.

The Swiss projects are summarised in the Table 67 to Table 72 (see also Annex 7-9).

Table 67: Swiss rail projects mainly enhancing the removal of capacity issues and bottlenecks

No.	Costs (M €)	CC	Location	CB	Study or Works	Description of project	Timing
2003	40	CH	Basel Bad - Basel SBB	x	Works	Upgrade to 4 tracks	started-2015
2010	8,235	CH	Erstfeld - Biasca (Gotthard base tunnel)		Works	Interventions concerning gradient, speed limitations, Resolution of physical bottlenecks	started-2016
2020	664	CH	Olten-Aarau		Works	4 track line	2014-2020
2022	141.1	CH	Simplon Tunnel	X	Works	Complete structural rehabilitation necessary	2011-2016
2012	640	CH	Frutigen - Visp		Works	Base tunnel, 2 tracks (2nd phase)	unknown-after 2025

2021	37.4	CH	Altdorf		Works	Upgrade of station	2020-2022

Source: Information from national Ministries of Transport and infrastructure managers

Table 68: Swiss rail projects mainly concerning interoperability

No.	Costs (M €)	CC	Location	CB	Study or work	Description of project	Timing
2001	230	CH	Basel - Bellinzona - Chiasso	Part	Works	Other telematic application systems	unknown-2019
2002	700	CH	Basel - Bellinzona - Chiasso	Part	Works	Intervention concerning profile limitations (upgrade to P400)	unknown-2020
2006	2,048	CH	Bellinzona - Lugano, Ceneri Basetunnel	x	Works	Interventions concerning gradient, speed limitations, resolution of physical bottlenecks	started-2019
2008	18	CH	Bern - Thun		Works	Other telematic application systems (Headway 2')	started-2014
2009	115	CH	Corridor A/1 lines	part	Works	Development of traffic management system (ERTMS Level 1)	started-2015
2019	70.6	CH	Pratteln-Brugg (Bözberg Tunnel)		Works	Intervention concerning profile limitations (upgrade to P400)	2015-2018

Source: Information from national Ministries of Transport and infrastructure managers

Table 69: Swiss rail projects mainly concerning urban areas

No.	Costs (M €)	CC	Location	CB	Study or Works	Description of project	Timing
2017	40	CH	Rail node Bern		Works	Resolution of physical bottlenecks	unknown until 2025

Source: Information from national Ministries of Transport and infrastructure managers

Table 70: Swiss rail projects with no public planning details available yet

No.	Costs (M €)	CC	Location	CB	Study or work	Description of project	Timing
2016	83	CH	Mägenwil - Lupfig		Works	Resolution of physical bottlenecks	unknown-until 2019
2018	74.7	CH	Walchwil - Arth-Goldau		Works	Resolution of physical bottlenecks	unknown-2018
2004	747	CH	Basel East, Ergolztal		Works	Resolution of physical bottlenecks	unknown-until 2025
2007	124.5	CH	Bellinzona - Tenero		Works	Resolution of physical bottlenecks	unknown-until 2022
2011	n/a	CH	Ferden - Mitholz (Lötschberg base tunnel)		Works	Resolution of physical bottlenecks	unknown-after 2025
2013	522	CH	Gümlingen - Münsingen		Works	Resolution of physical bottlenecks	unknown-until 2025
2014	124.5	CH	Liestal		Works	Resolution of physical bottlenecks	unknown-2026
2015	83	CH	Lugano	x	Works	Resolution of physical bottlenecks	unknown-until 2025
2000	n/a	CH	Axen		Works	Resolution of physical bottlenecks	unknown-after 2030
2005	n/a	CH	Basel-Mittelland		Works	Resolution of physical bottlenecks	unknown-after 2030

Source: Information from national Ministries of Transport and infrastructure managers

Table 71: Swiss road projects mainly concerning capacity issues

No.	Costs (M €)	CC	Location	CB	Study or Works	Description of project	Timing
2028	138	CH	Intersection Härkingen - Intersection Wiggertal		Works	Resolution of physical bottlenecks	2012-2014
2024	1,685	CH	Connection Göschenen - connection Airolo		Works	Complete structural rehabilitation	unknown
2025	325	CH	Intersection Basel Hagnau - Intersection Augst		Works	Resolution of physical bottlenecks	unknown
2026	763	CH	Intersection Basel Wiese - Intersection Basel Hagnau		Works	Resolution of physical bottlenecks	unknown
2027	675	CH	Intersection Bellinzona - CH-I border Chiasso	part	Works	Resolution of physical bottlenecks	unknown
2029	1,221	CH	Intersection Rotsee - Intersection Lopper		Works	Resolution of physical bottlenecks	unknown

Source: Information from national Ministries of Transport and infrastructure managers

Table 72: Swiss road projects mainly concerning urban areas

No.	Costs (M €)	CC	Location	CB	Study or Works	Description of project	Timing
2023	47	CH	CH-D border Basel - Intersection Basel Hagnau (dir. South)	x	Works	Upgrading of ordinary road to connect node to motorway	2013-2015

Source: Information from national Ministries of Transport and infrastructure managers

4.5.3 Deployment plan ERTMS

Within the study on the Rhine-Alpine Corridor, a deployment for ERTMS has to be carried out. The elaboration of this plan considers the alignment of the corridor. Hence, this deployment plan is not identical with the respective deployment plan of the ERTMS Corridor A respectively the Rail Freight Corridor Rhine-Alpine (ERTMS Corridor is part of the Rail Freight Corridor Rhine-Alpine).

The ERTMS deployment plan of the Core Network Corridor Rhine-Alpine has a draft status. It has to be checked and coordinated by the Member States and the respective rail infrastructure managers. Its realisation depends on the availability of national and European funding. Currently, the ERTMS implementation plan of the Rail Freight Corridor Rotterdam Genoa is under revision. The new version of this ERTMS implementation plan is expected to be published in December 2014 earliest. Hence, there might be new information concerning the planned ERTMS deployment and the respective implementation dates for the Rhine-Alpine Corridor.

4.5.3.1 Introduction

The European Rail Traffic Management System (ERTMS) describes the future approach for guaranteeing interoperability in the European railway market. All Member States have agreed subsequently that ERTMS should be a key part of the future European rail system as the universal traffic rail management system to achieve seamless cross-border rail services.

The TENT-T Core network has to be fully equipped with ERTMS by 2030. Currently, and "despite the significant provision of EU funding"[57] implementation of ERTMS is still on a low level. This is among others reasoned by limited availability of national resources for co-financing.

The coordination of the deployment of ERTMS in Europe is accompanied by a European Coordinator to avoid a patchwork of developments. The deployment of ERTMS is laid down in the Decision 2006/679/EC and the Decision 2012/88/EU. A European ERTMS deployment plan (EDP) has been developed in 2009. The EDP has defined six ERTMS corridors that shall be equipped with ERTMS respectively by 2015 or 2020 (Decision 2012/88/EU). An updated European ERTMS work plan is expected by the end of 2014[58]. The Rail Freight Corridor Rhine-Alpine also has elaborated an ERTMS implementation plan considering the EDP and the Regulation 913/2010.

However, the European railway network is a shared system and each stakeholder is responsible to realise and implement ERTMS on his rail net in order to ensure success. Therefore, beside the European deployment plan, national deployment plans have been developed. On the Rhine-Alpine Corridor, The Netherlands, Belgium and Switzerland made the decision to implement ERTMS in their entire national rail network[59].

Nevertheless, it is partly challenging to collect the latest information on ERMTS planning, schedules and planned projects, because planning is subject to change (delays in financing, formal objections of residents, delay due to different interpretations and versions of the technical ERTMS specification etc.).

4.5.3.2 Data sources and methodology for data gathering

The collection of data on ERTMS deployment on the Rhine-Alpine-Corridor is based on various sources. Firstly, the TENtec data base was analysed to describe the current status (January 2014) of ERTMS implementation along the corridor.

Data on planned ERTMS projects have been gathered by the analysis of studies and reports, coordination with the MoT of the concerned countries and by the analysis of identified projects which have also been coordinated with the MoT and rail IMs (participants of the Corridor Fora). Additionally, publicly available information and official documents have been analysed. Main information sources for elaboration of the ERMTS deployment plan for the Rhine-Alpine Corridor were:

- Commission Staff Working Document - on the state of play of the implementation of the ERTMS Deployment Plan – SWD(2014) 48 final – Brussels, February 2014;
- European Rail Traffic Management System - Annual Report of the Coordinator – Brussels, October 2013;
- Implementation plan for the Rail Freight Corridor Rhine-Alpine (Dec. 2013)

[57] *SWD(2014) (48) final*

[58] *Information from Gerhard Troche - DG MOVE – Unit B.2*

[59] *European Rail Traffic Management System - Annual Report of the Coordinator – Brussels, October 2013*

- Commission Decision of 25 January 2012 on the technical specification for interoperability relating to the control-command and signalling subsystems of the trans-European rail system (2012/88/EU);
- Railway map ERTMS Version 2.0 and 3.0- Memorandum on Alternatives – Dutch Ministry of Infrastructure and the Environment – Dec. 2013;
- Publicly available information on the ERTMS Masterplan for Belgium;
- Identified ongoing and planned ERTMS projects identified by the contractors;
- Coordination with the Member States (The Netherlands, Italy);
- Coordination with the participants of the corridor fora.

4.5.3.3 ERTMS deployment on the corridor countries

The Netherlands:

By 2030, The Netherlands plan full implementation of ERTMS on all sections of the corridor[60]. The goal of reaching full operation of ERTMS by 2030 on Rhine-Alpine Corridor can be considered – for The Netherlands – as more than likely. The Figure 64 below provides information about the timeline concerning the decision making process concerning ERTMS implementation.

Figure 64: Decision making process on ERTMS implementation in The Netherlands

Source: ERTMS railway map 2.0 (status November 2013; potential discrepancies due to outdated data sources will be discussed for the third Corridor Forum and the Final Report)

Based on 2014, the corridor-related ERTMS lines in operation in The Netherlands are:

- Rotterdam – Zevenaar (Betuweline): ERTMS level 2;
- Amsterdam Bijlmer – Utrecht: ERTMS level 2;
- Barendrecht – Lage Zwaluwe: ERTMS level 2 (the part of the HSL south line).

A general overview on the current situation concerning ERTMS in The Netherlands is given in Figure 65.

[60] *ERTMS railway map 3.0, status April 2014*

Figure 65: Introduction of Summary of already realised and previously agreed rollout of ERTMS to 2028

Source: Dutch Ministry of Transport

Identified ongoing ERTMS-related projects in The Netherlands are the ERTMS deployment for Vlissingen – Moerdijk as well as for the section Utrecht – German border. This is expected to be finished by 2030 latest (compare map above). The project volume consists of €75 M for infrastructure (including overlap with other corridors of NL) and €150 M for the equipment of rolling stock (for all three corridors in The Netherlands)

ERTMS roll-out plan (for the Rail Freight Corridor Rhine-Alpine – planning status December 2013):

- Zevenaar - Emmerich: ERTMS level 2; implementation 2014
- Roosendaal – Barendrecht: implementation 2020
- Utrecht – Geldermalsen: implementation 2030
- Utrecht – Arnhem – Zevenaar: ERTMS level 2; implementation: 2030
- Vlissingen – Roosendaal: implementation 2030

Belgium

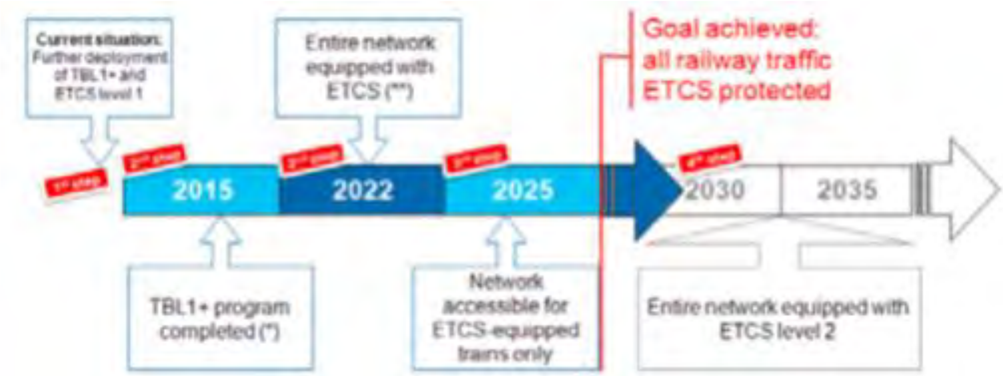
Belgian network manager Infrabel has developed a Master Plan for ERTMS implementation on the whole conventional rail network in which they announced to implement the ERTMS technology on its entire rail network by 2022[61]. The progress is

[61] *Compare project list*

considered to be on time so far, with two sections belonging to the corridor already equipped with ERTMS. Belgium profits from its own national automatic train protection system (TBL1+) which is currently undergoing the final stages of implementation and is based on ERTMS hardware. By 2016, Infrabel expects to have the line via Liège between Brussels and the German border to be fully operational on ERTMS, by 2025 it is planned to make the entire network only accessible for ERTMS-equipped trains. ERTMS will be installed first on the new and upgraded lines.

As from 2025, rolling stock will be required to be equipped with ERTMS, to be allowed to run on the conventional network. The Figure 66 below provides more detailed information about the timeline concerning the ERTMS implementation.

Figure 66: Infrabel's four-stage programme to improve train protection and move to a network-wide use of ETCS Level 2 by 2030-4



Source: Railway Gazette International - April 2014

Identified current Belgian corridor-related ERTMS lines in operation:

- Schaerbeek-Leuven (6km), Level 1 (Source: SWD48 final, Railway Gazette (April 2014)).
- Chênée (Liège) – Hergenrath (German border) (42km), Level 2 (Source: UNIFE, 2014)

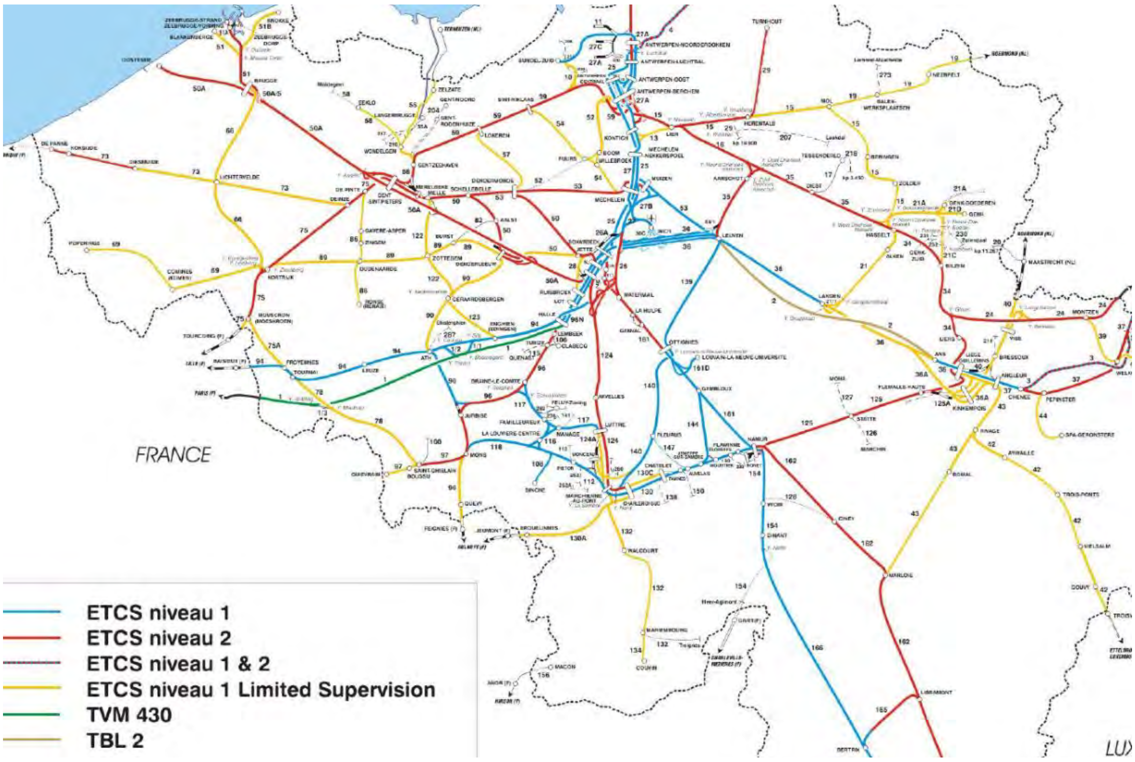
Identified ongoing ERTMS-related projects in Belgium are the ETCS deployment on the entire Core Network by latest 2022 with a project volume of €935.5 M.

ERTMS roll-out plan (for the Rail Freight Corridor Rhine-Alpine – planning status December 2013):

- <u>A'pen Noord – A'pen Berchem</u>: ERTMS level 1; implementation 2015
- <u>Zeebrugge – Brugge</u>: ERTMS level 1; implementation: 2018
- <u>Brugge – Ghent</u>: ERTMS level 2; implementation 2018
- <u>Antwerpen-Kallo – Y Melsele</u>: ERTMS level 1, implementation 2018
- <u>Y Melsele – A'pen Berchem</u>: ERTMS level 2, implementation 2018
- <u>Hasselt – Visé – German border</u>: ERTMS level 2, implementation 2020

For a general overview on the ERTMS implementation on the Belgian network, see Figure 67.

Figure 67: ERTMS implementation plan on the Belgian network



Source: Infrabel

Germany:

Germany has committed itself to equip the ERTMS Corridor A with ERTMS level 1 Limited Supervision or ERTMS level 2. ERTMS level 2 will be only equipped either on highly utilised line sections for enhancing the capacity or if the respective interlocking already meet the requirements for ERTMS level 262. Corridor A shares most of the sections with the Rhine-Alpine Corridor, namely the sections Emmerich – Köln (conventional line only between Oberhausen - Köln), Köln – Mannheim (right side of the Rhine), Mannheim – Basel. For the passenger line between Oberhausen - Köln, Köln – Koblenz (left side of the Rhine) and for the section Köln – Frankfurt – Groß Gerau – Mannheim – Heidelberg – Karlsruhe as well as for the line between the Belgian Hergenrath border and Köln, the status of the ERTMS implementation cannot be estimated. For the latter, in terms of interoperability, this situation could have a negative impact on development of the Rail Freight Corridors (RFC1 and RFC8) and on the modal split of the Belgian ports.

Identified ongoing ERTMS-related projects in Germany are on the one hand the ERTMS implementation on the existing line between Zevenaar and Oberhausen (timing and costs not available). On the other hand, ERTMS shall be implemented on the entire network of the ERTMS Corridor A between Emmerich and Basel. The project volume is estimated at €284 M. Works are ongoing since 2013, the implementation date is unknown.

ERTMS roll-out plan (for the Rail Freight Corridor Rhine-Alpine – planning status December 2013):

- Emmerich-Oberhausen: ERTMS level 2
- Oberhausen - Darmstadt: ERTMS level 1
- Darmstadt - Mannheim: ERTMS level 2
- Mannheim - Karlsruhe: ERTMS level 1
- Karlsruhe – Weil am Rhein: ERTMS level 2

Switzerland:

The SBB plans to equip its entire standard gauge rail network on the Rhine-Alpine Corridor with ERTMS level 1 by 2015. For the rest of the Swiss standard gauge rail network ERTMS level 1 will be implemented until 2017[63] . The section Carnorino – Vezia (Ceneri base tunnel), which will be opened by 2019 will have ERTMS level 2 already implemented.

Current ERTMS lines in operation (since 2007): Rothrist – Mattstetten (44km), level 2; Lötschbergtunnel (Frutigen – Visp) (34km), level 2.

ERTMS-related projects are the development of ERTMS level 1 on all Corridor A/1 lines until the beginning of 2016. This project is estimated at €115 M. Works are ongoing already.

ERTMS roll-out plan (for the Rail Freight Corridor Rhine-Alpine – planning status December 2013):

- Weil – Basel Bad Bf: ERTMS level 1; implementation: 2015 (in coordination with DB Netz)
- Basel – Rothrist: ERTMS level 1; implementation: 2016
- Mattstetten – Frutigen: ERTMS level 1; implementation: 2016
- Visp – Iselle (Border): ERTMS level 1; implementation 2016
- Basel - Brunnen: ERTMS level 1; implementation 2016
- Castione - Bellinzona: ERTMS level 1; implementation: 2015
- Lugano - Chiasso: ERTMS level 1; implementation: 20165
- Brunnen - Rynächt: ERTMS level 2; implementation: 2015
- Poleggio N - Claro: ERTMS level 2; implementation: 2015
- Gotthard base tunnel: ERTMS level 2; implementation: 2016
- Camorino - Vezia: ERTMS level 2; implementation: 2019

Alternative routing through the mountain lines[64]:

- Erstfeld - Poleggio (Gotthard mountain line): ERTMS level 1; implementation: 2016
- Frutigen - Visp (Lötschberg mountain line): ERTMS level 1; implementation: 2016
- Giubiascao - Vezia (Mountain line): ERTMS level 1; implementation: 2016, partly level 2 from mid 2017

Italy:

For the Italian rail network, a stepwise ERTMS implementation is planned. Within year 2018 an interoperable corridor connection from Gottardo pass to the port of Genova will be ensured through the equipment with ERTMS L2 of the rail sections Chiasso-Milano, Milano-Tortona and Tortona-Genova; within 2020 will be available also the connection from Simplon pass to Novara (entire project volume €55 M).

The rest of the Italian sections belonging to the Core Network of the Rhine-Alpine Corridor will be equipped with ERTMS within 2025/2030 (project costs of €100 M).

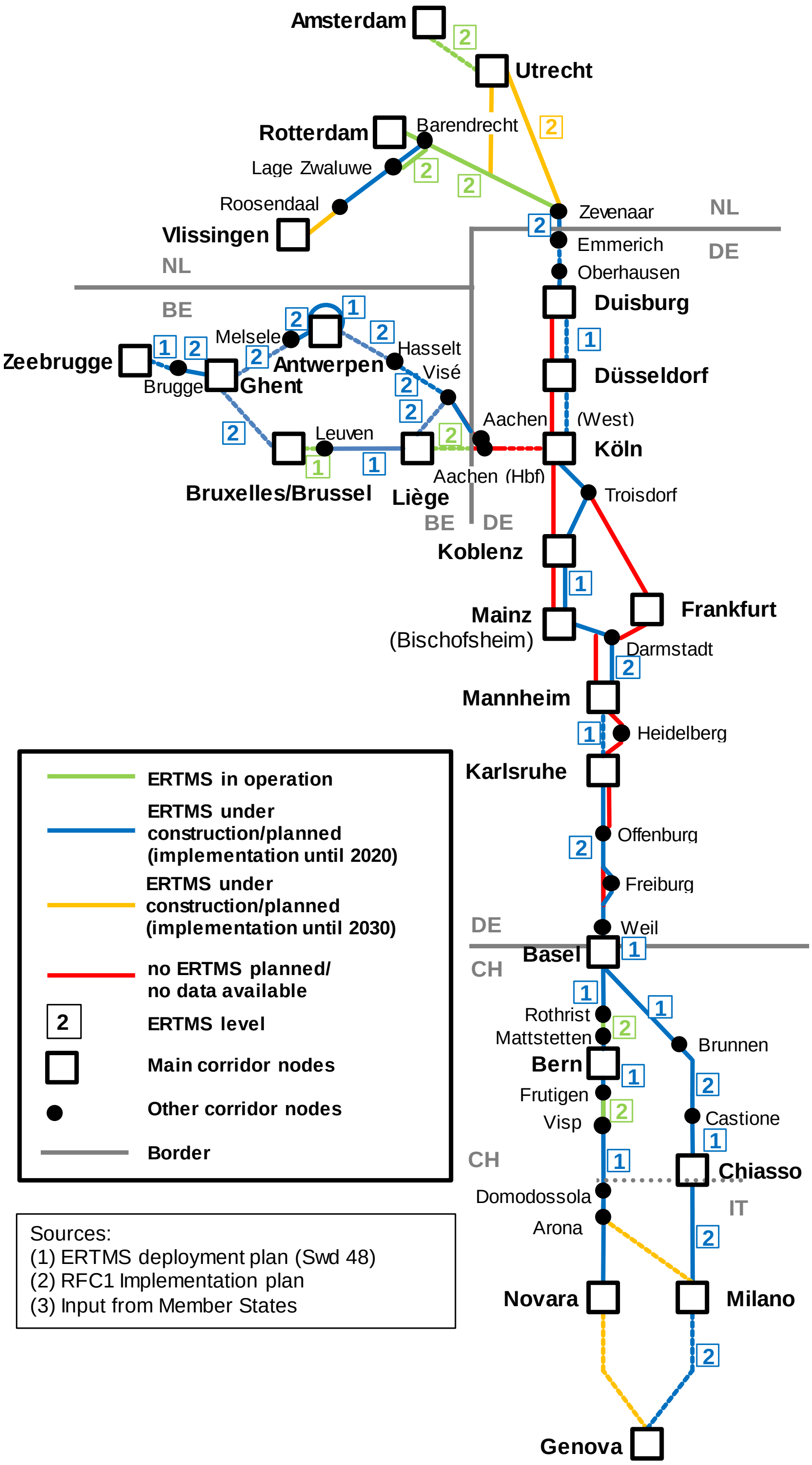
[63] Bundesamt für Verkehr (BAV): European Train Control System ETCS, Standbericht 2013

[64] for informative purposes only

4.5.3.4 Status of ERTMS implementation on the corridor

This figure shows the current status of ERTMS usage for the Rhine-Alpine Corridor and its respective levels of implementation for 2020 and 2030.

Figure 68: ERTMS deployment on the Rhine-Alpine Corridor (2014 – 2030)



Source: Information from national Ministries of Transport and infrastructure managers (status Oct 2014)

Whereas The Netherlands already have ERTMS equipped on most of their corridor-aligned network and opt to integrate the missing lines until latest 2030, the other involved countries run ERTMS on only a few sections (Belgium, Switzerland) or on none at all (Germany, Italy).

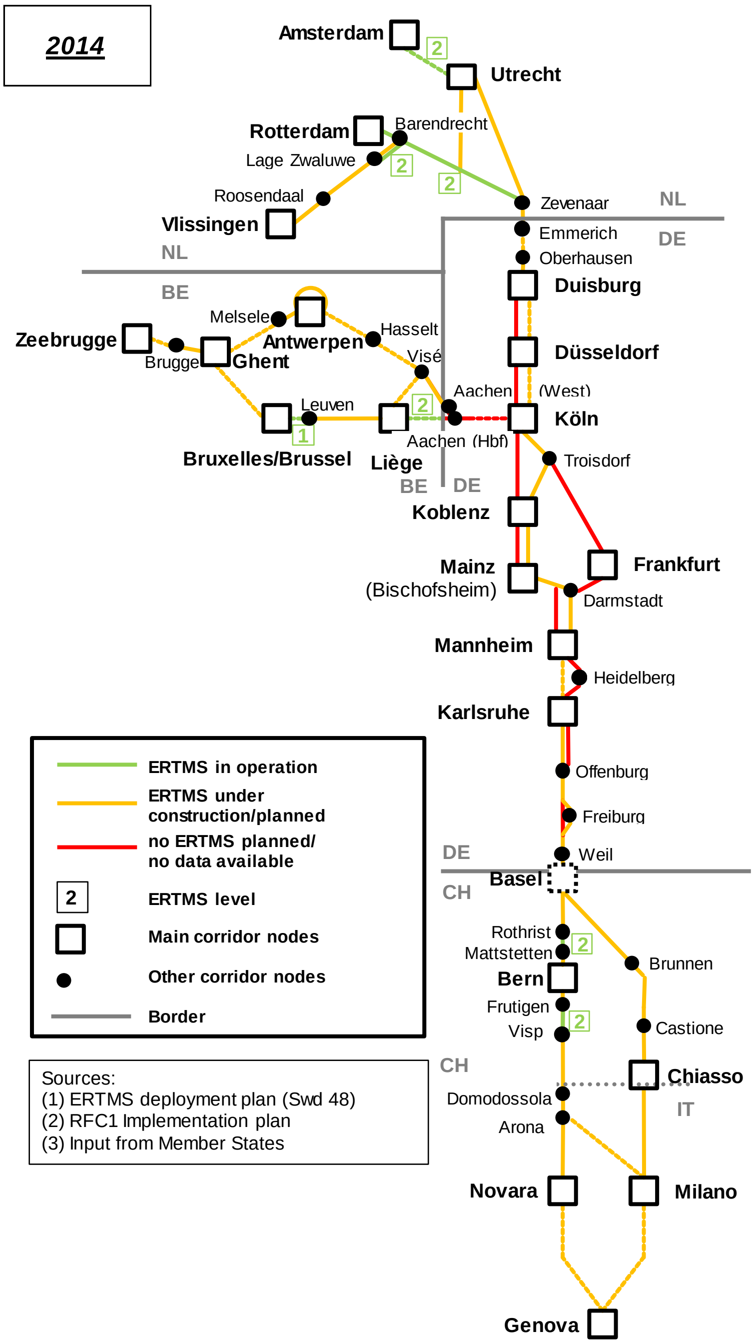
Belgium looks forward to implement ERTMS on its entire network until 2022, the majority of the corridor-aligned sections, namely Zeebrugge – Ghent, Melsele – Antwerpen, the Ring of Antwerpen, Hasselt – Botzelaer border (German border) and Brussels – Liège shall be equipped even before 2020.

A similar approach can be found in Switzerland, where the entire corridor-aligned network will implement ERTMS until latest 2019. Whereas Belgium opts to run most sections with ERTMS level 2, the majority of the corridor-aligned Swiss rail network will be fit with ERTMS level 1 (exceptions are the sections with ERTMS already in operation and the line Brunnen – Castione).

In Germany however, only the sections belonging to the ERTMS Corridor A will be running ERTMS (level 2 only on the priority project sections Emmerich – Oberhausen and Karlsruhe – Basel (Weil), as well as the section Darmstadt – Mannheim). The other lines, namely Duisburg – Köln (high speed line), Hergenrath (border) – Aachen Hbf – Köln, Köln – Mainz (left side of the Rhine), Troisdorf – Darmstadt, Groß Gerau – Mannheim – Heidelberg – Karlsruhe – Offenburg as well as the freight route through Freiburg (Gbf) do not have any planned ERTMS development. Especially for the section between the Belgian Hergenrath border and Köln, in terms off interoperability, this situation could have a negative impact on development of the Rail Freight Corridors (RFC1 and RFC8) and on the modal split of the Belgian ports.

The ETCS level to be used on the Italian lines involved in the migration process has been identified safeguarding both the capacity needs and the principle of minimal intrusiveness on performances currently offered.

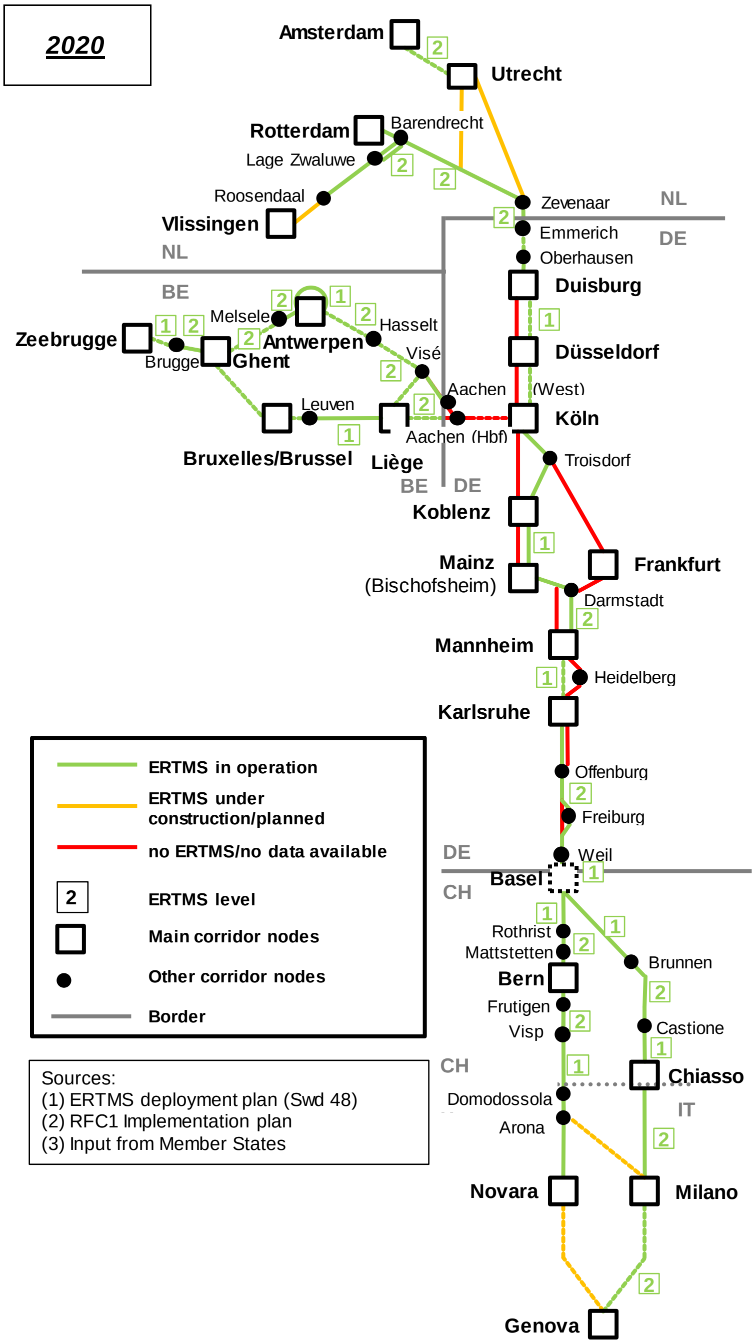
Figure 69: ERTMS implementation on the Rhine-Alpine Corridor (2014)



Source: HaCon based on information from national Ministries of Transport and infrastructure managers (status Oct 2014)

The only sections running ERTMS are Rotterdam – Zevenaar, Amsterdam – Utrecht and Lage Zwaluwe – Barendrecht (the part of the HSL South Line) for The Netherlands, Schaerbeek – Leuven and Chênée (Liège) – Hergenrath (German border) for Belgium and Rothrist – Mattstetten as well as the Lötschbergtunnel for Switzerland.

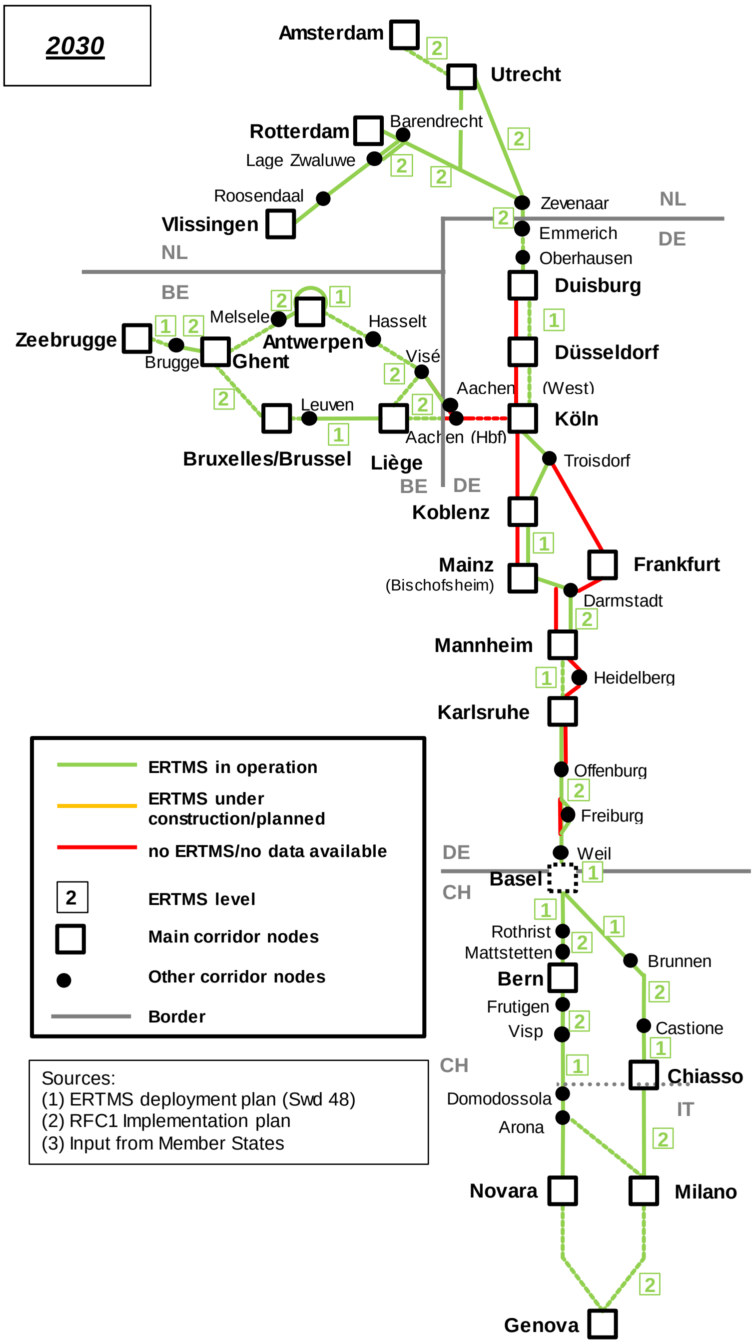
Figure 70: ERTMS implementation on the Rhine-Alpine Corridor (2020)



Source: Information from national Ministries of Transport and infrastructure managers (status Oct 2014)

In 2020, the majority of the Belgian rail network is equipped with ERTMS. For the German part, all planned implementations concerning ERTMS are planned to be carried out. Switzerland's entire corridor-aligned rail network is running ERTMS, whereas Italy also full coverage for the section between Chiasso and Genova.

Figure 71: ERTMS implementation on the Rhine-Alpine Corridor (2030)



Source: Information from national Ministries of Transport and infrastructure managers (status Oct 2014)

Looking at the level of ERTMS implementation in 2030, Belgium, The Netherlands and Switzerland and Italy have a full coverage of ERTMS in their corridor network. In Germany, however, there are multiple sections which are still not covered by ERTMS, namely Duisburg – Köln (high speed line), Köln – Mainz (left side of the Rhine), Groß Gerau – Mannheim – Heidelberg – Karlsruhe and the alternative route through Freiburg.

4.5.4 Deployment plan RIS

The RIS deployment plan of the Core Network Corridor Rhine-Alpine has a draft status. It has to be checked and coordinated by the Member States and the respective infrastructure managers.

4.5.4.1 Introduction

The concept of River Information Services (RIS) stands for the most substantial change in the IWW sector for the last decades.

River Information Services means the harmonised information services to support inland waterway navigation and management to enhance safe and efficient environmental friendly transport. Supported by RIS, inland waterways should be utilised to their fullest extent and should facilitate interfaces with other transport modes in order to guarantee interoperability. These harmonised information services shall provide data on lock management, traffic management, navigation, transport logistics to harbour dues, law enforcement and statistics.

The key relevant document of the EU concerning RIS is the Directive 2005/44/EC of the European Parliament and of the Council of 7 September 2005 on harmonised river information services (RIS) on inland waterways in the Community (implemented by the Member States on 20 October 2007).

By setting a framework for the deployment and use of the RIS, the Directive aims at a harmonised implementation of the various types of already existing information services about waterways and their transport activity.

In a long-term point of view, RIS aims at supporting traffic and transport management in inland waterway transport as well as enhancing safety, efficiency and environmental friendliness of the inland waterway transport operations in general.

The Directive applies to *"…. all inland waterways of the Member States of class IV and above which are linked by a waterway of class IV or above to a waterway of class IV or above of another Member State, including the ports on such waterways."* Those Member States (Austria, Belgium, Bulgaria, Czech Republic, Germany, France, Hungary, Luxembourg, The Netherlands, Poland, Romania, Croatia and the Slovak Republic) shall provide all relevant data in an accessible electronic format for the RIS users.

To ensure that RIS is built on interoperable systems and available for all system suppliers and users, the European Commission defined technical guidelines jointly forming the legislative framework for the planning, implementation and operational use of RIS in the areas of:

- Implementation guidelines, RIS Guidelines: 414/2007;
- Notice to skippers: 415/2007;
- Vessel Tracking and Tracing 416/2007 and 689/2012;
- Electronic reporting 164/2010;
- Electronic chart display and information system for inland navigations (inland ECDIS): 909/2013;
- Directive 2013/49/EU amending Annex II to Directive 2006/87/EC addressing the issues related to the Unique European Vessel Identification Number (ENI) and the European Hull Database
- Compatibility of the equipment necessary for the use of RIS.

Responsible for the implementation of the River Information Services are the Members of the River Commissions (e.g. CCNR), UNECE, PIANC as well as RIS Expert Groups in the fields of Electronic Chart Display and Information Systems (ECDIS), Electronic Reporting International (ERI), Notices to Skippers (Nts) and Vessel Tracking and Tracing (VTT).

The River Information Services itself can be divided into traffic-related and transport-related services:

Traffic-related services:

- FIS – Fairway Information Services: general geographical, hydrological and administrative data that are used by skippers and fleet managers to plan, execute and monitor a vessel's trip or voyage.
- TTI/STI – Tactical/Strategic Traffic Information: The Tactical Traffic Information supports the skipper in his navigational decisions concerning short-term traffic situations. The Strategic Traffic Information provides the skipper with a general overview of the traffic situation in a relatively large area. Whereas TTI is used for immediate decisions, STI is mainly used for planning and monitoring.
- TM – Traffic Management Services: Carried out by the respective RIS authority, the Traffic Management Services aim at the optimal utilisation of infrastructure, assurance of safe navigation and protection of the environment (using vessel traffic services and bridge management
- CAS – Calamity Abatement Services: related to the RIS authorities, the Calamity Abatement Services provide information on accidents (focused on a traffic situation), present data on patrol vessels, police boats and rescue vessels, and finally initiate search and rescue activities.

Transport-related services:

- ITL – Information for Transport Logistics: the development and use of RIS services for transport logistics is still in an initial stage. In the 7RFP RISING projects, information services which would efficiently support inland waterway transport and logistics operations will be further identified and integrated into the RIS system like voyage planning, fleet management, port/terminal management and event management.
- ILE – Information for Law Enforcement: The Information for Law Enforcement enhances cross-border law enforcement on inland navigation, and also enables law enforcement for the requirements for traffic safety and environment.
- ST – Statistics: The Statistics service can be used to collect relevant data on inland waterway traffic and statistics and thus being able to utilise the collected data instead of needing the skippers and terminal/lock operators to provide special statistics.
- WCHD – Waterway Charges and Harbour Dues: the Waterway Charges and Harbour Dues assist in levying charges for the use of infrastructure. The voyage data of a ship can be used to automatically calculate the charge and initiate invoicing.

To ensure that these services and functionalities can be provided, the following RIS key technologies are utilised:

- Inland ECDIS: with Electronic Navigational Charts (ENCs) and inland electronic chart display and information systems for inland navigation (inland ECDIS), skippers are able to plan their voyage ahead.

- Electronic Ship Reporting: Electronic Ship Reporting consists of standardised electronic data exchange between skippers and waterway authorities (ship to authority and authority to authority) concerning relevant cargo, traffic and transport information.
- Vessel Tracking and Tracing (Inland AIS): similar to maritime navigation, inland automatic identification system (AIS) on board of inland vessels allows for vessel tracking and tracing on inland waterways.
- Notices to Skippers: notices to Skippers are standardised messages for skippers containing fairway information allowing traffic management as well as voyage planning.

In order for these technologies to operate properly and efficiently, three supporting services were built (see below). These supporting tools are key elements in the RIS standards and an important link between the various RIS services:

The RIS reference data include information about the entire inland waterway network, such as the location of locks, bridges and ports. This service enhances the harmonised generation of this information as it provides a central database where the data can be downloaded from one central point as well as a web service application for maintaining RIS reference data.

The hull database provides information on vessels with a unique European Vessel Identification number and their certificates as well as enabling a possibility to check whether a vessel already has a European Vessel Identification number.

The RIS Index is a European wide encoded, harmonised list of location codes with additional information on the objects (e.g. characteristics, restrictions, operating times).

4.5.4.2 Current situation

Since no specific data for the Rhine-Alpine Corridor according to the TEN-T Regulation 1315 and 1316/2013 were available, the following description is based on the study "Evaluation of RIS Implementation for the period 2006-2011 (main report – published July 2014) and cover the entire Rhine catchment area (consisting of the Rhine stream area, Neckar, Mosel and the waterways in Northern Netherlands).

In the EU, 11.160 km is the total length of the network with waterway classes CEMT IV or higher and 75% of this network has a waterway class strictly higher than class IV. The total length of the navigable waterways in the countries was in 2010 29,995 km. So from a purely spatial viewpoint, the RIS Directive applies to about 37% of the total navigable waterway network of the countries involved.

The Rhine-Alpine Corridor is very advanced in RIS implementation. However, RIS have until now primarily been used for safety and security purposes. For the future, it will be a priority to extend the use of RIS for logistics purposes.

Figure 72: Inland Waterways covered by the RIS directive (extract)

Source: Evaluation of RIS Implementation for the period 2006-2011 (main report)

Concerning the Rhine catchment area, roughly 3,000km apply to the RIS directive, of which Germany and The Netherlands obviously have the lion's share (see Table 73 below):

Table 73: Length of waterways in the Rhine catchment area with class IV and higher

Rhine catchment area (country)	km class IV and higher
The Netherlands	1,152
Germany	1,745
France	243
Luxemburg	18
Switzerland	22
Total	3,180

Source: Evaluation of RIS Implementation for the period 2006-2011 (main report)

The Table 74 below illustrates the technical availability of the key RIS technologies in the Rhine corridor:

Table 74: Technical availability of the key RIS technologies in the Rhine catchment area

		France (VNF)	Luxembourg	Germany	Netherlands
Notices to Skippers	Fairway & Traffic Messages (FTM)	Yes	Yes	Yes	Yes
	Water Related Messages (WRM)	Yes	Yes	Yes	Yes
	Ice Message (ICEM)	No	No	Yes	Yes
	Weather Related Messages (WERM)	Yes	No	No	Yes
	Method of diffusion	Online internet portal and e-mail subscription	Online internet portal and e-mail subscription	Online internet portal and e-mail subscription	Online internet portal and e-mail subscription
AIS	AIS shore-side infrastructure	Yes	Yes, in testing phase	Only ship-ship communication available	Yes
	On-board equipment[26]	Yes,> 50 % of the fleet meaning more than 500 ships	Most of the vessels meaning almost 35 ships	Yes,> 90 % of the fleet meaning more than 1450 ships	Yes meaning 3730 ships
	Exchange	No (neither national nor international)	No	No	Possible but not operational
Electronic reporting messages supported	ERINOT and ERIRSP	Yes and Yes	No and No	Yes and No	Yes and Yes
	BERMAN and PAXLISTS	No and No	No and No	No and No	Yes and Yes
	Exchange	No	No	Yes	Yes
ENC	Coverage (regarding the Rhine)	Almost 100 %	100%	100%	100%
	Provision free of charge	Yes	Yes	Yes	Yes

Source: Evaluation of RIS Implementation for the period 2006-2011 (main report)

- Table 74 shows that only in The Netherlands all types of Nts (notices to skippers) are provided.
- The use of AIS (automatic identification system – used for vessel tracking and tracing) on the Rhine corridor is relatively high. In Germany and The Netherlands (which have the highest share on the corridor), over 90% of the fleet is already equipped with on-board equipment. Germany intends to set AIS in fully operation by mid of 2015.
- Voyage reporting is currently only required for container vessels on some main inland waterways in the Rhine corridor. The free software application BICS allows for electronic reporting according the ERINOT standard. International cross-border data exchange along waterways is not implemented, but due to international exchange only needed once per voyage.
- The ENC (electronic navigational charts) coverage on the Rhine corridor is extensive except for some gaps in the upper Rhine area.

4.5.4.3 Project concerning RIS on the Rhine-Alpine Corridor

In total, 4 RIS related projects have been identified, almost all of which belonging to multiple countries. The total investment volume sums up to about €25 M.

All projects are expected to be implemented by 2020 latest.

Table 75: RIS related projects

No.	CC	Location	Study or work	Description of project	Timing	Costs [Mio €]
86	BE, NL	Westerscheldt River	Works	Implementation of RIS on the Westerscheldt River II	2012-2014	2.65
87	BE, NL	Westerscheldt River	Works	Implementation of RIS on the Westerscheldt River III	2013-2015	4.75
101	FR	Upper Rhine	Works	Development of traffic management system (RIS)	2015-2020	10
138	NL, BE, DE	NL, BE, DE	Study	RIS enabled IWT corridor management	2011-2014	8

Source: Information from national Ministries of Transport and infrastructure managers

4.5.5 Financial analysis of the work plan – methodological approach

The analysis carried out and summarised in this chapter paragraph is aimed at providing an indication of possible links between projects identified for the Rhine-Alpine Corridor during the corridor study and the Specific Sectoral Objectives set in art. 4 of the TEN-T Regulation 1316/2013[65] and included in the Multi-Annual Work Programme for financial assistance in the field of the Connecting Europe Facility-Transport sector for the period 2014-2020[66].

It is worth noting that this analysis is a preliminary exercise based on partial information. Analogue to the implementation plan, the financial analysis only covers the total amount of costs which is known and/or publically available. The decision if a project is eligible for CEF funding is under the responsibility of INEA which will base its decision on the evaluation of the applications submitted according to the calls for proposal.

The below pictured table describes the relationship between the CEF funding priorities and the three Specific Sectoral Objectives defined in Regulation 1316/2013.

Table 76: Specific Sectoral Objectives of TEN-T Regulation 1316/2013 and CEF funding priorities

Objectives	Priorities
1. Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections	Projects on the corridors of the Core Network Projects on the other sections of the Core Network Rail interoperability European Rail Traffic Management Systems (ERTMS)
2. Ensuring sustainable and efficient transport systems in the long run, as well as enabling all modes of transport to be decarbonised	New technologies and innovation in all transport modes Safe and Secure infrastructure
3. Optimising the integration and interconnection of transport modes and enhancing the interoperability of transport services, while ensuring the accessibility of transport infrastructures	Single European Sky – SESAR River Information Services – RIS Intelligent Transport Services for road – ITS Motorways of the sea – MoS Actions implementing transport infrastructure in nodes of the Core Network, including urban nodes Connections to and development of multimodal logistics platforms

Source: PwC based on TEN-T Regulation 1316/2013

The work plan identifies 145 projects on the Core Network of the Rhine-Alpine Corridor (cp. chapter 4.5.2). The estimated overall costs of the 145 projects amount to €47,615 Million. As shown in the Table 77, the 145 projects are located in five different countries along the corridor, 9 are relevant for multiple countries.

---

[65] *C(2013) 9690 final*

[66] *C(2014) 1921 final*

Table 77: Number of projects and related costs by country

Countries	Number of projects	Estimated cost of projects (€ M)	Cost share
Belgium	15	3,237	7%
Germany	31	17,467	37%
France	11	133	0,3%
Italy	57	18,018	38%
The Netherlands	22	8,476	18%
Measures that involve more than one country	9	284	0,6%

Source: PwC based on TEN-T Regulation 1316/2013

Italy presents the highest number of projects (57) which sums up to a total cost of€18 billion. The total cost of the 31 projects in Germany (17.5 billion) is slightly lower than for Italy. Table 78 below provides the number of projects and related costs broken down by mode of transport.

Table 78: Number of projects and related costs by transport mode

Mode of transport	Number of projects	Estimated cost of projects (€ M)	Cost share
Airports	7	644	1%
IWW and inland ports	37	5,677	12%
Rail	60	31,249	66%
Road	15	7,617	16%
Rail-Road Terminal	7	373	1%
Seaports	19	2,055	4%

Source: PwC based on TEN-T Regulation 1316/2013

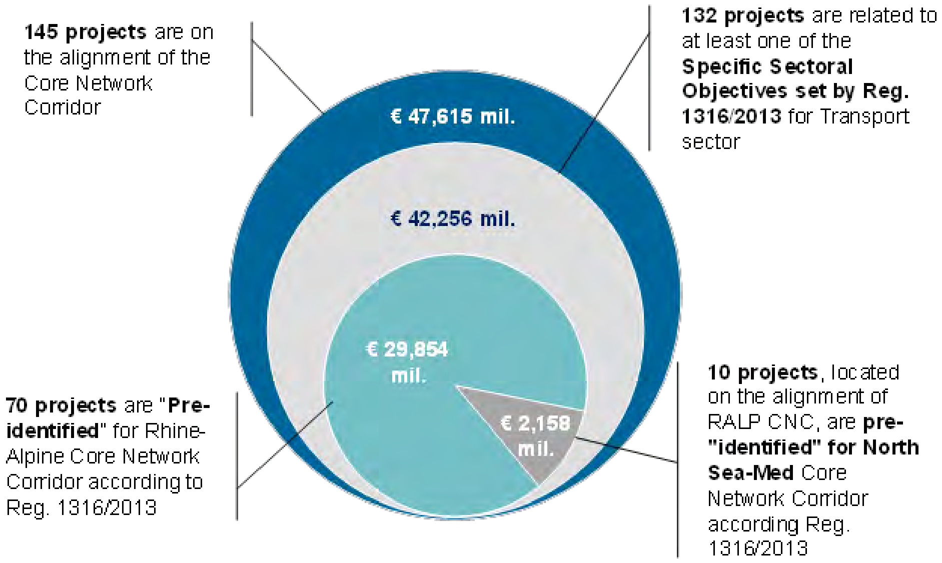
Rail projects, with a share of 66%, are by far the most relevant in terms of number and overall costs. Inland waterway and inland port projects are more than twice as many road projects, but present lower overall costs.

According to the applied assessment, 70 out of 145 projects fall under the definition of *"Pre-identified Projects"* for Rhine-Alpine Core Network Corridor (cp. Annex 9) as specified in Annex I (Part I) of the Regulation 1316/2013. The expected total cost of the above mentioned 70 projects amounts to €29,854 M. Additionally, 10 projects which are located on the alignment of the Rhine-Alpine Corridor are considered *"Pre-identified Projects"* for the North Sea-Mediterranean Corridor. The overall cost of the 10 projects is €2,158 M.

In addition to the 80 (70+10) *"pre-identified projects"* mentioned above, there are 52 projects which can be associated to at least one of the priorities set by Regulation 1316/2013 according to the applied assessment. The estimated overall cost of the mentioned 52 projects accounts for €10,245 M.

In summary, as shown in Figure 73, about 90% of the projects on the alignment of Rhine-Alpine Core Network Corridor (132 projects) fall under the CEF funding priorities, since they are *"pre-identified projects"* or projects which can be associated to at least one of the Specific Sectoral Objectives defined by the Regulation 1316/2013. The estimated overall cost of the 132 projects amounts to €42,256 M.

Figure 73: Projects falling under the priorities of CEF funding



Source: PwC based on TEN-T Regulation 1316/2013

Table 79 below shows the number of projects broken down by objectives and the related costs.

Table 79: Projects falling under the priorities of CEF funding: breakdown by CEF Specific Sectoral Objectives

Objectives	Number of projects	Estimated cost of projects (€ M)	Cost share
1. Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections	86	34,303	81%
2. Ensuring sustainable and efficient transport systems in the long run, as well as enabling all modes of transport to be decarbonised	10	1,255	3%
3. Optimising the integration and interconnection of transport modes and enhancing the interoperability of transport services, while ensuring the accessibility of transport infrastructures	36	6,697	16%
Projects not addressing any specific sectoral objectives defined by Reg. (EU) 1316/2013.	13	5,359	-

Source: PwC based on TEN-T Regulation 1316/2013

The objective of "Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections" covers the largest number of projects (86) for a total cost of €34.3 billion. The objective of "Optimising the integration and interconnection of transport modes and enhancing the interoperability of transport services, while ensuring the accessibility of transport infrastructures" presents a lower number of projects (36) and a total project cost of €6.7 billion. Finally, the objective of "Ensuring sustainable and efficient transport systems in the long run, as well as enabling all modes of transport to be decarbonised" is pursued by only 10 projects for a total cost of €1.26 billion.

As shown below, the largest numbers of projects falling under the priorities for CEF funding are located in Italy (52), Germany (26) and The Netherlands (19). The highest cost of implementation of corridor projects are found in Germany (€17,020 M), followed by Italy (€14,367 M).

Table 80: Projects falling under the priorities of CEF funding: breakdown by country

Countries	Number of projects	Estimated cost of projects (€ million)	Cost share
Belgium	15	3,237	8%
Germany	26	17,020	40%
France	11	133	0,3%
Italy	52	14,367	34%
The Netherlands	19	7,216	17%
Measures that involve more than one country	9	284	0,7%

Source: PwC based on TEN-T Regulation 1316/2013

The table below shows the breakdown of project falling under the priorities of CEF funding by mode of transport.

Table 81: Projects falling under the priorities of CEF funding: breakdown by transport mode

Mode of transport	Number of projects	Estimated cost of projects (€ M)	Cost share
Airports	5	305	1%
IWW & inland ports	36	5,515	13%
Rail	60	31,249	74%
Road	5	2,759	7%
Rail-Road Terminal	7	373	1%
Seaports	19	2,055	5%

Source: PwC based on TEN-T Regulation 1316/2013

Annexes

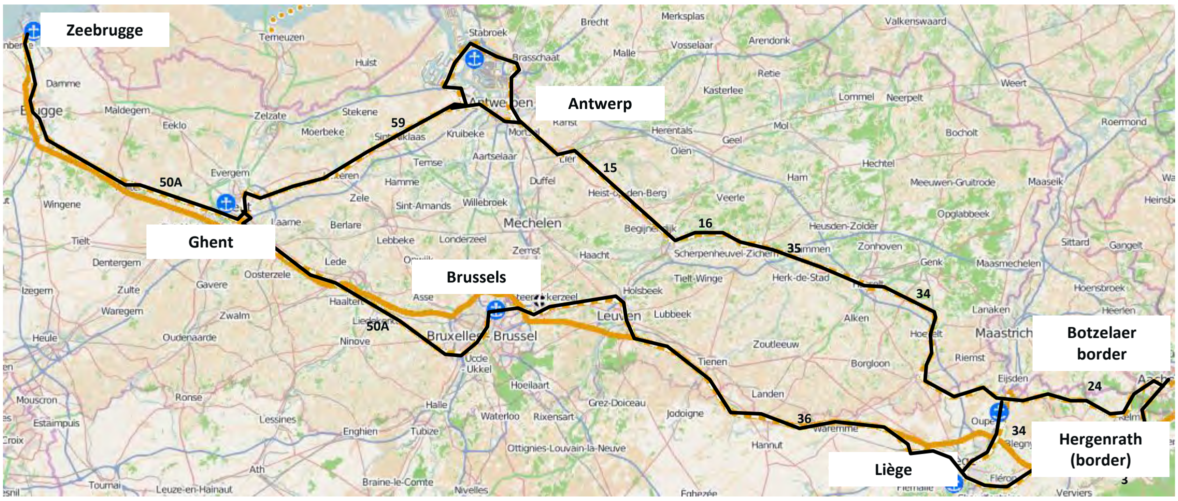
1. Annex: Corridor alignment maps

The Netherlands – Rail

alignment according regulation

Source: HaCon – based on TENtec maps

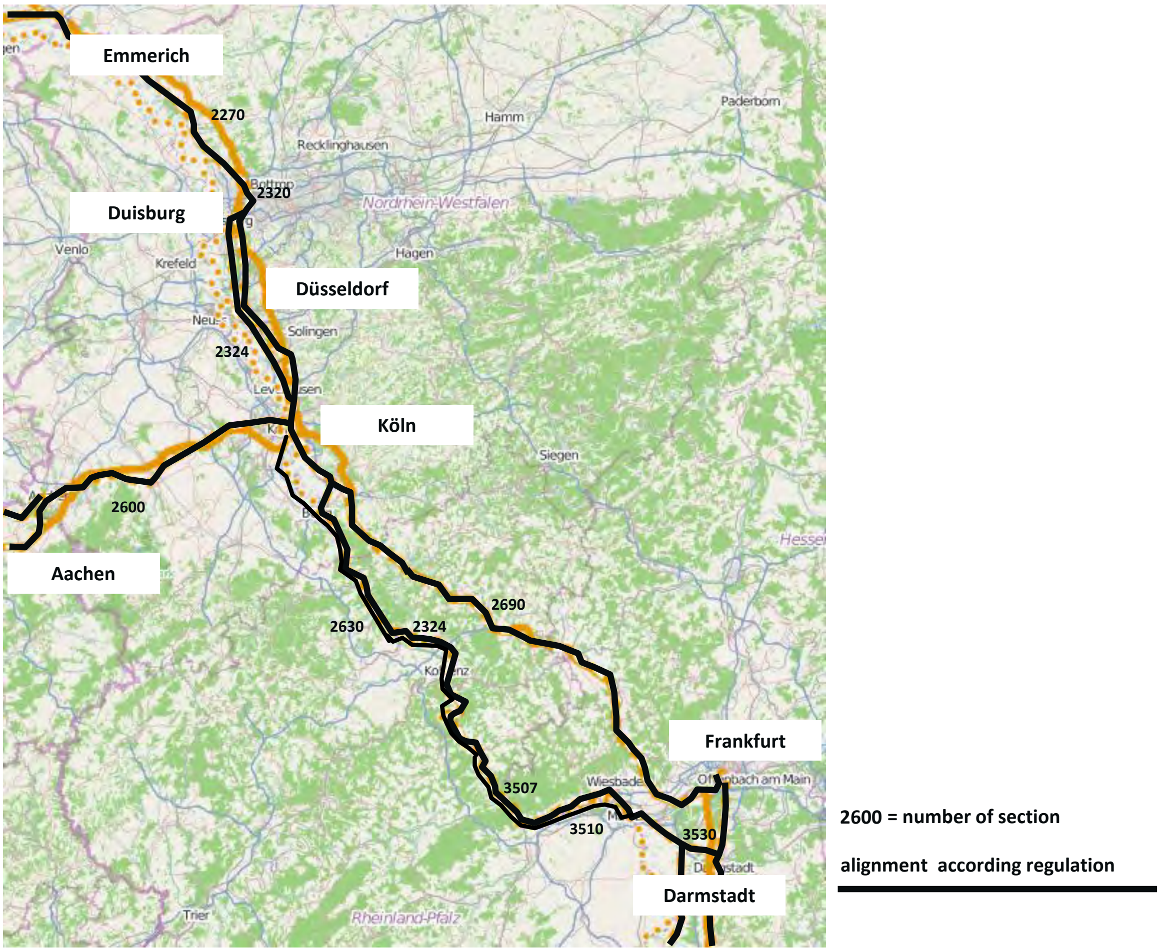
Belgium – Rail



alignment according regulation   50A = number of section

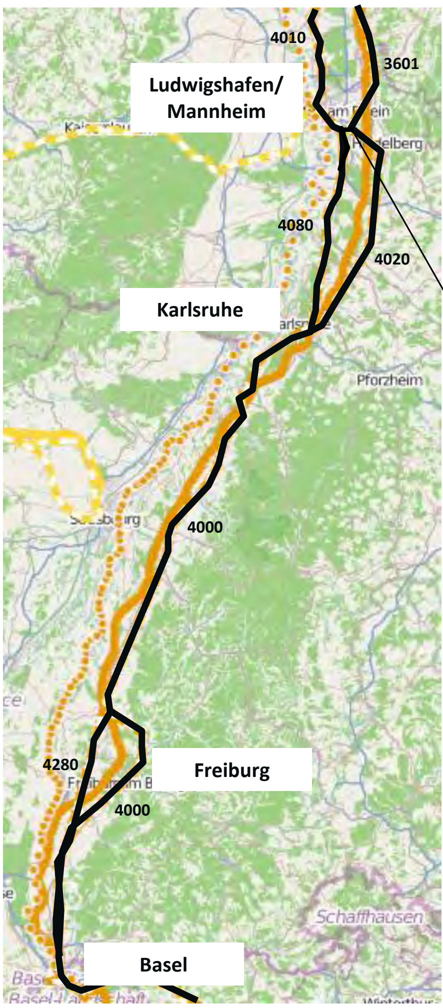
Source: HaCon – based on TENtec maps

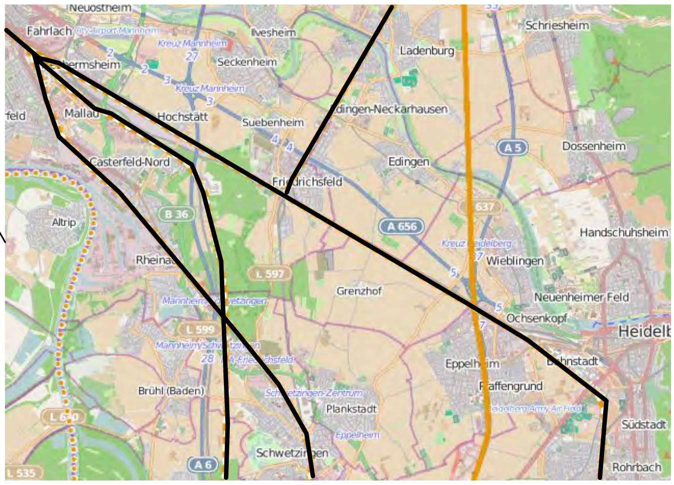
Germany (Lower and Middle Rhine-region) – Rail



Source: HaCon – based on TENtec maps

Germany (Upper Rhine-region) - Rail



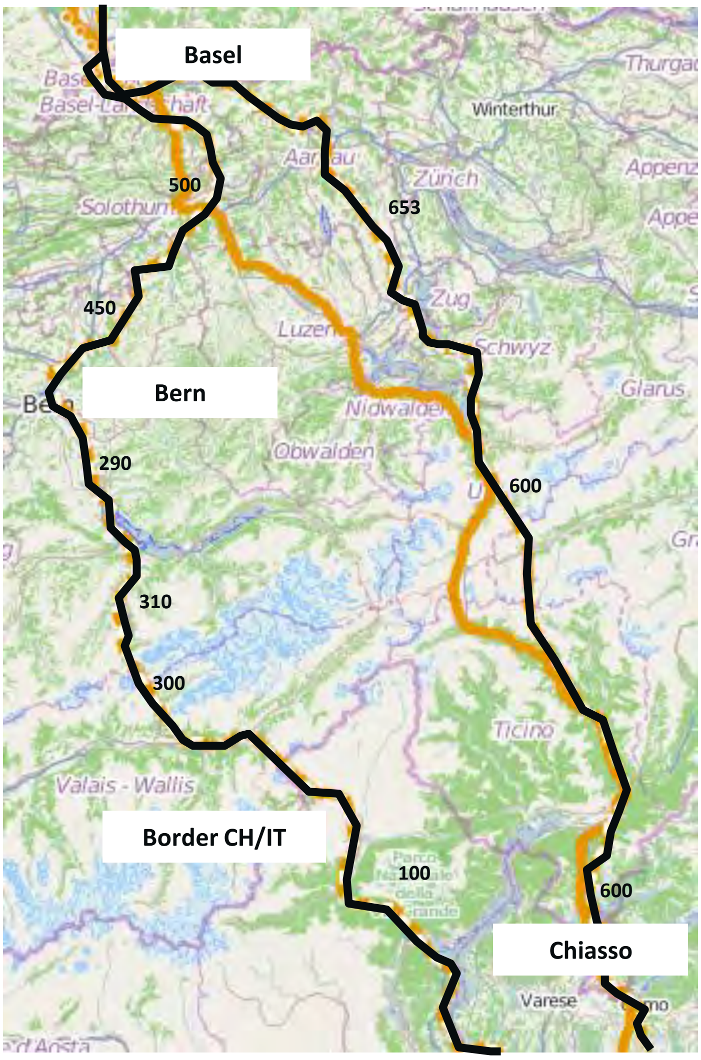


4000 = number of section

alignment according regulation

Source: HaCon – based on TENtec maps

Switzerland – Rail



alignment according regulation **500 = number of section**

Source: HaCon – based on TENtec maps

Italy - Rail

alignment according regulation

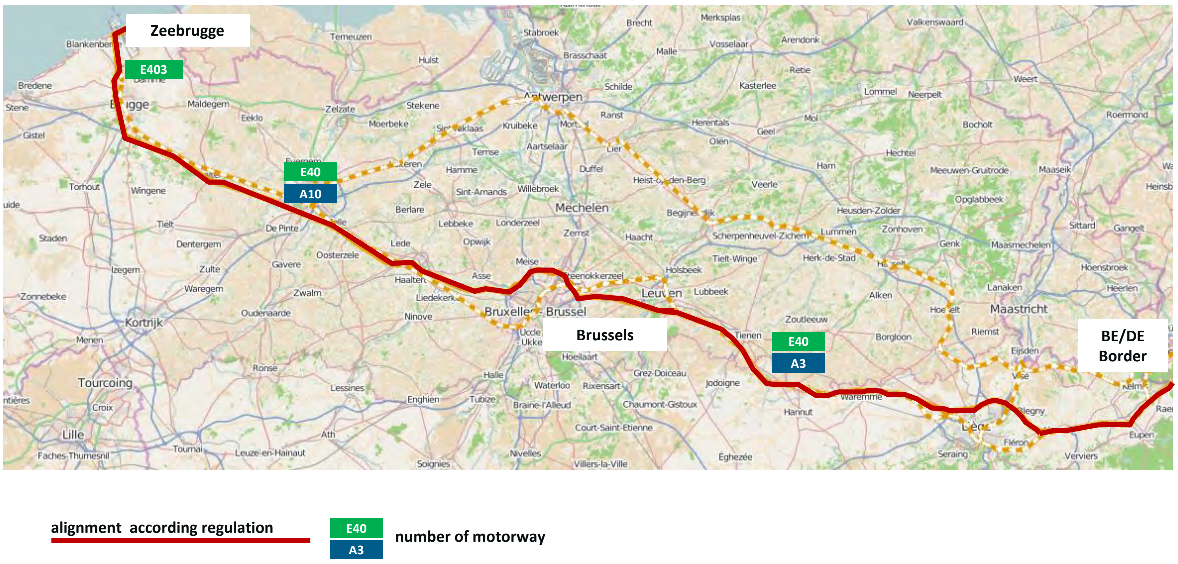
500 = number of section

Source: HaCon – based on TENtec maps

The Netherlands – Road

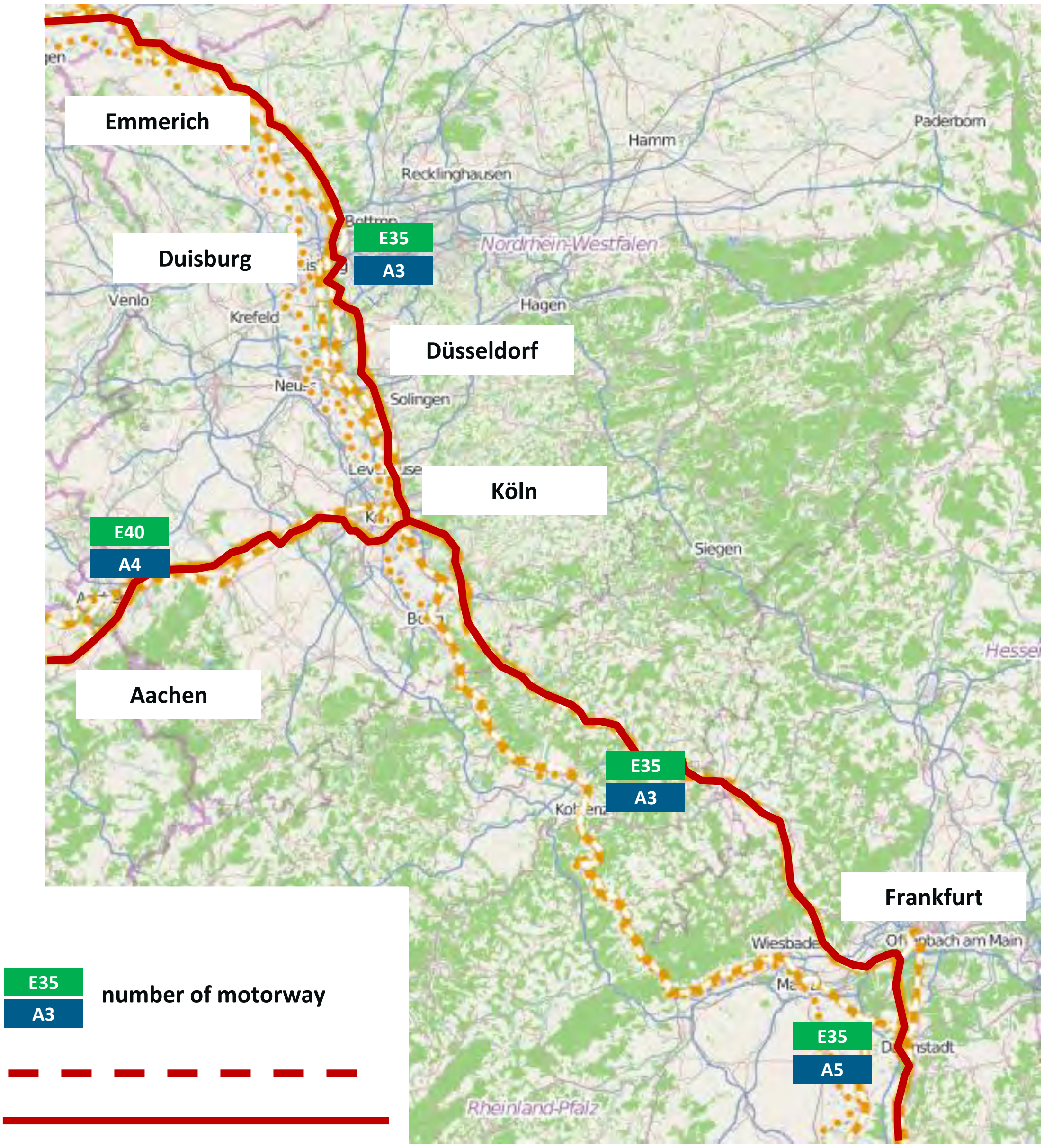
Source: HaCon – based on TENtec maps

Belgium – Road



Source: HaCon – based on TENtec maps

Germany (Lower and Middle Rhine-region) - Road



9

Source: HaCon – based on TENtec maps

Germany (Upper Rhine-region) - Road

Source: HaCon – based on TENtec maps

Switzerland – Road

Source: HaCon – based on TENtec maps

Italy – Road

alignment according regulation

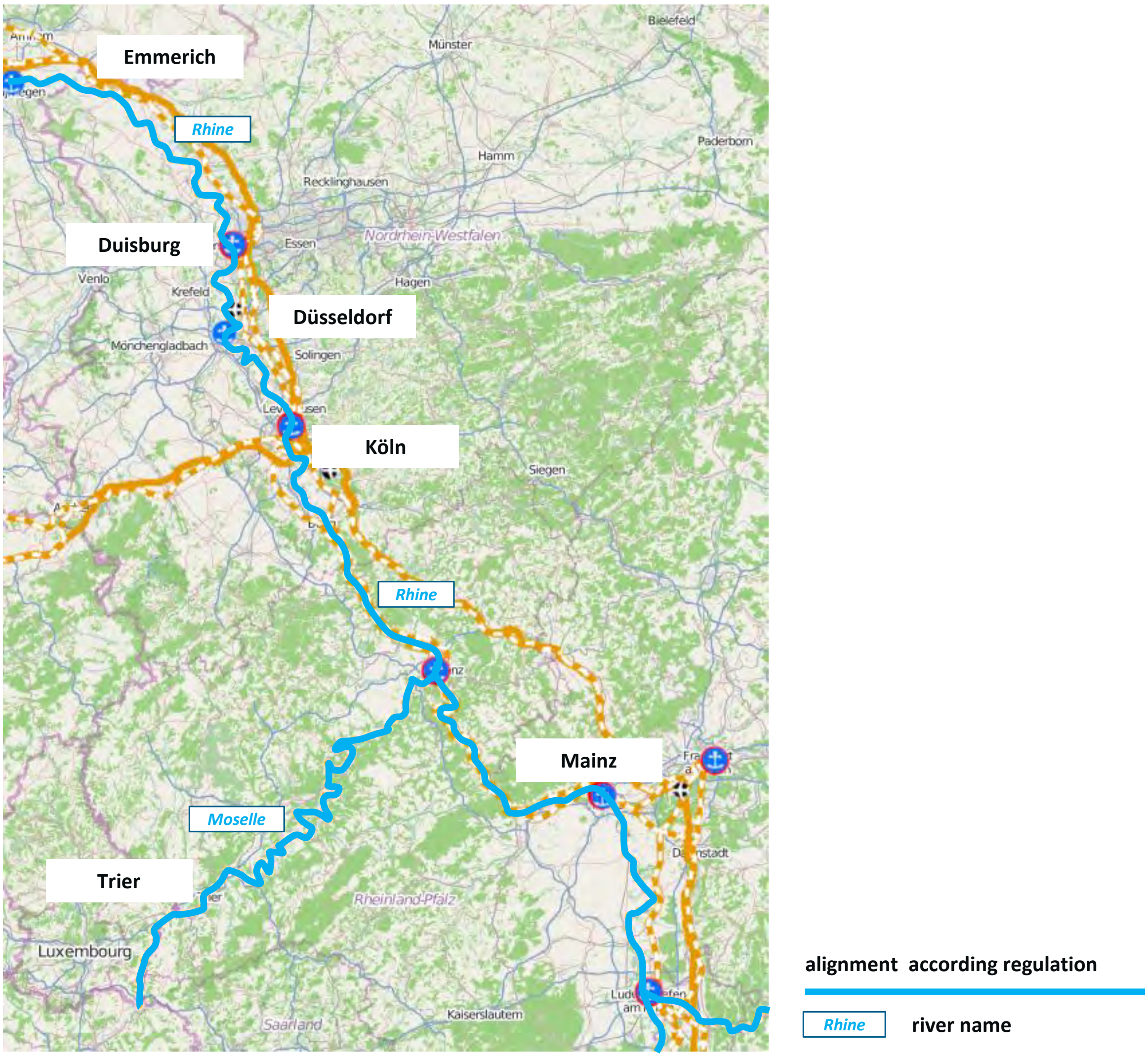
E62 **A7** **number of motorway**

Source: HaCon – based on TENtec maps

The Netherlands – IWW

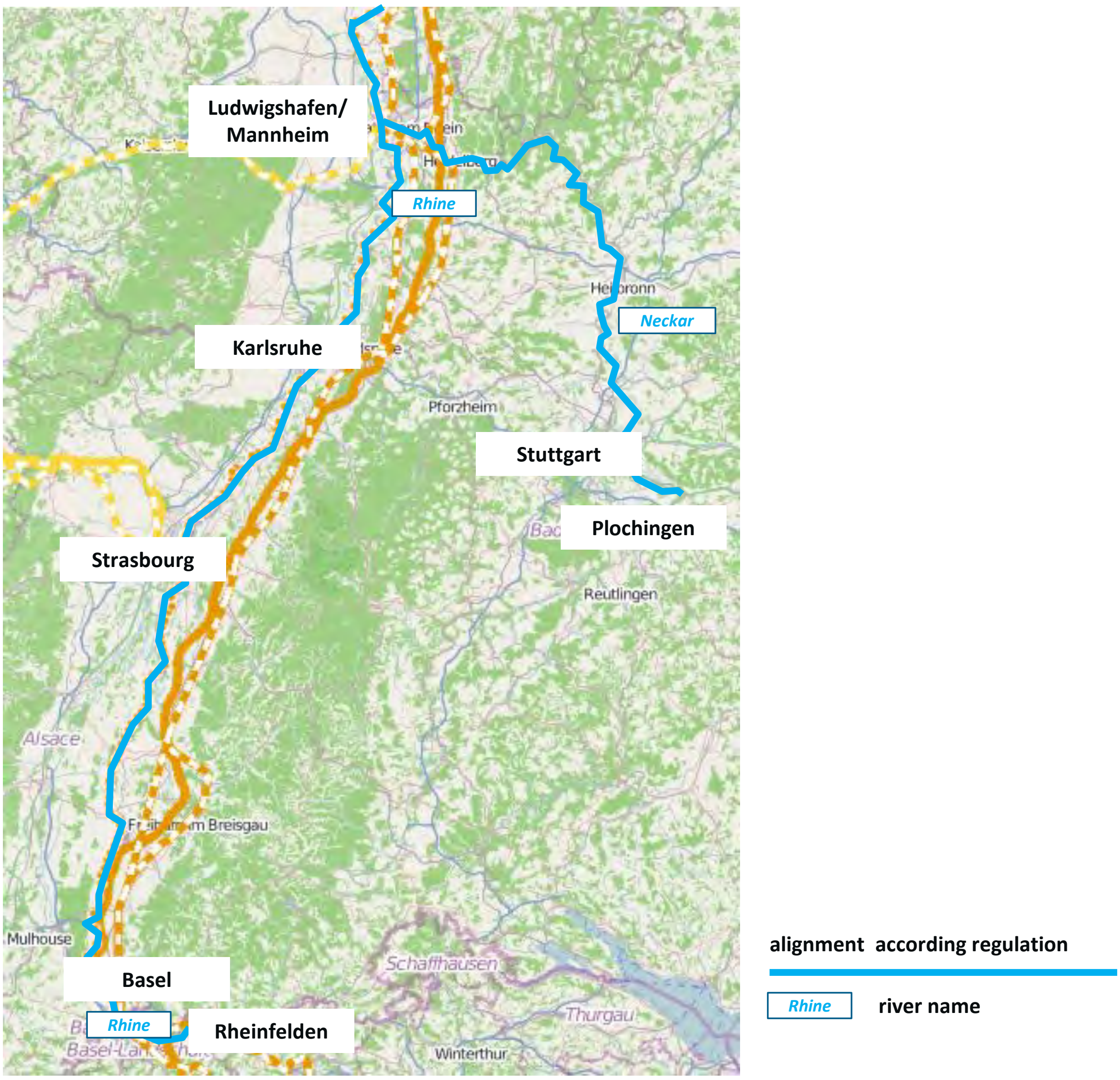
Source: HaCon – based on TENtec maps

Germany (Lower and Middle Rhine-region) – IWW



Source: HaCon – based on TENtec maps

Germany (Upper Rhine-region) and Switzerland - IWW



Source: HaCon – based on TENtec maps

2. Annex: List of stakeholders

CC	Group	Organisation	Name	
BE	Airport	Bruxelles airport	Arnaud	Feist
BE	Airport	Charleroi airport	Laurent	Leveque
BE	Airport	Departement Mobiliteit en Openbare Werken - Afd. Luchthavenbeleid	Erika	Verstrepen
BE	Airport	Liège airport	Luc	Partoune
BE	Airport	Ostende airport	Gino	Vanspauwen
BE	Airport	SOWAER - Société wallonne des aéroprts	Luc	Vuylsteke
BE	Barge operator	Alcotrans	Hans	Buytendijk
BE	Barge operator	BCTN	Simon	Riggall
BE	Barge operator	CFNR - Compagnie Française de Navigation Rhénane SA	Gino	Verhoene
BE	Barge operator	Danser		
BE	Barge operator	H&S container line	Guy	Van Looy
BE	Barge operator	Katoen natie		
BE	Barge operator	MAASKADE BEVRACHTERS BELGIUM	Piet	Wassernaar
BE	Barge operator	Port connect		
BE	Barge operator	United container transport	Richard	De Wilde
BE	Intermodal Operator	2XL		
BE	Intermodal Operator	Ambrogio		
BE	Intermodal Operator	APMT terminal	Mark	Geilenkirchen
BE	Intermodal Operator	Contargo GmbH & Co. KG		
BE	Intermodal Operator	DP World	Rob	Harrison
BE	Intermodal Operator	Euro shoe group		
BE	Intermodal Operator	Euroports - Global Forwarding		
BE	Terminal	Ghent container terminal	Johan	De Raeve
BE	Terminal	Volvo logistics	Johan Mario	Kersters Van den Bussche
BE	Terminal	Intermodal platform Ghent	Johan Frank	De Raeve Vanoutryve
BE	Terminal	Shuttlewise	Martijn Richard	Elbers Nomden
BE	Intermodal Operator	Groep Gheys		
BE	Intermodal Operator	Hupac Intermodal		
BE	Intermodal Operator	Hutchinson port handling		
BE	Intermodal Operator	Interferryboat	Paul	Wouters
BE	Intermodal Operator	Kombiverkehr	Jean Philippe	Florijn

CC	Group	Organisation	Name	
BE	Intermodal Operator	Manuport container terminal		
BE	Intermodal Operator	Naviland cargo		
BE	Intermodal Operator	Novatrans		
BE	Intermodal Operator	Port connect	Olivier	Crousel
BE	Intermodal Operator	PSA intermodal		
BE	Intermodal Operator	Quadrum Raillogistics	Philippe	Carrastquet
BE	Intermodal Operator	Trimodal Terminal Brussels	Michel	Dartevelle
BE	Intermodal Operator	Van Moer Stevedoring	Jo	Van Moer
BE	IWW	Association de Maîtres bateliers des régions de Liège, Limbourg, Namur et Charleroi a.s.b.l. (A.M.B.)	Nicolas	Berx
BE	IWW	De Scheepvaart	Chris	Danckaerts
BE	IWW	De Scheepvaart	Erik	PORTUGAELS
BE	IWW	Départment environnement, aménagement du territoire, énergie, mobilité Union Wallone des Entreprises (UWE)	Samuël	Saelens
BE	IWW	DGO de la Mobilite et des Voise Hydrauliques	Yvon	Loyaerts
BE	IWW	Direction générale opérationnelle Mobilité et des Voies Hydrauliques	Christophe	Vanmuysen
BE	IWW	Direction générale opérationnelle Mobilité et des Voies Hydrauliques	Jacques	Hacourt
BE	IWW	Direction générale opérationnelle Mobilité et des Voies Hydrauliques	Virginie	Wislez
BE	IWW	Union générale des Bateliers	Sabrina	Kegels
BE	IWW	vzw ITB asbl	Frédéric	Swiderski
BE	IWW	Waterwegen en Zeekanaal	Ann-Sofie	Pauwely
BE	IWW	Waterwegen en Zeekanaal	Leo	Clinckers
BE	Logistics service provider/Forwarder	Bepost		
BE	Logistics service provider/Forwarder	DHL	Juan Carlos	Martin
BE	Logistics service provider/Forwarder	DSV		
BE	Logistics service provider/Forwarder	GLS - General Logistics Systems	Luc	Deshrijver
BE	Logistics service provider/Forwarder	Greenmodaltransport - ZEEBRUGGE Britannia		
BE	Logistics service provider/Forwarder	Katoen natie	Koen	Cardon
BE	Logistics service provider/Forwarder	Kuehne Nagel	Jan	Sergers

CC	Group	Organisation	Name	
BE	Logistics service provider/Forwarder	P&O		
BE	Logistics service provider/Forwarder	Rhenus	Hugo	Geerts
BE	Logistics service provider/Forwarder	TCT logistiek	Martine	Hiel
BE	Logistics service provider/Forwarder	Van Moer logistiek	Jo	Van Moer
BE	Logistics service provider/Forwarder	Ziegler		
BE	Member State	Member State	Benjamin	Lemaire
BE	Member State	Member State	Julie	Buy
BE	Member State	Member State	Laurent	Demilie
BE	Member State	Service Public Fédéral - Mobilité et Transports	Laurent	Ledoux
BE	Port	Avelgem Container Terminal n.v		
BE	Port	BCTN Meerhout	Simon	Riggall
BE	Port	Beverdonk	Sven	Simons
BE	Port	Gosselin container terminal	René	Beckers
BE	Port	Port autonome de Charleroi	Claude	DESPIEGELEER
BE	Port	Port autonome de Liège	Emile-Louis	Bertrand
BE	Port	Port autonome du centre et de l'ouest (PACO)	Catherine	Maheux
BE	Port	Port de Bruxelles	Alfons	Moens
BE	Port	Port de Genk	Patrick	Geerinck
BE	Port	Port de Namur	Marc	Bauvin
BE	Port	Port of Antwerpen	Eddy	BRUYNINCKX
BE	Port	Port of Antwerpen	Toon	Tessier
BE	Port	Port of Ghent	Daan	Schalck
BE	Port	Port of Ghent	Kate	Verslype
BE	Port	Port of Oostende	Paul	Gérard
BE	Port	Port of Oostende	Wim	Stubbe
BE	Port	Port of Zeebrugge	Joachim	Coens
BE	Port	Port of Zeebrugge	Patrick	Van Cauwenberghe
BE	Port	Willebroek TC	Martine	Hiel
BE	Project	Viacombi - Interferryboats	Paul	Wouters
BE	Rail infrastructure	de Lijn	Roger	Kesteloot
BE	Rail infrastructure	Infrabel	Luc	Lallemand
BE	Rail infrastructure	Infrabel	Michaël	Diericks

CC	Group	Organisation	Name	
BE	Rail infrastructure	SRWT (Société régionale wallonne du Transport)/TEC	Jean-Marc	Vandenbroucke
BE	Rail infrastructure	STIB - Société des transports intercommunaux bruxelleois	Kris	Lauwers
BE	Railway undertaking	SNCB	Jo	Cornu
BE	Railway undertaking	SNCB logistic	Heiko	Brückner
BE	Railway undertaking	Thalys	Frank	Gervais
BE	Regional authority	Departement Mobiliteit en Openbare Werken	Fernand	Desmyter
BE	Regional authority	Ministère de la Région de Bruxelles-Capitale Bruxelles Mobilité	Jean-Paul	Gailly
BE	Regional authority	Region Flanders	Olivier	Vandersnickt
BE	Regional authority	Region Flanders	Pim	Bonne
BE	Regional authority	Service Public de Wallonie - Direction générale opérationnelle de la Mobilité et des Voies hydrauliques	Pascal	Moens
BE	Road infrastructure	Agentschap Wegen en Verkeer	Tom	Roelants
BE	Road infrastructure	FEBETRA (transporteurs routiers et les logisticiens pour compte de tiers)		
BE	Road infrastructure	Service public de Wallonie	Etienne	Willame
BE	Road infrastructure	Sofico	Jacques	Dehalu
BE	Road infrastructure	Union professionnelle du transport et de la logistique par la route	Michaël	Reul
BE	Shipping line	CMA CGM	Eugène	Vanfleteren
BE	Shipping line	Evergreen		
BE	Shipping line	Fast lines	Catrien Yvan	Scheers Vlaminckx
BE	Shipping line	Flamar	Alphonse	Daenens
BE	Shipping line	Lalemant	Jacques	Pattyn
BE	Shipping line	Maersk		
BE	Shipping line	MSC - Mediterranean shipping compagny		
BE	Terminal	Athus terminal	Jean	Dedite
BE	Terminal	ATO Antwerpen	Ahmet	Altunbay
BE	Terminal	Charleroi Dry port	Dirk	Desmet
BE	Terminal	Combinant NV	Ben	Beirnaert
BE	Terminal	Eurocarex Liège	Jean-Pierre	Grafe
BE	Terminal	Genk euroterminal	Galip	Goktas
BE	Terminal	IFB Cirkeldyck	Mahmut	Altunbay
BE	Terminal	IFB Zomerweg	Lieven	Vanderheyden

CC	Group	Organisation	Name	
BE	Terminal	Liège Logistics intermodal	Tom	Paeshuys
BE	Terminal	Mouscron Dry port - Delcatransport Rekkem	Johnny	Delbeeke
BE	Terminal	Muizen Dry Port	Marc	Vandoorne
CH	Airline	Swiss International Air Lines AG	Harry	Hohmeister
CH	Airport	Euro Airport Basel Mulhouse Freiburg	Jürg	Rämi
CH	Airport	Flughafen Zürich AG	Thomas	Kern
CH	Association	Automobil Club der Schweiz (ACS)	Stefan	Holenstein
CH	Association	Groupement Fer Groupement Fret AG	Urs	Müller
CH	Association	Les Routiers Suisses	Daniel	Piras
CH	Association	Pro Bahn Schweiz	Kurt	Schreiber
CH	Association	Schweizerischer Nutzfahrzeugverband (ASTAG)	Michael	Gehrken
CH	Association	Schweizerischer Verladerverband	Fabio	Regazzi
CH	Association	Touring Club der Schweiz (TCS)	Stephan	Grötzinger
CH	Association	VAP (cargorail.ch)	Frank	Furrer
CH	Association	Verband der ÖV-Unternehmen (VöV)	Ueli	Stückelberger
CH	Association	Verkehrsclub der Schweiz (VCS)	Caroline	Beglinger Fedorova
CH	Association	Verkehrsclub der Schweiz (VCS)	Martin	Enz
CH	Customs	Oberzolldirektion	Rudolf	Dietrich
CH	Intermodal Operator	HUPAC	Peter	Howald
CH	Intermodal Operator	SBB Cargo	Martin	Haller
CH	Local authority	Bau- und Verkehrsdepartement Basel-Stadt	Alain	Groff
CH	Logistics service provider/Forwarder	GS1	Nicolas	Florin
CH	Logistics service provider/Forwarder	SPEDLOGSWISS	Thomas	Schwarzenbach
CH	Member State	Bundesamt für Strassen	Rudolf	Dieterle
CH	Member State	Bundesamt für Verkehr	Peter	Füglistaler
CH	Member State	Eidgenössisches Department für Umwelt, Verkehr, Energie und Kommunikation	Leuthard	Doris
CH	Member State	Member State	Anton	Eder
CH	Port	Port of Switzerland (Ports du Rhin à Bâle)	Florian	Röthlingshöfer
CH	Port	Port of Switzerland (Ports du Rhin à Bâle)	Hans-Peter	Hadorn
CH	Port	Port of Switzerland (Ports du Rhin à Bâle)	Sabine	Villabruna

CC	Group	Organisation	Name	
CH	Project	AlpTransit Gotthard AG	Simoni	Renzo
CH	Rail infrastructure	BLS	Daniel	Wyder
CH	Rail infrastructure	BLS	Juergen	Maier
CH	Rail infrastructure	BLS Infrastruktur	Peter	Fankhauser
CH	Rail infrastructure	SBB Infrastructure	Hansruedi	Kaeser
CH	Rail infrastructure	SBB Infrastructure	Philippe	Gauderon
CH	Rail infrastructure	SBB Infrastructure	Reto	Bleisch
CH	Railway undertaking	BLS Cargo	Stephan	Moll
CH	Railway undertaking	BLS Personenverkehr	Andreas	Willich
CH	Railway undertaking	SBB Cargo	Ruedi	Büchi
CH	Railway undertaking	SBB Cargo International	Michail	Stahlhut
CH	Railway undertaking	SBB Personenverkehr	Jeanine	Pilloud
CH	Regional authority	Bau- und Justizdepartement des Kantons Solothurn	Peter	Heiniger
CH	Regional authority	Bau- und Umweltschutzdirektion des Kantons Baselland	Oliver	Jacobi
CH	Regional authority	Bau-, Umwelt- und Wirtschaftsdepartement des Kantons Luzern	Rolf	Bättig
CH	Regional authority	Baudepartement des Kantons Schwyz	Daniel	Kassubek
CH	Regional authority	Baudirektion des Kantons Nidwalden	Josef	Eberli
CH	Regional authority	Baudirektion des Kantons Uri	Stefan	Flury
CH	Regional authority	Departement Bau, Verkehr und Umwelt des Kantons Aargau	Simone	Rangosch
CH	Regional authority	Dipartimento del Territorio del Canton Ticino	Riccardo	De Gottardi
CH	Regional authority	Volkswirtschaftsdirektion des Kantons Zürich	Markus	Traber
CH	Road infrastructure	Amt für Betrieb Nationalstrassen	Werner	Furrer
CH	Road infrastructure	Bundesamt für Strassen	Jörg	Dreier
CH	Road infrastructure	Bundesamt für Strassen	Jürg	Röthlisberger
CH	Road infrastructure	Nationalstrassen Nordwestschweiz	Ruedi	Hofer
CH	Terminal	HUPAC	Piero	Solca
CH	Terminal	SBB Cargo	Nicolas	Perrin
CH	Terminal	Swissterminal AG	Roman	Mayer
DE	Airline	Air Berlin PLC & Co. Luftverkehrs KG	Wolfgang	Prock-Schauer
DE	Airline	Deutsche Lufthansa Aktiengesellschaft	Dr. Christoph	Franz
DE	Airport	ACI Airport Council Europe	Oliver	Jankovec
DE	Airport	Arbeitsgemeinschaft Deutscher Verkehrsflughäfen (ADV) e.V.	Markus	Engemann

CC	Group	Organisation	Name	
DE	Airport	Flughafen Düsseldorf GmbH	Thomas	Schnalke
DE	Airport	Flughafen Köln/Bonn GmbH	Michael	Garvens
DE	Airport	Flughafen Stuttgart GmbH	Georg Walter	Prof. Fundel Schoefer
DE	Airport	Fraport AG Frankfurt Airport Services Worldwide	Dr. Stefan	Schulte
DE	Association	ADAC e.V.	Peter	Meyer
DE	Association	Allianz pro Schiene e.V.	Dr. Andreas	Geißler
DE	Association	Arbeitsgemeinschaft Deutscher Verkehrsflughäfen (ADV) e.V.	Ralph	Beisel
DE	Association	Bundesverband der Deutschen Industrie e. V. (BDI)	Dr. Markus	Kerber
DE	Association	Bundesverband Materialwirtschaft, Einkauf und Logistik e.V. (BME)	Dr. Holger	Hildebrandt
DE	Association	Bundesverband Wirtschaft, Verkehr und Logistik (BWVL) e.V.	Christian	Labrot
DE	Association	Deutsches Verkehrsforum e.V.	Thomas	Hailer
DE	Association	Interessengemeinschaft der Bahnspediteuere (IBS) e.V.	Community of Railforwarders	Krüger
DE	Association	Pro Bahn e.V. Bundesverband	Jörg	Bruchertseifer
DE	Association	Verband der Automobilindustrie (VDA) e. V.	Dr. Michael	Niedenthal
DE	Association	Verband der Chemischen Industrie e.V. (VCI)	Andrea	Heid
DE	Association	Verband Deutscher Verkehrsunternehmen e. V. (VDV)	Oliver	Wolff
DE	Barge operator	Bundesverband der Deutschen Binnenschifffahrt e.V. (BDB)	Jens	Schwanen
DE	Intermodal Operator	DB Schenker Intermodal	Andreas	Schulz
DE	Intermodal Operator	Kombiverkehr	Armin	Riedl
DE	IWW	Wasser- und Schifffahrtsverwaltung des Bundes	Reinhard	Klingen
DE	Local authority	Stadt Duisburg	Sören	Link
DE	Local authority	Stadt Düsseldorf	Dirk	Elbers
DE	Local authority	Stadt Frankfurt	Peter	Feldmann
DE	Local authority	Stadt Karlsruhe	Frank	Dr. Mentrup
DE	Local authority	Stadt Koblenz	Joachim	Prof. Dr. Hofmann-Göttig
DE	Local authority	Stadt Köln	Jürgen	Roters
DE	Local authority	Stadt Mainz	Michael	Ebling
DE	Local authority	Stadt Mannheim	Peter	Dr. Kurz
DE	Local authority	Stadt Stuttgart	Fritz	Kuhn

CC	Group	Organisation	Name	
DE	Logistics service provider/Forwarder	Contargo GmbH & Co. KG	Heinrich	Kerstgens
DE	Logistics service provider/Forwarder	DHL Freight GmbH	Klaus-Peter	Lehmkuhl
DE	Logistics service provider/Forwarder	DSLV Deutscher Speditions- und Logistikverband e.V.	Frank	Huster
DE	Logistics service provider/Forwarder	Hapag Lloyd AG	Henner	Meyer
DE	Logistics service provider/Forwarder	neska Schiffahrts- und Speditionskontor GmbH	Richard	Schroeter
DE	Member State	Member State	Georg	Henkelmann
DE	Member State	Member State	Ralf	Schulze
DE	Member State	Member State	Reiner	Nagelkrämer
DE	Member State	Member State		
DE	Port	Duisburger Hafen AG	Dr. Julian	Böcker
DE	Port	Duisburger Hafen AG	Erich	Staake
DE	Port	Federal Association of German Inland Ports	Boris	Kluge
DE	Port	Hafen Stuttgart	Carsten	Strähle
DE	Port	Hafenbetriebe Ludwigshafen am Rhein GmbH	Franz Josef	Reindl
DE	Port	HFM Managementgesellschaft für Hafen und Markt mbH	Ralf	Karpa
DE	Port	Neuss-Düsseldorfer Häfen GmbH & Co. KG	Andreas	Hamm
DE	Port	Neuss-Düsseldorfer Häfen GmbH & Co. KG	Ulrich	Gross
DE	Port	Rhein Ports Basel - Mulhouse - Weil	Hans Peter	Mösch
DE	Port	RheinCargo GmbH & Co. KG	Rainer	Schäfer
DE	Port	Rheinhafen Karlsruhe	Jens-Jochen	Roth
DE	Port	Rheinhafen Karlsruhe	Patricia	Erb-Korn, Ass. jur.
DE	Port	Staatliche Rhein-Neckar-Hafengesellschaft Mannheim mbH	Roland	Hörner
DE	Port	Stadtwerke Koblenz GmbH	Petra	Ensel-Kasper
DE	Port	Stadtwerke Mainz	Dr. Werner	Sticksel
DE	Project	"Upper-Rhine project"		
DE	Project	Internationale Kommission zum Schutz des Rheins	Ben	van de Wetering
DE	Project	Zentralkommission für die Rheinschifffahrt	Dr. Norbert	Kriedel
DE	Rail freight corridor	EEIG Corridor Rhine - Alpine	Stefan	Wendel

CC	Group	Organisation	Name	
DE	Rail infrastructure	DB Netz AG	Oliver	Pflüger
DE	Rail infrastructure	DB Netz AG	Sophie	Ismaier
DE	Rail infrastructure	DB Netz AG	Wolfgang	Bohrer
DE	Rail infrastructure	DB Netze Personenbahnhöfe	Dr. André	Zeug
DE	Rail infrastructure	Eisenbahn-Bundesamt (EBA)	Gerald	Hörster
DE	Railway undertaking	DB Fernverkehr	Andreas	Busemann
DE	Railway undertaking	DB Regio AG	Frank	Sennhenn
DE	Railway undertaking	DB Schenker Rail AG	Thorsten	Dieter
DE	Railway undertaking	TX Logistik AG	Norbert	Rekers
DE	Regional authority	Hessisches Ministerium für Wirtschaft, Energie, Verkehr und Landesentwicklung	Günther	Hermann
DE	Regional authority	Hessisches Ministerium für Wirtschaft, Energie, Verkehr und Landesentwicklung	Mathias	Samson
DE	Regional authority	Ministerium des Innern, für Sport und Infrastruktur des Landes Rheinland-Pfalz	Dr. Lothar	Kaufmann
DE	Regional authority	Ministerium für Bauen, Wohnen, Stadtentwicklung und Verkehr des Landes Nordrhein-Westfalen	Jens	Petershoefer
DE	Regional authority	Ministerium für Bauen, Wohnen, Stadtentwicklung und Verkehr des Landes Nordrhein-Westfalen	Karin	Paulsmeyer
DE	Regional authority	Ministerium für Verkehr und Infrastruktur Baden-Württemberg	Elmar	Steinbacher
DE	Regional authority	Ministerium für Verkehr und Infrastruktur Baden-Württemberg	Hartmut	Bäumer
DE	Road infrastructure	Hessen Mobil Straßen- und Verkehrsmanagement	Burkhard	Vieth
DE	Road infrastructure	Landesbetrieb Mobilität Rheinland-Pfalz	Bernd	Hölzgen
DE	Road infrastructure	Landesbetrieb Straßenbau Nordrhein-Westfalen	Winfried	Pudenz
DE	Road infrastructure	Landesstelle für Straßentechnik (LST) des Landes Baden-Württemberg	Dr. Martin	Schmid
DE	Road infrastructure	Toll Collect GmbH	Hans-Karsten	Kirchmann
DE	Terminal	Contargo GmbH & Co. KG	Heinrich	Kerstgens
DE	Terminal	CTS Container-Terminal GmbH	Andreas	Stolte
DE	Terminal	DeCeTe Duisburger Container-Terminalgesellschaft mbH		
DE	Terminal	Deutsche Umschlaggesellschaft Schiene–Straße (DUSS) mbH	Wolfgang	Müller
DE	Terminal	DIT Duisburg Intermodal Terminal GmbH	Bernd	Putens

CC	Group	Organisation	Name	
DE	Terminal	DKT Duisburg Kombiterminal GmbH	Dirk	Knüppel
DE	Terminal	Duisburg Trimodal Terminal GmbH	Ralf	Jahnke
DE	Terminal	Frankenbach Container Terminals GmbH	Ernst	Frankenbach
DE	Terminal	Häfen und Güterverkehr Köln AG	Horst	Leonhardt
DE	Terminal	KTL Kombi-Terminal Ludwigshafen GmbH	Roland	Klein
DE	Terminal	Multimodal Rail Terminal Duisburg (Hohenbudberg) Samskip Van Dieren Multimodal	Niels	van der Vlist
DE	Terminal	Rhein- Ruhr Terminal Gesellschaft für Container- und Güterumschlag mbH	Andreas	Stolte
DE	Terminal	SCT Stuttgarter Container Terminal GmbH/ MCT Mannheimer Container Terminal Rhein-Neckar GmbH	Torsten	Lindenberg
EU	IWW	European Federation of Inland Ports (EFIP)	Kathrin	Obst
EU	IWW	Inland Navigation Europe (INE)	Karin	De Schepper
EU	RFC	RFC 1	Martin	Ruiz
EU	RFC	RFC 1	Stefan	Wendel
FR	IWW	VNF - Voies navigables de France	Guy	Rouas
FR	Member State	Member State	Anne	Pluvinage-Nierengarten
FR	Member State	Member State	Thibaud	Delvincourt
FR	Member State	Ministère de l'écologie, du développement durable et de l'énergie	Clara	Bentz
FR	Member State	Ministère de l'écologie, du développement durable et de l'énergie	Jerome	Meyer
FR	Port	Strasbourg	Didier	Dieudonné
FR	Port	Strasbourg	Emilie	Gravier
FR	Port	Strasbourg	Hélène	Hasle
FR	Port	Strasbourg	Jean-Louis	Jerome
FR	Port	Strasbourg	Manfred	Rausch
FR	Port	VNF - Voies navigables de France	Emilie	Gravier
FR	Regional authority	Region Alsace	François	Bouchard
IT	Airport	Aeroporto di Genova SpA	Marco	Bresciani
IT	Airport	Aeroporto di Genova SpA	Massimiliano	Vicari
IT	Airport	Aeroporto di Genova SpA	Paolo	Sirigu
IT	Airport	ENAC - Italian Civil Aviation Authority	Roberto	Vergari
IT	Airport	SACBO SpA	Emilio Renato Angelo	Bellingardi
IT	Airport	SEA SpA	Giovanni	Falsina

CC	Group	Organisation	Name	
IT	Airport	SEA SpA	Massimo	Corradi
IT	Association	Assaero (National Association Carriers and Air Transport Operators)	Bevilacqua	Aldo Francesco
IT	Association	CONFETRA	Luzzati	Piero
IT	Association	CONFITARMA	Lombardi	Giuseppe
IT	Association	CONFITARMA (Association of shipowners)	Grimaldi	Emanuele
IT	Association	FEDESPEDI (Association of italian shipping companies)	Lazzeri	Piero
IT	Association	FEDESPEDI (Association of italian shipping companies)	Marini	Piera
IT	Logistics service provider/Forwarder	ASSOLOGISTICA (Association of companies working in the logistic field)	Daher	Jean François
IT	Logistics service provider/Forwarder	ASSOLOGISTICA (Association of companies working in the logistic field)	Mearelli	Carlo
IT	Member State	Member State	Federica	Polce
IT	Member State	Member State	Roberto	Ferrazza
IT	Port	Autorità Portuale di Genova	D'Aste	Gianbattista
IT	Port	Port of Genova	Luigi	Merlo
IT	Port	Port of Genova		
IT	Rail infrastructure	Rete Ferroviaria Italiana	Mr Michele Mario	Elia
IT	Rail infrastructure	Rete Ferroviaria Italiana	Mr Stefano	Castro
IT	Rail infrastructure	Rete Ferroviaria Italiana	Ms Nannina	Ruiu
IT	Rail infrastructure	Rete Ferroviaria Italiana (RFI)	Cieri	Enrico
IT	Rail infrastructure	Rete Ferroviaria Italiana (RFI)	Radicioni	Mara
IT	Railway undertaking	Assoferr (National Association Railway and intermodal operators)	Nicolini	Guido
IT	Railway undertaking	Fercargo (Association of private rail freight operators)	Rizzi	Giuseppe
IT	Railway undertaking	Trenitalia Cargo	Maietta	Aldo
IT	Regional authority	Regione Liguria	Poggi	Giovanni Battista
IT	Regional authority	Regione Liguria	Roberto	Murgia
IT	Regional authority	Regione Liguria		
IT	Regional authority	Regione Lombardia	Andrea	Gibelli
IT	Regional authority	Regione Lombardia	Gianlorenzo	Martini
IT	Regional authority	Regione Lombardia	Tavano	Anna
IT	Regional authority	Regione Piemonte	Manto	Aldo
IT	Regional authority	Regione Piemonte	Marchisio	Lorenzo

CC	Group	Organisation	Name	
IT	Road infrastructure	AISCAT - Associazione Italiana Società Concessionarie Autostrade e Trafori	Massimo	Schintu
IT	Road infrastructure	ANAS - Società per Azioni (National Highway Agency)	Carrarini	Luigi
IT	Road infrastructure	ANAS - Società per Azioni (National Highway Agency)	Sabato	Maura
IT	Road infrastructure	ANAS - Società per Azioni (National Highway Agency)	Settimio	Nucci
IT	Road infrastructure	Autostrade per l'Italia SpA	Fusari	Sandro
IT	Road infrastructure	Milano Serravalle-Milano Tangenziali S.p.A.	Martino	Mario
IT	Road infrastructure	Milano Serravalle-Milano Tangenziali S.p.A.		
IT	Road infrastructure	Struttura di vigilanza sulle concessioni autostradali (Ministerial Toll Road Monitoring Office)	Mauro	Coletta
IT	Road infrastructure	Struttura di vigilanza sulle concessioni autostradali (Ministerial Toll Road Monitoring Office)		
IT	Terminal	CIM SpA	Comoli	Maurizio
IT	Terminal	Contship Italia Group	Grasso	Sebastiano
IT	Terminal	Contship Italia Group	Romanengo	Davide
IT	Terminal	Contship Italia Group	Scotto	Roberto
IT	Terminal	Hupac SpA	Crespi	Sergio
IT	Terminal	Hupac SpA	Crivelli	Francesco
IT	Terminal	Hupac SpA	Solcà	Piero
IT	Terminal	Interporto Rivalta Scrivia	Arghenini	Roberto
IT	Terminal	Interporto Rivalta Scrivia	Gemme	Silvano
IT	Terminal	Interporto Rivalta Scrivia	Stoppini	Sergio
IT	Terminal	Terminal Intermodale di Mortara Srl	Colnaghi	Antonio
IT	Terminal	Terminal Intermodale di Mortara Srl	Muzio	Davide
IT	Terminal	Terminali Italia	Locurcio	Aldo
IT	Terminal	Terminali Italia	Ventrella	Pasquale
LU	IWW	Commission de la Moselle	Max	Nilles
NL	Airline	KLM	Michiel	Lauman
NL	Airport	Rotterdam/Den Haag Airport		
NL	Airport	Schiphol Airport Amsterdam	Frank	Janssen
NL	Airport	Schiphol Airport Amsterdam	Maurits	Schaafsma
NL	Association	ANWB	Kees-Jan	van Ginkel
NL	Association	EVO	Godfried	Smit
NL	Association	FENEX	Johan	Baggerman

CC	Group	Organisation	Name	
NL	Association	Koninklijke Nederlandse Vereniging voor Luchtvaart	F.	Brink
NL	Association	Nederlandse vereniging van binnenhavens		
NL	Association	Nederlandse Vereniging van luchthavens	Erik	Lagerweij
NL	Association	ROVER	Arriën	Kruyt
NL	Barge operator	Bureau Voorlichting Binnenvaart	Henk	van Laar
NL	Intermodal Operator	Hupac Intermodal N.V.	Mark	Jansen
NL	IWW	RWS - Rijkswaterstaat	Andre	van Lammeren
NL	IWW	RWS - Rijkswaterstaat	Richard	van der Elburg
NL	Logistics service provider/Forwarder	Contargo Network Service GmbH & Co. KG	Frank	Tabbers
NL	Logistics service provider/Forwarder	DHL		
NL	Logistics service provider/Forwarder	TNT Express Road Network (ERN) B.V.	Jan	Salomons
NL	Member State	Ministerie van Infrastructuur en Milieu	Dirk	Dekkers
NL	Member State	Ministerie van Infrastructuur en Milieu	Hinne	Groot
NL	Member State	Ministerie van Infrastructuur en Milieu	Jerry	de Wit
NL	Member State	Ministerie van Infrastructuur en Milieu	Randi	Mandrup Thomsen
NL	Member State	Ministerie van Infrastructuur en Milieu	Sjoerd	Hoornstra
NL	Port	Barge & Rail Terminal Born B.V.	Norman	Verstoep
NL	Port	Barge Terminal Tilburg B.V.	Jory	van der Voort
NL	Port	Havenbedrijf Amsterdam	Ab	Cherribi
NL	Port	Havenbedrijf Amsterdam	Yvonne	van der Hoff
NL	Port	Havenbedrijf Rotterdam	Caroline	Nagtegaal
NL	Port	Havenbedrijf Rotterdam	Victor	Schoenmakers
NL	Port	Logistiek Centrum Gorinchem B.V.	Henk	Berben
NL	Port	Nijmegen Haven		
NL	Port	Passenger Terminal Amsterdam		
NL	Port	Port of Utrecht	Erwin	van der Weide
NL	Port	TCT Venlo bv	Marc	Stubenitcki
NL	Port	Zeeland Seaports	Wouter	Vos
NL	Port	Zeeland Seaports	Wouter	Vos
NL	Rail freight corridor	EEIG Corridor Rotterdam – Genoa EWIV	Jan	Deeleman
NL	Rail infrastructure	KeyRail	Guus	de Mol
NL	Rail infrastructure	NS Stations	Michiel	Noy

CC	Group	Organisation	Name	
NL	Rail infrastructure	Prorail	Erik	van der Linden
NL	Rail infrastructure	ProRail	Justus	Hartkamp
NL	Railway undertaking	DB Schenker	Aart	Klompe
NL	Railway undertaking	ERS Railways	Frank	Schuhholz
NL	Railway undertaking	KNV	Ad	Toet
NL	Railway undertaking	NS Personenenvervoer	Wim	Oosterwijk
NL	Regional authority	Provincie Gelderland	Coen	Mekers
NL	Regional authority	Provincie Limburg	Marc	Onnen
NL	Regional authority	Provincie Noord - Holland	Bjorn	Hutten
NL	Regional authority	Provincie Noord -Brabant	Dieuwke	Piebenga
NL	Regional authority	Provincie Overijssel	Aart	Kinds
NL	Regional authority	Provincie Utrecht	Robbert	van Dijk
NL	Regional authority	Provincie Zeeland	Maurice	Buuron
NL	Regional authority	Provincie Zuid-Holland	Sjors	Rietveld
NL	Road infrastructure	Fietsersbond	Wim	Bot
NL	Road infrastructure	RDW	Arjan	van Vliet
NL	Road infrastructure	TLN	Elmer	de Bruin
NL	Terminal	ORAM	Kees	Noorman
NL	Terminal	BCTN	Rien	Geurts
NL	Terminal	Container Terminal Utrecht B.V.	Etienne	Morrien
NL	Terminal	ECT Delta Terminal		den Dulk
NL	Terminal	Pernis Combi Terminal BV	Koerd	Reijken
NL	Terminal	RSC - Rail Service Center Rotterdam BV	Pieter	Förrer
CCNR	IWW	Central Commission for the Navigation of the Rhine	Benjamin	Hofmann

3. Annex: Stakeholder list for the third and fourth Corridor Forum

CC	Group	Organisation	Name	
BE	Airport	Departement Mobiliteit en Openbare Werken - Afd. Luchthavenbeleid	Erika	Verstrepen
BE	Airport	Liège airport	Luc	Partoune
BE	IWW	DGO de la Mobilite et des Voise Hydrauliques	Yvon	Loyaerts
BE	IWW	Direction générale opérationnelle Mobilité et des Voies Hydrauliques	Pascal	Moens
BE	IWW	Waterwegen en Zeekanaal	Kris	Van Schepdael
BE	MS	Member State	Julie	Buy
BE	MS	Member State	Benjamin	Lemaire
BE	MS	Member State	Laurent	Demilie
BE	Regional authority	Member State	Pim	Bonne
BE	Regional authority	Member State	Olivier	Vandersnickt
BE	Port	Port of Antwerpen	Toon	Tessier
BE	Port	Port of Zeebrugge	Joachim	Coens
BE	Port	Port of Zeebrugge	Patrick	Van Cauwenberghe
BE	Rail	Infrabel	Michaël	Diericks
BE	Road infrastructure	Agentschap Wegen en Verkeer	Tom	Roelants
BE	Road infrastructure	Service public de Wallonie	Etienne	Willame
BE	Road infrastructure	Sofico	Jacques	Dehalu
CH	MS	Member State	Anton	Eder
CH	Port	Port of Switzerland (Ports du Rhin à Bâle)	Sabine	Villabruna
CH	Port	Port of Switzerland (Ports du Rhin à Bâle)	Florian	Röthlingshöfer
CH	Rail	BLS	Daniel	Wyder
CH	Rail	BLS	Juergen	Maier
CH	Rail	BLS	Felix	Loeffel
CH	Rail	SBB Infrastructure	Philippe	Gauderon
CH	Rail	SBB Infrastructure	Reto	Bleisch
CH	Rail	SBB Infrastructure	Hansruedi	Kaeser
DE	Airport	Arbeitsgemeinschaft Deutscher Verkehrsflughäfen (ADV) e.V.	Markus	Engemann
DE	MS	Member State	Georg	Henkelmann
DE*	MS	Member State	Reiner	Nagelkrämer
DE	Port	Duisburger Hafen AG	Erich	Staake

CC	Group	Organisation	Name	
DE	Port	Duisburger Hafen AG	Dr. Julian	Böcker
DE	Port	Federal Association of German Inland Ports	Boris	Kluge
DE	Port	Neuss-Düsseldorfer Häfen	Andreas	Hamm
DE	Port	Rheinhafen Karlsruhe	Jens-Jochen	Roth
DE	Rail	DB Netz AG	Sophie	Ismaier
DE	Rail	DB Netz AG	Oliver	Pflüger
DE*	Rail	DB Netz AG	Thomas	Schneider
DE	Regional authority	Hessisches Ministerium für Wirtschaft, Energie, Verkehr und Landesentwicklung	Günther	Hermann
DE	Regional authority	Ministerium des Innern, für Sport und Infrastruktur des Landes Rheinland-Pfalz	Dr. Lothar	Kaufmann
DE	Regional authority	Ministerium für Bauen, Wohnen, Stadtentwicklung und Verkehr des Landes Nordrhein-Westfalen	Karin	Paulsmeyer
DE	Regional authority	Ministerium für Verkehr und Infrastruktur Baden-Württemberg	Elmar	Steinbacher
EU*	IWW	Central Commission for the Navigation of the Rhine	Benjamin	Hofmann
EU	RFC	RFC 1	Stefan	Wendel
EU	RFC	RFC 1	Martin	Ruiz
FR	IWW	VNF - Voies navigables de France	Guy	Rouas
FR	MS	Ministère de l'écologie, du développement durable et de l'énergie	Clara	Bentz
FR	MS	Member State	Thibaud	Delvincourt
FR	MS	Member State	Anne	Pluvinage-Nierengarten
FR	Port	Strasbourg	Emilie	Gravier
FR	Port	Strasbourg	Hélène	Hasle
FR	Port	Strasbourg	Jean-Louis	Jerome
FR	Port	Strasbourg	Manfred	Rausch
FR	Port	VNF - Voies navigables de France	Emilie	Gravier
FR	Rail	RFF	Luc	Roger
FR	Rail	RFF	Eulalie	Rodrigues
FR	Regional authority	Region Alsace	François	Bouchard
IT	Airport	Aeroporto di Genova SpA	Paolo	Sirigu
IT	Airport	Aeroporto di Genova SpA	Marco	Bresciani
IT	Airport	Aeroporto di Genova SpA	Massimiliano	Vicari
IT	Airport	ENAC - Italian Civil Aviation Authority	Roberto	Vergari
IT	Airport	SACBO SpA	Emilio Renato Angelo	Bellingardi

CC	Group	Organisation	Name	
IT	Airport	SEA SpA	Massimo	Corradi
IT	Airport	SEA SpA	Giovanni	Falsina
IT*	Motorways of the Sea	Rete Autostrade Mediterranee (RAM)	Andrea	Chiappetta
IT*	Motorways of the Sea	Rete Autostrade Mediterranee (RAM)	Antonio	Cancian
IT*	Motorways of the Sea	Rete Autostrade Mediterranee (RAM)	Laura	Scarpelli
IT	MS	Member State	Federica	Polce
IT	MS	Member State	Roberto	Ferrazza
IT*	Port	Port of Genova	Emanuele	Profice
IT	Port	Port of Genova	Luigi	Merlo
IT	Rail	Rete Ferroviaria Italiana	Ms Nannina	Ruiu
IT	Rail	Rete Ferroviaria Italiana	Mr Stefano	Castro
IT	Regional authority	Regione Liguria	Roberto	Murgia
IT	Regional authority	Regione Lombardia	Andrea	Gibelli
IT	Road infrastructure	AISCAT - Associazione Italiana Società Concessionarie Autostrade e Trafori	Massimo	Schintu
IT	Road infrastructure	ANAS - Società per Azioni (National Highway Agency)	Settimio	Nucci
IT	Road infrastructure	Struttura di vigilanza sulle concessioni autostradali (Ministerial Toll Road Monitoring Office)	Mauro	Coletta
LU	IWW	Commission de la Moselle	Max	Nilles
NL	Airport	Schiphol Airport	Maurits	Schaafsma
NL	Infrastructure rail	Keyrail	Guus	de Mol
NL	IWW	RWS - Rijkswaterstaat	Richard	van der Elburg
NL	MS	Member State	Hinne	Groot
NL	MS	Member State	Sjoerd	Hoornstra
NL	Port	Havenbedrijf Amsterdam	Ab	Cherribi
NL	Port	Rotterdam	Victor	Schoenmakers
NL	Rail	Prorail	Erik	van der Linden
NL	Regional authority	Provincie Gelderland	Coen	Mekers

*only for the fourth Corridor Forum.

4. Annex: General studies review

#	title of study	Organisation funding study	Study author	Publication date	Status*	Time Period covered by study	Country	Section (described freely)	Mode	Passenger / Freight	Type of issue
1	Study for the deepening of the river Meuse between Flémalle and Seraing	SOFICO	SGS - Stratec	2013 - 2014	Public	n/a	BE	Meuse entre Flémalle et Seraing	IWT	Freight	Bottleneck
2	Traffic charging by kilometer for trucks	SANEF	Stratec	2013 - 2014	Con-fidential	2013 - 2030	BE	Belgium highway network	Road	Freight	Inter operabililty
3	Impact assessment study on the improvement of the Scheldt through Tournai - Seine-Scheldt link	Service Public de Wallonie	Stratec - JNC - SGS - ASM Acoustic	2013 - 2014	Public	2007 - 2050	BE	Tournai	IWT	Freight	Bottleneck
4	Development of a high-speed line for freight at Schaerbeek marshalling yard in Brussels	Bruxelles Mobilité	Stratec	2011 - 2013	Restricted	2012 - 2020	BE	Links between Brussels and south of France	Rail	Freight	Bottleneck
5	Seine-Scheldt waterway link - East section	Service Public de Wallonie	Tecnum	2010 - 2011	Restricted	2007 - 2050	BE	Waterways in Wallonia	IWT	Freight	Bottleneck
6	Socio-economic study for the contruction of 2 new locks on the river Meuse (Ivoz-Ramet and Ampsin-Neuville)	Service Public de Wallonie	Stratec	2007 - 2008	n/a	2007 - 2050	BE	Waterways in Wallonia	IWT	Freight	Bottleneck
7	Environmental impact study on the 4th lock of Lanaye (Albertkanaal)	SOFICO	Stratec	2006 - 2010	n/a	2007 - 2050	BE	Waterways in Wallonia	IWT	Freight	Bottleneck
8	Erstes und Zweites Programm zur Engpassbeseitigung auf dem Nationalstrassennetz	Swiss Federal Roads Office	ASTRA	2013	Public	2005-2030	CH	Basel -Italy	Road	Both	Bottleneck
9	Perspektiven des Schweizerischen Personenverkehrs bis 2030	Swiss Federal Office of Spatial Development	ProgTrans/Infras	2006 / 2012	Public	2000-2030	CH	Basel -Italy	Rail/Road	Pax	n/a
10	Perspektiven des Schweizerischen Güterverkehrs bis 2030	Swiss Federal Office of Spatial Development	ProgTrans/Infras	2004 / 2012	Public	2000-2030	CH	Basel -Italy	Rail/Road	Freight	n/a
11	Entwicklung des Luftverkehrs in der Schweiz bis 2030 - Nachfrageprognose	BAZL	ntraplan	2005	Public	2004-2030	CH	Basel -Italy	Air	Both	n/a
12	Finanzierung und Ausbau der Bahninfrastruktur	Swiss Federal Office of Transport	BAV	2013	Public	2000-2030	CH	Basel -Italy	Rail	Both	Bottleneck
13	Anforderungen der Güterlogistik an die Netzinfrastruktur und die langfristige Netzentwicklung in der Schweiz	UVEK/ASTRA	IVT/Rapp Trans/ PTV	2013	Public	2000-2030	CH	Basel -Italy	Rail/Road	Freight	Bottleneck

#	title of study	Organisation funding study	Study author	Publication date	Status*	Time Period covered by study	Country	Section (described freely)	Mode	Passenger / Freight	Type of issue
14	Strassen- und Schienennetzbelastungspläne	Swiss Federal Office of Transport	ARE	2013	Public	2011	CH	Basel -Italy	Rail/Road	Freight	n/a
15	Ortsbezogene Massnahmen zur Reduktion der Auswirkungen des Güterverkehrs	UVEK/ASTRA	Infras/SBB/PTV/Steve n	2013	Public	2010-2030	CH	Basel -Italy	Rail/Road	Freight	Bottleneck
16	MISTRA Road Database	ASTRA	ASTRA	continous	restricted	various	CH	Basel -Italy	Road	Both	n/a
17	SBB Infrastructure Rail Data Base	SBB Infra	SBB	continous	restricted	various	CH	Basel -Italy	Rail	Both	n/a
18	Sachplan Verkehr (National Transport Plan)	UVEK / ARE	ASTRA/BAV/BAZL	2011	Public	n/a	CH	Basel -Italy	Rail/Road /Air	Both	Bottleneck
19	Marktanalyse für den Kombinierten Verkehr im Import/ Exportverkehr der Schweiz	SBB Cargo	Rapp Trans	2011	restricted	2008-2030	CH	Basel -Italy	Rail/Road	Freight	Cross border sections
20	Erstellung Mengengerüst für den Kombinierten Ladungsverkehr im Binnenverkehr der Schweiz	SBB Cargo	Rapp Trans	2010	restricted	2010-2030	CH	Basel -Italy	Rail/Road	Freight	Bottleneck
21	Terminal Landscape Switzerland	SBB Infra	Rapp Trans	2008	restricted	2008	CH	Basel -Italy	Rail/Road	Freight	Bottleneck
22	Studie Rheinschifffahrt und Verlagerungspolitik	Swiss Federal Office of Transport	Ecoplan/NEA/Moll	2010	Public	1995-2009	CH	Basel -Italy	Rail/Road /IWW	Freight	Bottleneck
23	Grossterminalstudie	Swiss Federal Office of Transport	Infras/IVTETHZ	2012	Public	2010-2030	CH	Basel -Italy	Rail/Road	Freight	Bottleneck
24	Vorlkswirtschaftliche Bedeutung des Flughafens Zürich	Flughafen Zürich AG	Infras / BAK	2013	Public	2000-2011	CH	Basel -Italy	Air	Both	n/a
25	Swiss Transport Statistics	BFS	BFS	continous	Public	various	CH	Basel -Italy	Air/Rail/R oad/IWT	Both	n/a
26	Logistics Market studies 2008-2014	GS1 (ed.)	LOG HSG	continous since 2008	Public	present time	CH	Whole Switzerland (no specific corridor)	Air/Rail/R oad/IWT	Freight	n/a
27	Luftfracht als Wettbewerbsfaktor des Wirtschaftsstandortes Schweiz	BAZL ET AL.	LOG HSG	2010	Public	present time + some estimates for 2030	CH	Swiss airports	Air	Freight	n/a
28	4m-Corridor Project (Botschaft)	Swiss Government	n/a	2013	Public	2011-2030	CH	Basel -Italy	Rail	Freight	Bottleneck
29	Gotthard rail project (incl. Monte Ceneri)	Swiss Government / AlpTransit AG	n/a	n/a	Public	n/a	CH	Basel -Italy	Rail	Both	Bottleneck
30	Wirtschaftlichkeitsrechnung NEAT 2010	Swiss Federal Office of Transport	Ecoplan/Infras	2011	Public	2005-2030	CH	Basel -Italy	Rail	Both	n/a
31	Road construction investment plans for Switzerland (Erhaltung und Ausbau der NS 2013; Bauprogramm für die Fertigstellung der NS 2013)	Swiss Federal Roads Office	ASTRA	annually	Public	present time	CH	Whole Switzerland, incl. Basel-Italy	Road	Both	Bottleneck
32	Rail construction investment plans for Switzerland (Eisenbahn-Grossprojekte, Standbericht per 30.6.13)	Swiss Federal Office of Transport	BAV	2013	Public	present time	CH	Whole Switzerland, incl. Basel-Italy	Rail	Both	n/a
33	Alpenquerender Verkehr 2020	Gotthard-komitee	Rapp Trans / ProgTrans	2004	Public	2000-2020	CH	Basel -Italy	Rail	Both	Bottleneck

#	title of study	Organisation funding study	Study author	Publication date	Status*	Time Period covered by study	Country	Section (described freely)	Mode	Passenger / Freight	Type of issue
34	Quantifizierung des Nutzens für den Bahngüterverkehr bei einem Vollausbau am Gotthard (Masterarbeit HSL)	Hochschule Luzern (Masterarbeit)	J. Arnet, R va der Velde Zbinden	2013	Public	2010-2050	CH	Basel -Italy	Rail	Freight	n/a
35	Infrastruktur Landverkehr - Engpassanalyse Infrastruktur	VAP, CargoForum Schweiz	IVT - ETHZ	2013	Public	2000-2030	CH	Whole Switzerland, incl. Basel-Italy	Rail/Road	Both	Bottleneck
36	STEP - Bewertung der regionalen Module sowie Zuordnung zu zwei Dringlichkeitsstufen	Swiss Federal Office of Transport	BAV/SBB/EBP	2011	Public	2010 -2030	CH	Whole Switzerland, incl. Basel-Italy	Rail	Both	Bottleneck
37	Bericht über die Verkehrsverlagerung	Swiss Federal Office of Transport	BAV	2013	Public	2010 -2030	CH	Basel -Italy	Rail/Road	Freight	n/a
38	Genova-Rotterdam: Un corridoio sostenibile	Swiss Embassy in Italy	Fondazione per lo sviluppo sostenibile	2012	Public	2009-2030	IT	Genoa-Rotterdam	Sea/Rail/ Road	Freight	n/a
39	Corridoio 6 Genova - Rotterdam - Dossier 2012	Assolombarda; Undione Industriale di Torino; Confindustria Genova	Osservatorio Territoriale infrastrutture (OTI) Nordovest	2012	Public	Progress at 2012 and next steps for development of infrastructures on the italian side	IT	Genoa-Milan; Milan-Gotthard;	Rail	Both	Bottleneck
40	Rapporto 2011	Assolombarda; Undione Industriale di Torino; Confindustria Genova	Osservatorio Territoriale infrastrutture (OTI) Nordovest	2011	Public	Progress at 2011 and next steps for development of infrastructures on the italian side	IT	Genoa-Milan; Milan-Gotthard;	Sea/Rail	Both	Bottleneck
41	Genova: il porto oltre l'appennino - Verifica di pre-fattibilità sullo sviluppo del nodo portuale di Genova	San Paolo IMI; SiTI; private sponsors (Shipowners, Terminal operators)	Politecnico di Torino - SiTI - Istituto Superiore sui Sistemi Territoriali per l'Innovazione	2008	Public	n/a	IT	Port of Genoa	Sea	Both	n/a
42	Programma Infrastrutture Strategiche - XI° Allegato Infrastrutture	MoT	MoT	2013	Public	2013-2020	IT	Genoa-Milan	Rail	both	Bottleneck
43	Le infrastrutture per il nordovest 2001-2011: dove eravamo, dove siamo	Assolombarda; Undione Industriale di Torino; Confindustria Genova	Osservatorio Territoriale infrastrutture (OTI) Nordovest	2011	Public	2001-2011	IT	Genoa-Milan; Milan-Gotthard;	Rail	both	Bottleneck
44	Programma Infrastrutture Strategiche - 8° Allegato Infrastrutture	MoT	MoT	2010	Public	n/a	IT	Genoa-Milan	Rail	both	Bottleneck
45	Programma Infrastrutture Strategiche - 7° Documento di Programmazione Economica e Finanziaria	MoT	MoT	2009	Public	n/a	IT	Genoa-Milan	Rail	both	Bottleneck
46	Implementation plan Rail Freight Corridor 1	EEIG Rotterdam - Genoa	Prorail,Infrabel, DB Netz, SBB Infra, BLS Infra, RFFI	2013	public	Forecasts to 2025-2030	ALL	ALL	ALL	both	Bottleneck

#	title of study	Organisation funding study	Study author	Publication date	Status*	Time Period covered by study	Country	Section (described freely)	Mode	Passenger / Freight	Type of issue
47	Studi preparatori alla revisione del Piano Nazionale della Logistica	MoT	Bocconi University (Milan) - CERTeT Centro di Economia regionale, dei Trasporti e del Turismo	2012	public	2012-2020	IT	Genoa-Milan; Milan-Gotthard; LÖTSCHBERG - SEMPIONE	ALL	Freight	Bottleneck
48	Piano Nazionale della Logistica 2012-2020	MoT	MoT	2012	Public	2012-2020	IT	ALL	ALL	Freight	Bottleneck
49	Rapporto sullo stato attuale delle infrastrutture in Italia: criticità di oggi, priorità di domani	Unioncamere	Uniontrasporti	2011	Public	2000-2010	IT	ALL	ALL	both	n/a
50	Voortgangsrapportage 2013 - Havenvisie 2030	Port of Rotterdam	Port of Rotterdam	2013	Public	2011-2013	NL; BE; DE	Hamburg Le Havre Range Ports	sea/rail/road/iwt	Freight	Bottleneck
51	Multimodale Achterlandknooppunten in Nederland	Ministry Infrastructure & Environment	n/a	2012	Public	2008-2030	NL	hinterland mainports NL in NL	Rail/road/iwt	freight	Bottleneck
52	MIRT projectenboek 2014	Ministry Infrastructure & Environment	n/a	2013	Public	2014-2028	NL	NL	sea/rail/road/iwt	both	Bottleneck
53	Onderzoek maritieme stromen - Beschrijven van de maritieme en continentale stromen voor de haven van Rotterdam	Havenbedrijf Rotterdam	Panteia	2013	Confidential	2010-2012	NL;BE;DE	Zeebrugge - Hamburg range	all	freight	n/a
54	IDVV Spoor 3 - Cluster 2 - Benutting infrastructuur	Ministry Infrastructure & Environment, Rijkswaterstaat	Marin, Witteveen en Bos, BTB, Deltares, Ecorys, Sarnia Maritime, Autena Marine, TU Delft, Carpe Diem, TKVeerhaven	2013	Public	2012-2040	NL	inland waterways NL	iwt	freight	Bottleneck
55	IDVV Spoor 3 - Cluster 3 - Afstemming in de keten	Ministry Infrastructure & Environment, Rijkswaterstaat	Panteia, TNO, AbOvo, EICB, TU Delft, Modality	2013	Public	2010-2040	NL;BE;DE	IWT Rhine corridor; Rotterdam - Antwerpen;	Rail/road/iwt	freight	Bottleneck
56	Hub & Spoke in de containerbinnenvaart	Connekt	Panteia, AbOvo	2013	Restricted	2012	NL;BE;DE; CH;FR	n/a	n/a	freight	Inter operabililty
57	Lange termijn perspectief spoorgoederenvervoer	Ministry Infrastructure & Environment	TNO, Panteia	2012	Public	2010-2040	NL;BE;DE	NL-BE; NL-DE	rail	both	Bottleneck
58	Terminal Study on the freight corridor Rotterdam - Genoa		Panteia, HaCon, Rapp Trans, Gruppo Clas	2008	Public	2007-2020	DE;CH;IT	NETHERLANDS - GENOA	RAIL	freight	Bottleneck
59	Heavy and/or Long trains	UIC	Panteia, Railistics	2013	Restricted	2013	NL;DE;CH; FR;SE;NO;	NL-DE-CH; FR-ES	RAIL	freight	Bottleneck
60	Railterminal Gelderland	Province of Gelderland	Panteia; logitech	2013	Public	2007-2050	NL;DE;PL;IT;CH;AT;CZ	n/a	Rail	freight	n/a
61	Financieringsconstructies ERTMS	Ministry Infrastructure & Environment	At Osborne, Plurel, Attica	2013	public	n/a	NL;DK;BE; CH	n/a	rail	both	Bottleneck

#	title of study	Organisation funding study	Study author	Publication date	Status*	Time Period covered by study	Country	Section (described freely)	Mode	Passenger / Freight	Type of issue
62	Masterplan Zeeland Seaports	Zeeland Seaports	Zeeland Seaports	2009	Public	2009-2020	NL;BE	Vlissingen-Terneuzen-Ghent; Vlissingen-Antwerpen;	sea/rail/road/iwt	both; mostly freight	Bottleneck
63	MKBA van de Westerschelde Container Terminal	Zeeland Seaports	Ecorys	2006	Public	2005-2059	NL;BE	n/a	sea/rail/road/iwt	freight	Bottleneck
64	Eindrapport nieuwe zeesluis IJmuiden	Ministry Infrastructure & Environment; Rijkswaterstaat Noord Holland	DHV, IV-Infra	2012	Public	2004-2046	NL	n/a	Sea	Both	Bottleneck
65	Achterlandverbindingen door Gelderland en Overijssel	provinces of Gelderland and Overijssel	Movares	2012	Public	- n/a	NL;DE	Rotterdam - Gelderland/Overijssel - Germany	Rail/road/iwt	both	Bottleneck
66	Havenstrategie 2030 Moerdijk	Havenschap Moerdijk	Havenschap Moerdijk	2013	Public	2010-2030	NL;BE;UK;IE;BALTIC STATES;MEDITERANNEAN; BLACK SEA	n/a	sea/road/rail/iwt	freight	Bottleneck
67	Ruimtelijk ontwikkelingsplan Schiphol 2015	Gemeente (municipality) Haarlemmermeer	Schiphol Group	2007	Public	2007-2015	NL; international	n/a	Air/road/rail	both	Bottleneck
68	Structuurvisie Mainport Amsterdam Schiphol Haarlemmermeer (SMASH)	n/a	n/a	expected March 2014	n/a	n/a	n/a	n/a	n/a	n/a	n/a
69	Mainport 2.0	Ministry Infrastructure & Environment	Commissie Ruimtelijke Ontwikkeling Luchthavens	2009	Public	n/a	NL	n/a	Air/road/rail	both	Bottleneck
70	beleidsplan regional luchtvaart 2008 - 2020	province of Zuid-Holland	province of Zuid-Holland	2008	Public	2008-2020	NL	n/a	air/road	both	Bottleneck
71	Quick scan: overzicht van logistieke netwerk hot spots in Nederland	Ministry of Economic affairs	TNO	2009	Public	2004-2020	NL	n/a	n/a	freight	Bottleneck
72	Study on long trains										
73	RETRACK	EU	newrail;transpetrol;archicom;CER;Panteia/NEA,et al	n/a	n/a	n/a	NL;GE;AT;HU;RO;TR	NL- DE - HU - TR	rail	freight	Bottleneck
74	Synchromodality: Pilot study Rotterdam - Moerdijk - Tilburg	Ministry of Infrastructure & Environment	TNO	2012	Public	n/a	NL	n/a	trimodal	freight	Bottleneck
75	Havenvisie gemeente Amsterdam	n/a	n/a	2008	Public	2008-2020	NL	n/a	sea/rail/road/iwt	both	Bottleneck
76	Netwerkanalyse Binnenhavens Oost-Nederland - deelrapportage Gelderland	Province of Gelderland	Ecorys	2008	n/a	n/a	n/a	n/a	n/a	n/a	n/a
77	Landelijke Capaciteitsanalyse Binnenhavens	Ministry Infrastructure & Environment	Ecorys	2010	Public	n/a	n/a	n/a	n/a	n/a	Bottleneck

#	title of study	Organisation funding study	Study author	Publication date	Status*	Time Period covered by study	Country	Section (described freely)	Mode	Passenger / Freight	Type of issue
78	Logistieke hot spot Zuid-Gelderland: Logistiek DNA en Branding, Promotie en Acquisitie Agenda	Oost NV; Province of Gelderland	Buck Consultants International	2013	n/a	n/a	n/a	n/a	n/a	n/a	n/a
79	Passenger survey on the section Paris - Orléans	RFF	Stratec - Setec Inter	2013 - 2014	Public	2007 - 2050	FR	Paris - Orléans - Blois	Rail	Pax	n/a
80	Socio-economic study of Bray-Nogent	VNF	Setec International - Stratec	2012 - 2013	Public	2012 - 2021	FR	Upper Seine	IWT	Freight	Bottleneck
81	Strategical thoughts to define, prioritize and organise investments on IWW in Nord-Pas-de-Calais for the period 2020-2040	VNF	Setec International - Stratec	2012 - 2013	n/a	2020 - 2040	FR	Dunkerque - Lille	IWT	Freight	Bottleneck
82	Traffic study on the river Oise	VNF	Stratec	2011 - 2012	n/a	n/a	FR	Conflans - Compiègne	IWT	Freight	Bottleneck
83	Study of demand and traffic for the Roissy-Picardie new rail link	RFF	Stratec	2011 - 2014	Public	2010 - 2050	FR	Amiens/Compiègne - Creil - CDG/Paris	Rail	Pax	Bottleneck
84	Traffic forecasts for the HSL PACA (Marseille - Toulon - Nice - Vintimille)	RFF	Setec International - Stratec	2010 - 2012	Public	2007 - 2050	FR; IT	n/a	Rail	Pax	Bottleneck
85	Study on fare policy to use waterway infrastructure in France	VNF	Alenium - Stratec	2009	Confidential	2007 - 2020	FR	Inland waterway network	IWT	Freight	Operational & Admin
86	Socio-economic study of a high capacity river lock at the seaport of Le Havre	GPMH	Setec International - Stratec	2008 - 2010	n/a	2007 - 2050	FR	n/a	IWT	Freight	Bottleneck
87	Market study and demand forecast for the futur CDG Express	Ministère de l'Ecologie, de l'Energie, du Développement Durable et de la Mer	Stratec	2006 - 2011	Confidential	2005 - 2050	FR	n/a	Air	Pax	Bottleneck
88	Eurocap-Rail	SNCB	Stratec	2005	n/a	n/a	n/a	n/a	n/a	n/a	n/a
89	Upper Rhine a connected corridor	Port autonome de Strasbourg	Setec International - Stratec - Progtrans	2013 - 2014	Public	n/a	FR; DE	Upper Rhine	IWT	Freight	Inter operabililty
90	Seine-Scheldt waterway link	VNF	Stratec	2011 - 2013	Confidential	2007 - 2060	FR; BE; NL	Seine - Scheldt	IWT	Freight	Bottleneck
91	Technical, socio-economic and supply/demand study regarding	Ferrmed	Stratec in the consortium led by	2007 - 2009	Restricted	2005 - 2050	FR; DE; SP; NL;	n/a	Rail	Freight	Bottleneck

#	title of study	Organisation funding study	Study author	Publication date	Status*	Time Period covered by study	Country	Section (described freely)	Mode	Passenger / Freight	Type of issue
	the transport of the FERRMED Great Rail Network (Scandinavia-Rhine-Rhone Western Mediterranean)		WYG				UK; BE; DK; FI				
92	Internalisation of freight transport externals cost in the Paris-Amsterdam corridor	European Commission	Stratec - Setec - CE Delft	2009 - 2011	Public	2007 - 2020	FR; BE; NL	Seine - Scheldt	Rail/Road /IWT	Freight	n/a
93	Study on Road Truck Parking (SETPOS) / TRUCKINFORM	EC	Move & Park	2014	public (registration needed)	present	All	All	Road	Both	n/a
94	Study on Road Truck Parking (LABEL)	EC	NEA	2007	Public	2007-2020	All	All	Road	Freight	Bottleneck
95	Driving Restrictions for Heavy Goods Vehicles in the EU	EC	NEA/TNO/Leuven	2010	Public	Present	All	All	Road	Both	Bottleneck
96	TEN-STAC: SCENARIOS, TRAFFIC FORECASTS AND ANALYSIS OF CORRIDORS ON THE TRANS-EUROPEAN NETWORK	EC	NEA et al.	2004	Public	2020	All	All	Rail, (Road)	both	Bottleneck
97	TEN-T: Implementation of the Priority Projects	EC	n/a	anually	Public	present/ planned	All	All	All	Both	Bottleneck
98	Transvisions: Report on Transport Scenarios with a 20 and 40 Year Horizon	EC	Tetraplan et al.	2009	Public	2030-2050	All	All	Road, rail, air	Both	Bottleneck
99	IRU: Transpark/ Truck Parking Areas (Parking inventory)	n/a	IRU	2014 updated	Public	present	All	All	Road	Both	n/a
100	Entwicklungskonzept Kombinierter Verkehr 2025 in Deutschland	Bundesministerium für Verkehr, Bau- und Stadtentwicklung	HaCon, KombiConsult	2012	restricted (partly public)	2010-2025	DE	Emmerich to Basel	rail, IWT	freight	Bottleneck
101	Evaluierung der KV Förderrichtlinie	Bundesministerium für Verkehr, Bau- und Stadtentwicklung	HaCon, KombiConsult	2011	confidential	2008-2025	DE	Germany	rail, IWT	freight	n/a
102	Evaluierung Gleisanschlussförderrichtlinie	Bundesministerium für Verkehr, Bau- und Stadtentwicklung	HaCon, KombiConsult	2011	confidential	2012	DE	Germany	rail	freight	n/a
103	Masterplan Güterverkehr und Logistik Deutschland	Bundesministerium für Verkehr, Bau- und Stadtentwicklung	HaCon, KombiConsult; LNC, Dornier, ISL, LUB	2008	public	2008	DE	Germany	rail, IWT	freight	Bottleneck
104	Prognose der deutschlandweiten Verkehrsverflechtungen 2025	Bundesministerium für Verkehr, Bau- und Stadtentwicklung	ITP, BVU	2007	public	2004-2025	DE	Germany	rail, road, IWT, air	both	Bottleneck
105	Grundkonzeption für den Bundesverkehrswegeplan 2015	Bundesministerium für Verkehr, Bau- und Stadtentwicklung	n/a	2013	public	2015-2015	DE	Germany	rail, road, IWT, air	both	Bottleneck

#	title of study	Organisation funding study	Study author	Publication date	Status*	Time Period covered by study	Country	Section (described freely)	Mode	Passenger / Freight	Type of issue
106	Investitionsrahmenplan 2011 – 2015 für die Verkehrsinfrastruktur des Bundes (IRP)	Bundesministerium für Verkehr, Bau- und Stadtentwicklung	n/a	2012	public	2011-2015	DE	Germany	rail, road, IWT, air	both	Bottleneck
107	Fünfjahresplan für den Ausbau der Bundesfernstraßen 2011 – 2015 - Projektliste und Erläuterungen -	Bundesministerium für Verkehr, Bau- und Stadtentwicklung	n/a	2012	public	2011-2015	DE	Germany	road	both	Bottleneck
108	Fünfjahresplan für den Ausbau der Schienenwege des Bundes 2011-2015 (Projektliste mit Erläuterungen)	Bundesministerium für Verkehr, Bau- und Stadtentwicklung	n/a	2012	public	2011-2015	DE	Germany	rail	both	Bottleneck
109	Verkehrsverflechtungsprognose 2030 Los 2 - Seeverkehrsprognose - Eckwerte der Hafenumschlagsprognose	Bundesministerium für Verkehr, Bau- und Stadtentwicklung	MWP; IHS, Uniconsult, CML	2013	public	2010-2030	DE, NL, BE, IT	Germany	sea	freight	n/a
110	Gutachten zur Erhöhung der Wettbewerbsfähigkeit der Binnenhäfen	Bundesministerium für Verkehr, Bau- und Stadtentwicklung	Planco	2013	public	2004-2025	DE	Germany	IWT	freight	Bottleneck
111	Eisenbahnverkehr - Betriebsdaten des Eisenbahnverkehrs 2012	Statistisches Bundesamt	n/a	2014	public	2012	n/a	Germany	rail	both	-
112	Eisenbahnverkehr 2012	Statistisches Bundesamt	n/a	2013	public	2011	n/a	Germany	rail	freight	-
113	Kombinierter Verkehr 2011	Statistisches Bundesamt	n/a	2013	public	2012	n/a	Germany	multimodall	freight	-
114	Luftverkehr 2012	Statistisches Bundesamt	n/a	2013	public	2012	n/a	Germany	air	freight	-
115	Güterverkehrsstatistik der Binnenschifffahrt 2012	Statistisches Bundesamt	n/a	2013	public	2012	n/a	Germany	IWT	freight	-
116	Seeschifffahrt 2012	n/a	n/a	2013	public	2012	n/a	Germany	IWT	freight	-
117	Transport market study for the Rail Freight Corridor 1 Rotterdam-Genoa (in accordance with EU Regulation 913/2010)	DB Netz AG, Frankfurt/Main (representing the EEIG Rail Freight Corridor 1)	HaCon, KombiConsult, Panteia, Progtrans	2012	confidential	2010-2016 and 2025	BE, NL, DE, CH, IT	entire corridor	rail	freight	Bottleneck
118	Lkw-Parken in einem modernen, bedarfsgerechten Rastanlagensystem	Bundesministerium für Verkehr, Bau- und Stadtentwicklung	n/a	2012	public	2008-2015	DE	Germany	Road	Freight	Bottleneck
119	Verkehrsinvestitionsbericht 2011 Schiene	n/a	n/a	n/a	public	1997-2015	DE	Germany	Road	Pass.&Freight	Bottleneck
120	ERTMS development and consolidation 2006-EU-93001-S	INEA	ERTMS Users Group	2011	public	2006-2010	EU	All	Rail	Both	Bottleneck

#	title of study	Organisation funding study	Study author	Publication date	Status*	Time Period covered by study	Country	Section (described freely)	Mode	Passenger / Freight	Type of issue
121	Feasibility study on international rail real time traffic monitoring and electronic path request systems 2008-EU-90000-S	INEA	RailNetEurope	2008	public	2008-2010	All (carried out by AT)	All	Rail	Both	Bottleneck
122	Studies on improving the Freight Corridor Concept by using Telematic Applications for Freight, and methods, tools and procedures developed by RNE for rail corridors 2010-EU-92240-S	INEA	RailNetEurope	2010	public	2010-2012	AT (All)	All	Rail	Both	Bottleneck
123	Betuwe Line für Rail Freight IPOL-TRAN_ET(2013)495838_EN.pdf	n/a	n/a	2013	public	1998 (1997)-2008 2007)	NL	Rotterdam - Border NL/DE	Rail	n/a	Bottleneck
124	Freight Corridor Betuweroute - South-East Netherlands– Germany 2011-NL-93022-S	INEA	ProRail	2011	public	2012-2014	NL	Utrecht Eindhoven	Rail	Freight	Bottleneck
125	Studies concerning the extension railway yard Maasvlakte West - Phase 1 2010-NL-92227-S	INEA	ProRail	2010	public	2010-2012	NL	Rotterdam - Nijmegen	Rail	Freight	Bottleneck
126	ERTMS implementation the Railway Corridor Rotterdam-Genoa- Netherlands part – Section Port Railway of Rotterdam 2007-NL-60310-P	INEA	ProRail	2007	public	2007-2012	NL	Rotterdam - Border NL/DE	Rail	Freight	Bottleneck
127	Upgrade of ETCS system to 2.3.0d in the Betuwe Route 2009-NL-60123-P	INEA	ProRail	2009	public	2010-2012	NL	Rotterdam - Border NL/DE	Rail	Freight	Bottleneck
128	ERTMS implementation on the railway corridor Rotterdam-Genoa- Netherlands Part - Kijfhoek & Zevenaar 2007-NL-60060-P	INEA	ProRail	2007	public	2007-2015	NL	Rotterdam - Border NL/DE	Rail	Both	Bottleneck
129	Preparatory studies for the implementation of additional measures on ERTMS Corridor Rotterdam-Genoa and ERTMS Corridor Antwerpen-Basel-Lyon 2011-EU-60005-S	INEA	EEIG Rhine-Alpine, GEIE	2011	public	2011-2014	DE, LU (?NL, BE, FR, CH, IT?)	Rotterdam - Genova Antwerpen - Basel/Lyon	Rail	Freight	Bottleneck
130	Studies concerning the construction of the third Track Zevenaar-German border 2010-NL-92226-S	INEA	ProRail	2010	public	2010-2012	NL	Nijmegen - Border NL/DE	Rail	Both	Bottleneck
131	Planning for the upgrading of the railway connection line NL/D border – Emmerich-Oberhausen 2005-DE-90308-S	INEA	DB NETZ AG	2005	public	2006-2009	DE	Border NL/DE - Duisburg	Rail	Freight	Bottleneck

#	title of study	Organisation funding study	Study author	Publication date	Status*	Time Period covered by study	Country	Section (described freely)	Mode	Passenger / Freight	Type of issue
132	Studies for the removal of the level crossings on the section Oberhausen- Emmerich 2008-DE-91003-S	INEA	Deutsche Bahn	2008	public	2008-2013	DE	Border NL/DE - Duisburg	Rail	Freight	Bottleneck
133	Studies and works for the upgrading of the high speed railway line Duisburg-Emmerich 2007-DE-24040-	INEA	DB NETZ AG	2007	public	2007-2015	DE	Border NL/DE - Duisburg	Rail	Freight	Bottleneck
134	Equipment with electronic interlocking of the railway line between Emmerich (Dutch-German border) and Basel (German-Swiss border), within Corridor A Rotterdam-Genoa 2009-DE-24070-E	INEA	DB NETZ AG	2009	public	2009-2012	DE	Border NL/DE - Border DE/CH (Emmerich - Basel)	Rail	Freight	Bottleneck
135	'Iron Rhine' 2007-EU-24090-S	INEA	INFRABEL, ProRail	2007	public	2007-2009	BE, NL	Antwerpen - Duisburg	Rail	Freight	Bottleneck
136	Studies for the construction of the high speed section between Frankfurt and Mannheim 2007-DE-24030-S	INEA	DB NETZ AG	2007	public	2007-2015	DE	Mainz (Frankfurt) - Mannheim	Rail	Both	Bottleneck
137	Works for the construction and upgrade of the railway section between Karlsruhe and Basel 2007-DE-24060-P	INEA	DB NETZ AG	2007	public	2007-2015	DE	Karlsruhe - Basel	Rail	Both	Bottleneck
138	Adaptation of the existing line between Mulhouse and the border for use by highspeed (TGV) or intercity express (ICE) trains on the Mulhouse-Mullheim (Freiburg) corridor 2010-FR-92204-P	INEA	Réseau Ferré de France	2010	public	2010- 012	FR	Mulhouse – Müllheim	Rail	Both	Bottleneck
139	Trackside ERTMS equipment on Italian part of Corridor A (600 km) 2007-IT-60360- P	INEA	Rete Ferroviaria Italiana S.p.A	2007	public	2008-2014	IT	(1) Brig – Genoa (2) Lugano - Milano	Rail	Both	Bottleneck
140	Malpensa 2000 Airport IPOL-TRAN_ET(2013)495838_ EN.pdf	EIB, SEA	EVA-TREN	2013	public	1990-1998	IT	Milan Malpensa	Airport	Passenger	Bottleneck
141	Cargo City Development - Railway Tunnel 2007-IT-91502-P	INEA	Aeroporto di Milano	2007	public	2008-2011	IT	Milan Malpensa	Airport	Both	Bottleneck
142	MXPT2LINK-UP	INEA	SEA	2010	public	2010-2015	IT	Milan-CH	Airport	Passenger	Bottleneck
143	Upgrade of the Tortona-Voghera section, Priority Project 24, Final Design 2009-IT-91404- S	INEA	Rete Ferroviaria Italiana S.p.A	2009	public	2009-2010	IT	Milano - Genova	Rail	Both	Bottleneck
144	Genoa rail node: Improvement of the traffic management system 2011-IT-93096-P	INEA	Rete Ferroviaria Italiana S.p.A	2011	public	2012- 2014	IT	Novara/Milano - Genoa	Rail	Both	Bottleneck
145	Railway node of Genova - Study for upgrading the section Genova Voltri-Genova Brignole	INEA	Rete Ferroviaria Italiana S.p.A	2007	public	2007-2008	IT	Novara/Milano - Genova	Rail	Pass.&Freight	Bottleneck

#	title of study	Organisation funding study	Study author	Publication date	Status*	Time Period covered by study	Country	Section (described freely)	Mode	Passenger / Freight	Type of issue
	2007-IT-24010-S										
146	Type approval of the first locomotive equipped with ETCS 2005-NL-91102-S	INEA	Senter Novem	2005	public	2005-2007	NL	Rotterdam - Border NL/DE	Rail	Both	Bottleneck
147	Retrofit of 90 Siemens ES64F4 E-locomotives with Alstom ETCS L2 equipment for usage on EU freight corridors and various conventional networks 2007-NL-60380-P	INEA	Mitsui Rail	2007	public	2008-2010	NL	Rotterdam - Border NL/DE	Rail	Both	Bottleneck
148	Equipment of the Railion Deutschland AG locomotives 2007-DE-60490-P	INEA	DB Schenker Rail Deutschland AG	2007	public	2008- 2009	DE	Nijmegen/Arnhem - Basel	Rail	Both	Bottleneck
149	EEIG: ERTMS Users Group - testing activities 2007-EU-60040-P	INEA	ERTMS User Group, Nokia-Siemens, UNIFE, Nortel GmbH	2007	public	2007-2011	SE, GB, NL, BE, DE, FR, IT, ES	All	Rail	Both	Bottleneck
150	Programme Management Office for the ERTMS deployment on the corridor Rotterdam-Genoa 2007-EU-60410-S	EU (50%) DB Netz AG, Rete Ferroviaira Italiana, Prorail (50%)	n/a	2009	public	2007-2009	NL, DE, CH, IT	Rotterdam - Genoa	Rail	Freight	Bottleneck
151	Programme management office for the ERTMS deployment on the corridor from Rotterdam to Genoa 2009-EU-60146-S	EU (50%) EEIG Corridor A Rotterdam-Genoa (50%)	EEIG Corridor A Rotterdam-Genoa	2013	public	2009-2013	NL, DE, CH, IT (?)	Rotterdam - Genoa	Rail	Freight	Bottleneck
152	Serial fitment of onboard ETCS equipment SRS 2.3.0 in 109 freight locomotives 2007-NL-60160-P	EU (50%) NL MoT (50%)	n/a	2008	public	2007-2008	NL	Rotterdam - Border NL/DE	Rail	Pass.&Freig ht	Bottleneck
153	Equipment of freight locomotives with ETCS on-board-units according to SRS 2.3.0.d 2009-DE-60120-P	EU (50%) Railpool 3 GmbH & Co. KG (50%)	Railpool 3 GmbH & Co. KG	2012	public	2009-2012	NL, DE, CH, AT, IT	DE, NL, CH, AT, IT	Rail	Freight	Bottleneck
154	Upgrade of locomotives with onboard ETCS equipment 2009-EU-60138-P	EU (50%) RBS Asset Finance Europe LTD (50%)	Alpha Trains Belgium	2014	public	2010-2013	NL, BE, DE, AT	NL, BE, DE, AT	Rail	Freight	Bottleneck
155	ERTMS upgrade of existing locomotives to ensure compatibility with SRS 2.3.0d for use in the Betuwe line 2009-NL-60124-P	EU (50%) NL MoT (50%)	n/a	2011	public	2010-2011	NL	NL, BE, DE, AT	Rail	Freight	Bottleneck
156	Fitting of ETCS onboard equipment to Traxx DABNLs 2009-NL-60128-P	EU (50%) CBRail S.a.r.l. (50%)	CBRail S.a.r.l.	2011	public	2009-2010	NL (?BE, DE, AT?)	NL, BE, DE, AT	Rail	Freight	Bottleneck
157	Retrofitting of ETCS onboard equipment for locomotives to run in ERTMS Corridor A 2009-NL-60142-P	EU (50%) Mitsui Rail Capital Europe BV; Rurtalbahn GMBH (50%)	Mitsui Rail Capital Europe BV; Rurtalbahn GMBH	2012	public	2009-2012	NL (BE, DE)	NL, BE, DE	Rail	Freight	Bottleneck

#	title of study	Organisation funding study	Study author	Publication date	Status*	Time Period covered by study	Country	Section (described freely)	Mode	Passenger / Freight	Type of issue
158	MOS 24 2010-EU-21101-S	EU (50%)	n/a	2013	public	2011-2013	BE, FR, IT, MT	Seaports around PP24	Sea port	Freight	Bottleneck
159	West Med Corridors 2006-EU-93016-S	EU (50%)	Rete Autostrade Mediterranee Puertos del Estado Ministry of Sustainable Develpment Malta Maritime Authority	2011	public	2006-2010	FR, IT, ES, MT	Western Mediterranean region	Sea port	Freight	Bottleneck
160	Motorways of the Sea Esbjerg-Zeebrugge 2008-EU-21020-P	Port of Zeebrugge Port of Esbjerg Danish Road Directorate	n/a	2014	public	2008-2012	DK, BE	Zeebrugge	Sea port	Freight	Bottleneck
161	NETLIPSE 2008-EU-91901-S	EU (50%) NL MoT; UK MoT (50%)	n/a	2010	public	2008-2010	All	All	Rail, Road, IWT	Pass.&Freig ht	Bottleneck
162	Prototyping, testing, renewed authorisation for placing in service and the retrofit of Siemens ES64U2 locomotives with ETCS L1/L2 2.3.0.d for Corridor A, B and E networks in DE, AT, HU and CH 2011-NL-60003-P	EU (50%) Mitsui Rail Capital Europe BV (50%)	Mitsui Rail Capital Europe BV	2014	public	2011-2013	DE, CH, AT, HU	Border DK/DE - Border AT/IT: Border NL/DE - Border CH/IT Border CZ/AT(?) - Border HU/RO	Rail	Freight	Bottleneck
163	CIM West Terminal expansion 2012-IT-24116-P	C.I.M. S.p.A.	C.I.M. S.p.A.	2014	public	2013-2015	IT	border CH-IT- Genoa	Rail/Road Terminal	Freight	Bottleneck
164	RIS enabled IWT corridor management 2012-EU-70004-S	MoT's and Österreichische Wasserstraßen-Gesellschaft mbH; nv De Scheepvaart; Bundesanstalt für Gewässerkunde	n/a	2015	public	2013-2015	AT, NL, BE, DE, LU	Rivers in AT, NL, BE, DE, LU	IWW	Freight	Bottleneck
165	LNG Masterplan for Rhine-Main-Danube 2012-EU-18067-S	EU (50%) Pro Danube Management GmbH (50%)	Pro Danube Management GmbH	2013	public	2012-2020	AT, BE, BG, CZ, DE, FR, HU, HR, LU, NL, RO, RS SV, CY, CH	Rhine, Main, Danube	IWW	Freight	Bottleneck
166	Support to implementation of Corridor A/1 Rotterdam - Genoa as required by the Regulation (EU) No. 913/2010 and conversion of governance structure to a European Rail Freight Corridor 1 2012-DE-94085-S	EU (50%) EEIG Corridor A Rotterdam-Genoa (50%)	EEIG Corridor A Rotterdam-Genoa	2015	public	2013-2014	NL, BE, DE, CH, IT	Rail Freight Corridor Rhine-Alpine	Rail	Freight	Bottleneck
167	Consolidation and strengthening of the corridor Upper Rhine as a central hub for the TEN-T	EU (50%) Port Authorities (50%)	n/a	2014	public	n/a	DE, FR	Rhine	Inland port	Freight	Bottleneck

#	title of study	Organisation funding study	Study author	Publication date	Status*	Time Period covered by study	Country	Section (described freely)	Mode	Passenger / Freight	Type of issue
	network 2011-EU-95029-S										
168	Genoa Airport / TEN-T railway corridor link 2012-IT-91009-S	EU (50%) Regional authorities (50%)	n/a	2014	public	2013-2015	IT	Genoa Airport	Airport	Passenger	Bottleneck
169	Follow up Actions Zürich Process (http://www.Zürich-process.org)	Transport Ministries of the alpine countries	n/a	n/a	public	n/a	CH, DE, AT, FR	Basel- Chiasso	rail, road	Freight	Bottleneck
170	UNECE blue book	EEIG Rotterdam - Genoa	UNECE	2012	public	n/a	Europe	Europe	IWW	Pass.&Freight	Bottleneck
171	Platina project	European Commission	Viadonau (coordinator)	2014	public	n/a	Europe	Europe	IWW	Pass.&Freight	Bottleneck
172	Marktbeobachtung 2013	Zentralkommission für die Rheinschifffahrt	n/a	n/a	public	n/a	NL, DE, CH	n/a	IWW	Freight	Bottleneck
173	ERTMS implementation plan update	UIC	n/a	n/a	public	2007-2015-2020, Dependent per corridor. Corridor 6 is 2015.	Most of EU	n/a	Rail	Freight	Bottleneck
174	RIS Upper Rhine	VNF	n/a	n/a	public	2013-2015	FR, DE	n/a	IWW	Freight	Bottleneck
175	Deployment of Inland AIS transponders in Flanders and The Netherlands	Rijkswaterstaat & Flemish Ministry	n/a	n/a	public	2010-2012	BE,NL	n/a	IWW	Freight	Bottleneck
176	TEN-T Funding, 2009-IT-91404-S: Upgrade of the Tortona-Voghera section, Priority Project 24, Final Design		n/a	n/a	public	2009-2010	IT	Milano - Genoa	Rail	n/a	Bottleneck
177	2006-IT-90906-S: Study on the migration from the system SCMT to ETCS	Italian Ministry of Infrastructure and Transport	n/a	n/a	public	2007-2011	IT	Genoa-Milan-Chiasso Genoa-Novara-Domodossola	Rail	n/a	Bottleneck
178	Fünfjahresplan für den Ausbau der Bundesfernstraßen 2011 – 2015 - Projektliste und Erläuterungen -	BMVBS	n/a	n/a	public	some started, some not-different	DE	All roads,	n/a	n/a	n/a
179	Erstellung eines Entwicklungskonzeptes KV 2025 in Deutschland als Entscheidungshilfe für die Bewilligungsbehörden	BMVBS	n/a	n/a	public	n/a	DE	terminal areas at Basel, Duisburg, Frankfurt am Main/Mainz, Karlsruhe, Koblenz, Köln, Mannheim/Ludwigshafen, Neuss/Düsseldorf, Stuttgart	Terminals	freight	Bottleneck
180	Study on unaccompanied combined transport of semitrailers through Switzerland	UIRR	KombiConsult GmbH	2012	public	n/a	DE-CH-IT	southern-feeder route to the Gotthard Base Tunnel	Rail	Freight	Bottleneck
181	Evaluierung Gleisanschlussförderrichtlinie	Bundesministerium für Verkehr, Bau- und	n/a	n/a	public	2025	DE	n/a	Rail	Freight	Bottleneck

#	title of study	Organisation funding study	Study author	Publication date	Status*	Time Period covered by study	Country	Section (described freely)	Mode	Passenger / Freight	Type of issue
		Stadtentwicklung									
182	Sozio-ökonomische und verkehrspolitsche Rahmenbedingungen der Verkehrsprognose im Rahmen der Verkehrsverflechtungen 2030 sowie Netzumlegungen der Verkehrsträger	Bundesministerium für Verkehr, Bau- und Stadtentwicklung	n/a	n/a	public	n/a	DE	n/a	All modes	Pass.&Freight	Bottleneck
183	Die zukünftige Rolle des Schienenverkehrs in einer nachhaltigen Mobilität - Potenziale, Risiken und Handlungsoptionen	Bundesministerium für Verkehr, Bau- und stadtentwicklung	n/a	n/a	public	DE	n/a	Rail	Freight	Bottleneck	n/a
184	Verkehrsinvestitionsbericht für das Berichtsjahr 2012	Bundesministerium für Verkehr, Bau- und Stadtentwicklung	n/a	n/a	public	n/a	DE	n/a	All modes	Pass.&Freight	Bottleneck
185	Projekt Langstreckenverkehre optimieren Schlussbericht	Bundesministerium für Verkehr, Bau- und Stadtentwicklung	n/a	n/a	public	n/a	DE	n/a	All modes	Freight	Bottleneck
186	Reducing Railway Noise Pollution	Bundesministerium für Verkehr, Bau- und Stadtentwicklung	n/a	n/a	public	n/a	DE	n/a	Rail	Passenger/ Freight	Bottleneck
187	FABI: Botschaft zur Initiative Für den öffentlichen Verkehr und zum direkten Gegenentwurf	Federal Government	n/a	2012	public	-2020-2030	CH	Basel-Simplon-Domodossola-Corridor	rail	Passenger/ Freight	Bottleneck
188	Federal Government of Switzerland: FABI - Botschaft zur Initiative Für den öffentlichen Verkehr und zum direkten Gegenentwurf	Federal Government	n/a	n/a	public	-2020-2030	CH	Basel-Gotthard-Ticino-Corridor	rail	Passenger/ Freight	Bottleneck
189	Federal Office of Transports / Ports of Switzerland: Rheinschifffahrt und Schweizerische Verlagerungspolitik	BAV Federal Office of Transport / Ports of Switzerland	Ecoplan / Kurt Moll / NEA	2010	public	2008-2020	CH	Rotterdam-Basel-Italy	river port	Freight	Bottleneck
190	Federal Goverment: Botschaft zum Bau und zur Finanzierung eines 4m-Korridors auf den Zufaufstrecken der NEAT zum Gotthard	Federal Government	n/a	n/a	public	-2020-2030	CH	Basel-Gotthard-Ticino-Corridor	Rail	Freight	Bottleneck
191	IVT Institute for Transport Planning and Systems / ETH Zürich:Studie Infrastruktur	Verband der verladenden Wirtschaft VAP /	IVT/ ETH	2013	public	-2020-2030	CH	Basel-IT	Rail (Road)	Passenger/ Freight	Bottleneck

#	title of study	Organisation funding study	Study author	Publication date	Status*	Time Period covered by study	Country	Section (described freely)	Mode	Passenger / Freight	Type of issue
	Landverkehr - Modul 1: Engpassanalyse Infrastruktur	CargoForum Schweiz									
192	Federal Office of Transports: Eisenbahn-Grossprojekte - Standbericht	Federal Government - Federal Office of Transport (BAV)	BAV	2013	public	-2016	CH	several lines	Rail	Passenger/ Freight	Bottleneck
193	Bundesbeschluss über das zweite Programm zur Beseitigung von Engpässen im National-strassennetz und über die Freigabe der Mittel	Federal Government	n/a	2013	public	Open-Open	CH	Intersection Basel Wiese - Intersection Basel Hagnau	Road	Passenger/ Freight	Bottleneck
194	Botschaft zur Änderung des Bundesgesetzes über den Strassentran-sitverkehr im Alpengebiet (Sanierung Gotthard-Strassentunnel)	Federal Government	n/a	2009	public	Open-Open	CH	Connection Göschenen - connection Airolo	Road	Passenger/ Freight	Bottleneck
195	Media communication Swiss Federal Roads Office	FEDRO	n/a	2013	public	2013-2015	CH	CH-D border Basel - Intersection Basel Hagnau (dir. South)	Road / IWW	Passenger/ Freight	Bottleneck
196	Intraplan (München): Monitoring der Wettbewerbsfähigkeit des Schweizer Luftverkehrs	Federal Office for Civil Aviation	INTRAPLAN	2012	public	n/a	CH	Various airports Switzerland	Air	Passenger/ Freight	Bottleneck
197	Grossterminalstudie	Swiss Ministry of Transport	INFRAS, IVT	2012	public	-2019 (delayed)	CH	gateway Limmattal und Basel-nord	Road/Rail	Freight	Bottleneck
198	Studie Terminal Basel Nord (Capacity Calculation)	SBB Cargo / Port of Switzerland	n/a	n/a	public	-2016 (Phase 1), 2019 (Phase 2)	CH	n/a	Road/Rail /IWW	Freight	Bottleneck
199	HS Rail Link Terzo valico dei Giovi	RFI (Italian Railway Manager)	n/a	n/a	public	2012-2020	IT	n/a	Rail	n/a	Bottleneck
200	Traffic pricing by kilometer for trucks	SANEF	n/a	n/a	public	n/a	BE	France	Road	Freight	Bottleneck
201	Socio-economic study of the PPP project of the Liefkenshoek tunnel in Antwerpen	INFRABEL	n/a	n/a	public	n/a	BE	Connection from Anterppen noord to the left bank of the port	Rail	Freight	Bottleneck
202	Infrabel Project plan	INFRABEL	n/a	n/a	public	n/a	BE	BE	Rail	Passenger/F reight	Bottleneck
203	Socio-economic study of rehabilitation of wallonnian motorways	Sofico	n/a	2012	public	n/a	BE	Wallonie	Road	Passenger/F reight	Bottleneck
204	Rail freight corridor Rhine-Alpine	INFRABEL	INFRABEL	2014	public	2024	BE	Rotterdam – Genoa , Belgium	Rail	Freight	Bottleneck
205	Deurganckdok lock	Mobiliteit en openbare werken	n/a	n/a	public	2013-2016	BE	Antwerpen	Sea port	n/a	Bottleneck
206	Visart lock		n/a	n/a	public	2013-2022	BE	Zeebrugge	Sea port	n/a	Bottleneck
207	Royer lock	Port of Antwerpen	n/a	n/a	public	2014-2015	n/a	Antwerpen	Sea port	n/a	Bottleneck
208	Infrastructuur Masterplan voor de Vlaamse waterwegen horizon 2014 -2020, De	Scheepvaart/waterw egen en zeekanaal	De Scheepvaart and Waterwegen & Zeekanaal NV	2014	public	2014-2030	BE	Flemish seaports, waterways of the Walloon Region and	IWW	Freight	Bottleneck

#	title of study	Organisation funding study	Study author	Publication date	Status*	Time Period covered by study	Country	Section (described freely)	Mode	Passenger / Freight	Type of issue
	Scheepvaart/Waterwegen en Zeekanaal							the Brussels-Capital Region			
209	SPW implementation plan	Service Public de wallonie	n/a	n/a	public	n/a	BE	Wallonie	Multimodal	Passenger/freight	Bottleneck
210	Socio-economic study	Liège carex	Cargo rail express	2010	public	n/a	BE	Liège	Rail	Freight	Bottleneck
211	Socio-economic study to evaluate the opportunity of a link Cerexhe - Heuseux - Beaufays	Sofico	Sofico	2011	public	n/a	BE	Liège	Road	Passenger/freight	Bottleneck
212	technical and economic feasability study of a new trimodal platform and logistic area in Liège (Trilogiport)	Port Autonome de Liège	Liege Port Authority	n/a	public	n/a	BE	Liège	IWW/rail/road	Freight	Bottleneck
213	Ports et trafic fluvial dans le Rhin supérieur	CRS, DRE Alsace	Bernard Fichtner, Jeannie Vaillant–Creismeas	2008	public	n/a	FR, DE,CH	Germersheim-Basel	Road, Rail, IWW	Freight	Bottleneck
214	Etude approfondie portant sur l'élaboration d'un concept pour la navigation et les ports intérieurs du Bade-Wurtemberg	Bade-Wurtemberg Minister of the Interior	n/a	n/a	public	n/a	FR, DE,CH	Ludwigshafen - Basel	Road, Rail, IWW	Freight	Bottleneck
215	Mobility assesment of Liège airport logistics area	SOWAER	n/a	n/a	public	n/a	BE	Brussels - Liège	Rail	Pass.&Freight	Bottleneck
216	Verkehrsentwicklung im Rheinland	Port of Antwerpen	IVV	2013	public	2004-2025	BE,FR,LU,DE,NL	Port of Antwerpen	IWW/rail/road	Freight	Capacity, Forecasts
217	Theodorushaven Bergen op Zoom, Toekomstvisie Bergen op Zoom 2025	Port of Bergen op zoom	Port of Bergen op zoom	2008	restricted	2008-2025	NL	Bergen op zoom (in between Vlissingen-Moerdijk)	Seaport	Freight	Forecasts, Strategy
218	Eindrapportage Verkenningen verbinding Axel-Zelzate	Zeeland Seaports	n/a	2013	n/a	n/a	NL, BE	Zelzate	Rail	Freight	Bottleneck
219	Perspectives of transport demand Belgium 2030	Federaal Planbureau	Federaal Planbureau	n/a	public	2008-2030	BE	n/a	All modes	Passenger/freight	n/a
220	Bottlenecks for flemish seaports - input CNC analyses	flemish seaports	flemish seaports	n/a	restricted	2013-2025	BE,FR,LU,DE,NL	flemish seaports (Antwerpen, Zeebrugge, Ghent)	IWW/rail/road	Freight	Bottleneck
221	Quick scan bottlenecks internationale corridors	Ministry of transport	Panteia	2014	public	n/a	NL, BE, DE, CH, IT, FR, PL	n/a	All modes	Freight	Bottleneck
222	Masterplan ETCS Belgium	INFRABEL	n/a	2014	public	2015-2035	BE	n/a	Rail	Passenger/freight	Bottleneck
223	Vier vergezichten op Nederland	CPB	Free Huizinga, Bert Smid, Centraal Planbureau	2004	public	2002-2050	NL	Netherlands	All modes	Passenger/freight	Forecasts
224	Energy, Transport and GHG Emissions Trends to 2050, Reference scenario 2013	DG Energy	E3M-Lab	2013	public	2010-2050	EU	EU27	All modes	Passenger/freight	Forecasts for transport and energy
225	Le transport ferroviaire : un atout structurant pour la Wallonie	Service public de Wallonie	TRITEL	2012	public	n/a	BE	n/a	Rail	Passenger/freight	n/a

#	title of study	Organisation funding study	Study author	Publication date	Status*	Time Period covered by study	Country	Section (described freely)	Mode	Passenger / Freight	Type of issue
226	Vlaamse Spoorstrategie	Flemish government	n/a	2013	public	Up to 2028	BE	Vlaanderen	Rail	Passenger/freight	Safety, capacity, combined transport
227	Mobiliteitsplan Vlaanderen 2030	Mobility and Public works, Flanders	n/a	2014	public	Up to 2030	BE	Flanders	All modes	Passenger/freight	n/a
228	Verkeer- en vervoersprognoses binnenvaart Scheldegebied - Situatie 2007 en prognoses 2020/2040	CPB	Ecorys, Resources Analysis	2009	public	n/a	BE	Flanders	IWT	Freight	Bottleneck
229	Capacity analysis Inland Waterway Transport, Schelde-area	Vlaams Nederlandse Schelde Commissie	Ecorys, Resources Analysis	2009	public	n/a	BE	Flanders	IWT	Freight	Bottleneck
233	Forecast of transport demand in Belgium by 2030	FOD MV, Federaal Planbureau	FOD MV, Federaal Planbureau	2012	public	2008-2030	BE	All of BE	All modes	Passenger/freight	Bottleneck
234	Alsace Rhine ports masterplan	Port of Strasbourg	CTS, VNF, Planco	2013	public	n/a	FR	Alsace (Strasbourg & Mulhouse)	IWT	Freight	n/a

5. Annex: Technical study review - national studies

Netherlands

Title: Status update Port Compass 2030 (NL01)

Mode/Location: Rail, Rotterdam- Barendrecht/Kijfhoek – Europoort - Calandspoorbrug

Keywords: infrastructure bottleneck, freight, upgrading measure, under study, national/regional funds

Map

Description of improvement measure:

The Calandspoorbrug Bridge, used for rail freight and dangerous goods transport by road, will not be able to cope with capacity around 2015. Life expectancy of the bridge will also end around 2020. Upgrade bridge, build a new one or divert the route.

The works are expected to start in 2015 and end in 2020.

Cost: 157 up to 420 million €. Depending on the selected option.

Title: Emmerich – Oberhausen (NL02)

Mode/Location: rail, Emmerich – Oberhausen, NL-DE borders

Keywords: operational/administrative bottleneck, freight, upgrading measure, under study

Map

Description of improvement measure:

The objective is to connect the Betuweroute to the German rail network. The Dutch ministry of transport has created a working group to address the issue. It consists of Prorail, Keyrail and Port of Rotterdam. Construction work will reduce capacity on the track. Diverting route, where possible.

Costs are not known.

Title: Rotterdam - Dordrecht (NL03)

Mode/Location: road, Rotterdam - Dordrecht

Keywords: operational/administrative bottleneck, passenger/freight, rehabilitation measure, under construction

Map

Description of improvement measure:

During peak hours, traffic is high in the Rotterdam area. This influences both freight and passenger. This improvement measures aims at traffic avoidance schemes.

The works have started in 2013.

Costs are not known.

Title: MIRT Alblasserdam - Gorinchem (NL04)

Mode/Location: : road, Alblasserdam - Gorinchem

Keywords: operational/administrative bottleneck, missing link, passenger/freight, upgrading measure, under study

Map

The MIRT project at the time of the study does not take the A15 near Papendrecht-Gorinchem into account.

Description of improvement measure: none

Title: Multimodale achterlandknooppunten in Nederland (NL05)

Mode/Location: all modes, Zaandam terminal

Keywords: infrastructure bottleneck, freight, upgrading measure, under study

Map

Description of improvement measure:

Container terminal capacity in The Netherlands is described in the study as sufficient. In future scenarios with modal shift (from road to IWW and rail) and higher transport volumes in general, there might be a shortage. Around Alkmaar it is described in the study that capacity is needed in the future and that there are no initiatives pending. The objective of the measure is to Increase the terminal capacity.

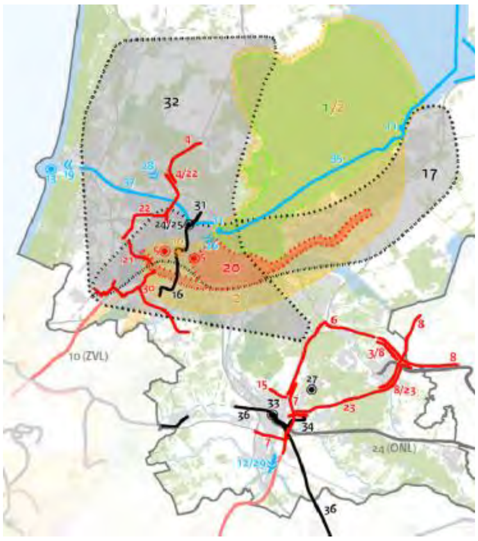
The project is under study.

Title: MIRT Ijmuiden – Amsterdam (NL06)

Mode/Location: sea/IWW, Ijmuiden - Amsterdam

Keywords: infrastructure bottleneck, missing link, freight, upgrading measure, planned, regional/national funds, corridors 2/6/8

Map



Description of improvement measure:

The biggest sea lock of IJmuiden is too small for modern sea vessels travelling to Amsterdam Port.

Missing link: lock does not allow large sea vessels.

Measure is building a larger sea lock to replace the current one.

The work is planned to start in 2015 and finish in 2019.

Cost: € 879,000,000

Title: MIRT Noordzeekanaal (NL07)

Mode/Location: inland waterways, Ijmuiden - Amsterdam Noordzeekanaal

Keywords: operational/administrative bottleneck, freight, upgrading measure, under construction, national/regional funds, corridors 2/6/8

Map

Description of improvement measure:

Traffic Management System is not sufficient for inland waterways (sea vessels also use this route). This consumes extra time. Also it is not compliant with international guidelines. It is an existing bottleneck expected to intensify over time.

Upgrade Traffic Management System.

The work has started in 2010 and is finishing in 2014.

Cost: € 26,000,000

Title: MIRT IJmuiden – Amsterdam seaport (NL08)

Mode/Location: seaport, IJmuiden - Amsterdam

Keywords: infrastructure bottleneck, freight, upgrading measure, under study, national/regional funds, corridors 2/6/8

Map

Description of improvement measure:

Current transhipment point for sea ships is creating a bottleneck for other traffic. Just before the northern sea lock, bulk cargo sea ships are lighter in their load to pass the canal towards the port of Amsterdam. This location partly blocks the way for other traffic using the lock and creates safety issues.

Improvement measure: new location for the transhipment point of bulk sea ships.

The work is planned to start in 2014 and finish in 2017.

Cost: € 65,000,000

Title: MIRT Zaandam - Amsterdam (NL09)

Mode/Location: inland waterways, Zaandam – Amsterdam, Wilhemina lock, river "De Zaan"

Keywords: infrastructure bottleneck, freight, upgrading measure, under construction, national / regional funds, corridors 2/6/8

Map

Description of improvement measure:

The lock reduces navigability of CEMT Va class waterway.

Improvement measure: upgrade lock to CEMT Va class specifications. This will fit with the rest of the waterway.

The work has started in 2013 and is planned to finish in 2015.

Cost: € 39,500,000

Title: MIRT Amsterdam - Utrecht (NL10)

Mode/Location: inland waterways, Amsterdam - Utrecht, Amsterdam Rhine canal, passage Zeeburg

Keywords: infrastructure bottleneck, freight, upgrading measure, under construction, national/regional funds

Map

Description of improvement measure:

Passage is smaller than the rest of the canal. This reduces capacity. Predictions are that the number of vessels will increase at least until 2020.

Improvement measure: make passage wider.

The work has started in 2013 and is planned to finish in 2015.

Cost: € 14,000,000

Title: MIRT Zaandam - Amsterdam (NL11)

Mode/Location: road, Zaandam - Amsterdam, Motorway Junction, junction Coenplein

Keywords: infrastructure bottleneck, passenger/freight, upgrading measure, planned, national/regional funds

Map

Description of improvement measure:

Starting point is traffic congestion at the junction.

Improvement measure: extra peak hour lane on line. Improvement of junction Zaandam to relieve the Coenplein junction.

The work starts in 2014 and is planned to finish in 2015.

Cost: € 25,000,000

Title: MIRT Amsterdam, Coentunnel (NL12)

Mode/Location: road, Amsterdam, Amsterdam North, Coentunnel

Keywords: infrastructure bottleneck, passenger/freight, upgrading measure, under construction, national/regional funds, corridors 2/6/8

Map

Description of improvement measure:

Starting point: tunnel is a traffic bottleneck and creates bottlenecks in the immediate junctions. A new tunnel has already been built, however the old tunnel is still there.

Improvement measure: renovate the old Coentunnel, alongside the 2nd Coentunnel. and improve accessibility by building an 10km stretch of highway.

The work started in 2013 and is expected to finish in 2014.

Cost: € 2,196,000,000

Title: MIRT Amsterdam, Badhoevendorp (NL13)

Mode/Location: road, Amsterdam, Amsterdam West, A9 Badhoevendorp

Keywords: infrastructure bottleneck, passenger/freight, upgrading measure, under construction, national/regional funds, corridors 2/8

Map

Description of improvement measure:

Starting point: traffic congestion junction.

Improvement measure: upgrade works.

The work started in 2013 and is expected to finish in 2017.

Cost: € 336,000,000

Title: MIRT Amsterdam, Badhoevendorp (NL14)

Mode/Location: road, Amsterdam, Amsterdam West, A9 Badhoevendorp

Keywords: infrastructure bottleneck, passenger/freight, upgrading measure, under study, national/regional funds, corridors 2/6/8

Map

Description of improvement measure:

Starting point: traffic congestion junction.

Improvement measure: upgrade work to separate local from long-distance traffic.

The work will start in 2017 and is expected to finish by 2028.

Cost: € 332,000,000

Title: MIRT Amsterdam, Station Amsterdam South (NL15)

Mode/Location: road/rail, Station Amsterdam South

Keywords: infrastructure bottleneck, passenger/freight, upgrading measure, under construction, national/regional funds, corridors 2/6/8

Map

Description of improvement measure:

Starting point: both public transport station and road traffic junctions around the station cannot handle future demand. The bottleneck occurred in 2012.

Improvement measure: increase capacity of station. Improve road and immediate junctions.

The work started in 2013 and is expected to finish by 2028 (specific segments will be finished earlier).

Cost: € 994,000,000

Title: MIRT Amsterdam – Utrecht - Utrecht North (NL16)

Mode/Location: road, Amsterdam – Utrecht, Utrecht North

Keywords: infrastructure bottleneck, passenger/freight, new construction measure, under study, national/regional funds

Map

Description of improvement measure:

Starting point: the Utrecht south route is congested.

Improvement measure: to relieve the Utrecht South route, a northern route is constructed.

The work will start in 2018 and is expected to finish by 2026.

Cost: € 213,000,000

Title: MIRT Amsterdam – Utrecht - Utrecht South A12 (NL17)

Mode/Location: road, Amsterdam – Utrecht, Utrecht South A12

Keywords: infrastructure bottleneck, passenger/freight, upgrading measure, under study, national/regional funds

Map

Description of improvement measure:

Starting point: the Utrecht south route is congested.

Improvement measure: increase capacity. Different solutions under study.

The work will start in 2018 and is expected to finish by 2025.

Cost: € 1,120,000,000

Title: MIRT - Utrecht - Utrecht Central Station (NL18)

Mode/Location: rail terminal, Utrecht - Utrecht Central Station

Keywords: infrastructure bottleneck, passenger/freight, upgrading measure, under construction, national/regional funds

Map

Description of improvement measure:

Starting point: Utrecht is expected to attract more passengers in the future. More than it can currently handle.

Improvement measure: to relieve the Utrecht South route, a northern route is constructed.

The work has started in 2007 and is expected to finish by 2019.

Cost: € 400,500,000

Title: MIRT - Amsterdam - Utrecht - Rotterdam (NL19)

Mode/Location: inland waterways, Amsterdam - Utrecht – Rotterdam, IWW junction between Rotterdam and Amsterdam

Keywords: infrastructure bottleneck, passenger/freight, upgrading measure, under study, national/regional funds, corridors 2/6

Map

Description of improvement measure:

Starting point: current lock is expected become a bottleneck in 2017 due to increased traffic flows.

Improvement measure: increase capacity of the lock.

The work will start in 2016 and is expected to finish by 2020.

Cost: € 216,000,000 (including the canal improvement – NL20)

Title: MIRT - Amsterdam - Utrecht - Rotterdam (NL20)

Mode/Location: inland waterways, Amsterdam - Utrecht – Rotterdam, IWW junction between Rotterdam and Amsterdam

Keywords: infrastructure bottleneck, freight, upgrading measure, under study, national/regional funds, corridors 8 / 6

Map

Description of improvement measure:

Starting point: the canal currently cannot handle CEMT VI vessels. Also there are insufficient mooring places. This causes delays elsewhere.

Improvement measure: widen the canal.

The work will start in 2016.

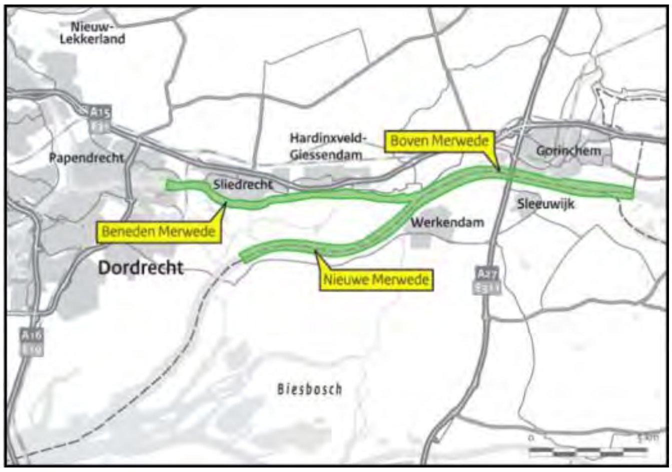
Cost: € 233,000,000 (including the lock improvement – NL19)

Title: MIRT - Rotterdam- Gorinchem (NL21)

Mode/Location: inland waterways, Rotterdam- Gorinchem, River Rhine (Merwede)

Keywords: operational/administrative bottleneck, freight, upgrading measure, under study, national/regional funds

Map



Description of improvement measure:

Starting point: there are insufficient mooring places on this stretch. This increased that probability of accidents. Including ships with dangerous goods. Also it could capacity in nearby locations.

Improvement measure: 3 options are considered: using alternative locations, using 3rd party locations, constructing new locations. Plus any combination.

The work will start in 2016 and is expected to finish in 2017.

Cost: € 29,000,000

Title: MIRT - Rotterdam - Duisburg (NL22)

Mode/Location: road, road terminal, Terminal Alblasserdam, A15 motorway/Rhine river

Keywords: operational/administrative bottleneck, passenger/freight, new construction measure, completed, national/regional funds

Map

Description of improvement measure:

Starting point: the A15 is congested. Also the port of Rotterdam has the ambition to reduce the amount of port related road traffic.

Improvement measure: an inland waterway terminal has been built to ease the congestion of the A15 motorway (Rotterdam-Germany). This is too expensive, thus public funds are invested in the terminal to make it.

The work started in 2010 and was completed in 2014.

Investment amount: € 7,000,000 (national government € 5,000,000, Province € 2,000,000).

Title: MIRT - Rotterdam Central station (NL23)

Mode/Location: rail, rail terminal, Rotterdam Central station

Keywords: infrastructure bottleneck, passenger/freight, upgrading measure, under construction, national/regional funds, corridors 2/6/8

Map

Description of improvement measure:

Starting point: Rotterdam is expected to attract more passengers in the future than it can currently handle.

Improvement measure: redevelop the station area to create space for the passengers.

The work has started in 2008 and was expected to finish in 2013.

Cost: € 330,000,000 (including land development)

Title: MIRT - Rotterdam port – A4 motorway (NL24)

Mode/Location: road, Rotterdam port, A4 motorway

Keywords: infrastructure bottleneck, passenger/freight, new infrastructure construction measure, under study, corridors 6/8

Map

Description of improvement measure:

Starting point: the network in Rotterdam cannot handle future road traffic. This affects the connection of the port with the hinterland. A bottleneck is expected to occur by 2015.

Improvement measure: new infrastructure to relieve bottlenecks, or upgrading current infra.

The work will start in 2017 and end in 2022.

Cost: not known

Title: MIRT - Rotterdam Port (Europort) - Zwijndrecht (NL25)

Mode/Location: rail (port railway line), Rotterdam Port (Europort) - Zwijndrecht

Keywords: infrastructure bottleneck (forecasted), freight, upgrade measure, under construction, national/regional funds, corridors 6/8

Map

Description of improvement measure:

Starting point: future rail volumes are expected to grow. The infrastructure has some bottlenecks.

Improvement measure: upgrade junctions or shunting yards. Reduce waiting times by improving the rail process. Each separate bottleneck has its own solution.

The work has started start in 2013 and will end before 2020.

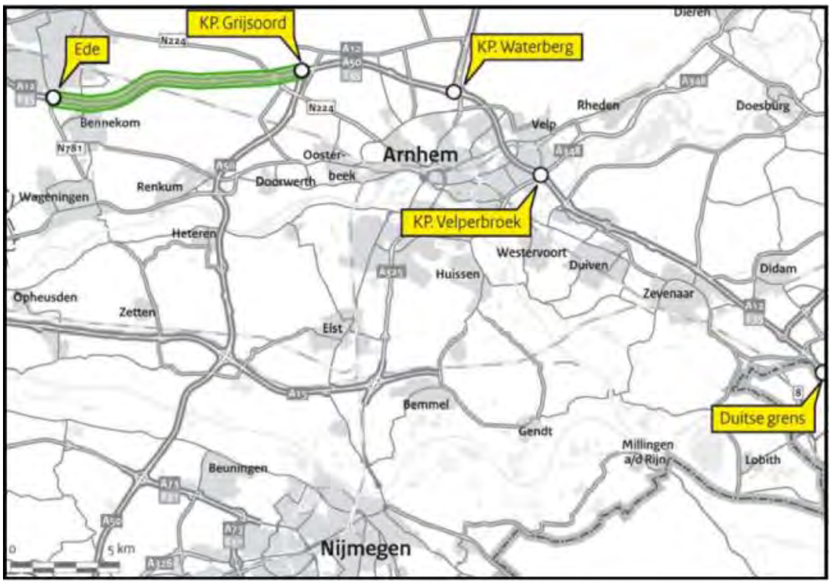
Cost: € 280,000,000

Title: MIRT – (NL26)

Mode/Location: road

Keywords: infrastructure bottleneck, freight, upgrade measure, planned, national/regional funds

Map



Description of improvement measure:

Starting point: -

Improvement measure: -

The work is planned to start in 2015 and end in 2016.

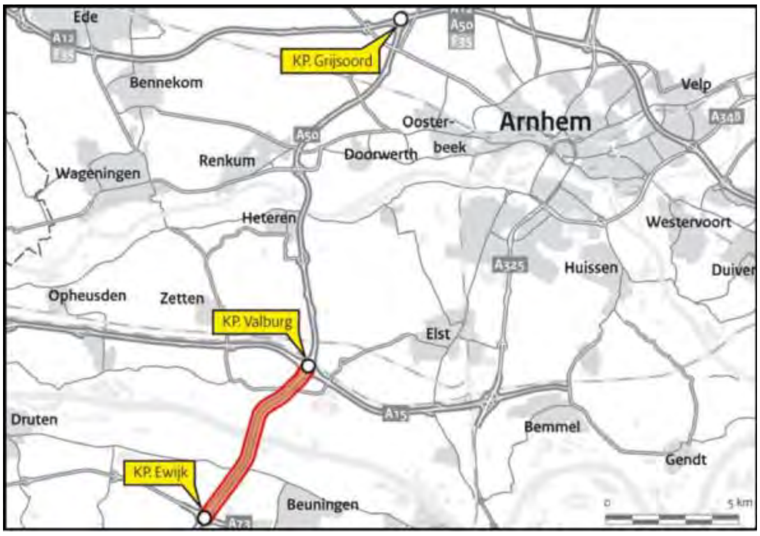
Cost: € 110,000,000

Title: MIRT – Rotterdam – Duisburg Motorway Junction (NL27)

Mode/Location: road, Rotterdam – Duisburg, Motorway Junction, A50 motorway Ewijk - Valburg. Also A15 junction.

Keywords: infrastructure bottleneck, passenger/freight, upgrade measure, under construction, national/regional funds, corridors 6/8

Map



Description of improvement measure:

Starting point: the Rotterdam - Venlo - Duisburg route is an alternative for the congested area near Arnhem. The area is also congested itself.

Improvement measure: more lanes, an extra new bridge and improvement of junctions.

The work has started start in 2011 and will end in 2015.

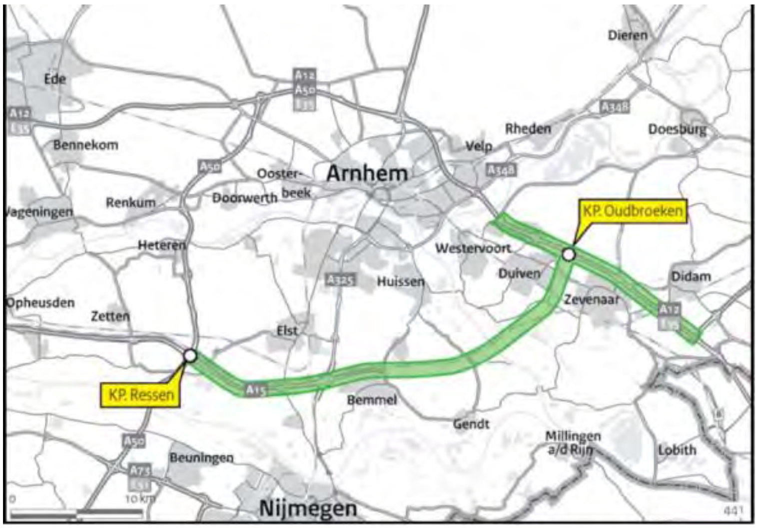
Cost: € 276,000,000

Title: MIRT – Rotterdam - Duisburg (NL28)

Mode/Location: road, Rotterdam – Duisburg, A15 motorway

Keywords: infrastructure bottleneck, passenger/freight, new construction measure, under study, national/regional funds

Map



Description of improvement measure:

Starting point: the A15 motorway stops near Arnhem. This means (port related) traffic has to divert north or south.

Improvement measure: extending the A15 to create a direct route to Zevenaar.

The work will started start in 2016 and will end in 2019.

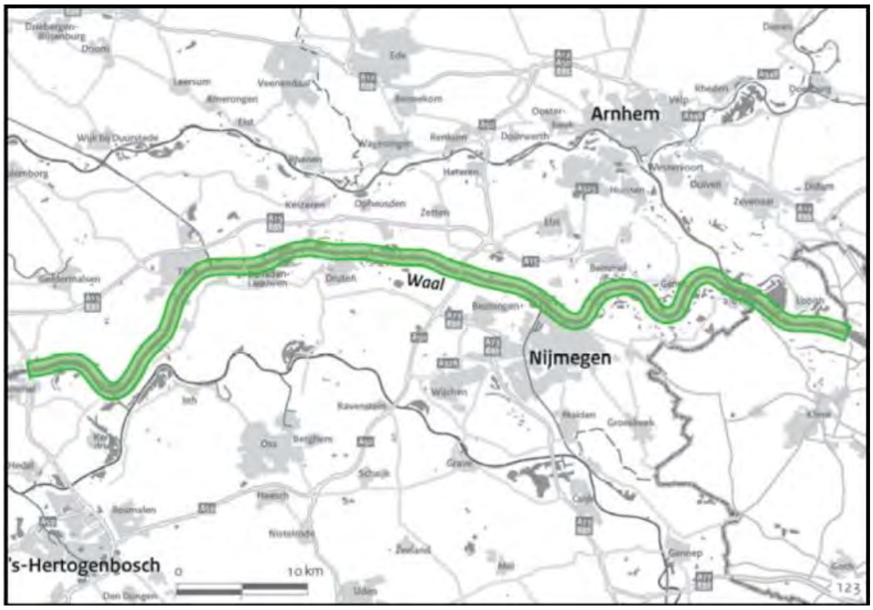
Cost: € 822,000,000

Title: MIRT – Dordrecht - Emmerich (NL29)

Mode/Location: inland waterways, Waal (simplified as Rhine) river, Dordrecht - Emmerich

Keywords: infrastructure bottleneck (temporary), freight, rehabilitation measure, under construction, corridors 6/8

Map



Description of improvement measure:

Starting point: waterway dimensions are restricting traffic. Also lack of (safe) mooring places. Temporary fixed, yet a permanent solution is requested as bottleneck will return.

Improvement measure: short term dredging to extend the dimensions. Finding a long term geological solution. Finally increasing the number of mooring places at Lobith.

The work has started start in 2006 and will end in 2021 (segments of the work are already finished).

Cost: € 131,000,000

Title: MIRT – Arnhem Central station (NL30)

Mode/Location: rail, Arnhem Central station

Keywords: infrastructure bottleneck, passenger, upgrade measure, under construction, national/regional funds

Map

Description of improvement measure:

Starting point: Arnhem, a station for the high-speed passenger line to Germany, is expected to attract more passengers in the future.

Improvement measure: redevelop the station area to create space for the passengers.

The work has started start in 2006 and will end in 2014.

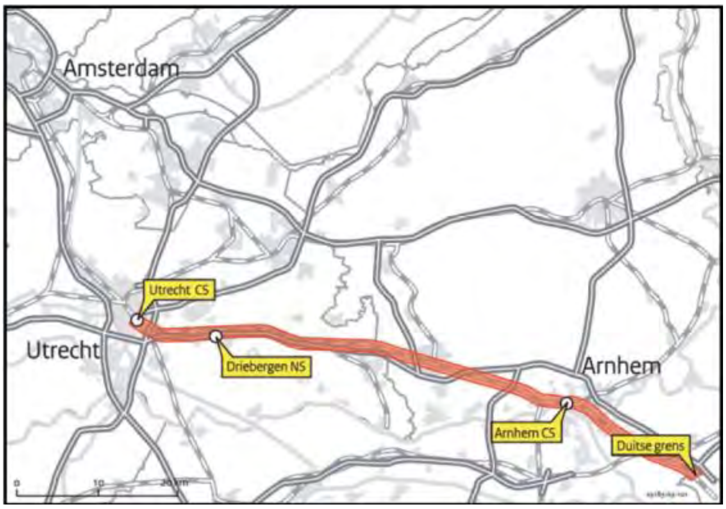
Cost: € 130,000,000

Title: MIRT – Utrecht - German border (NL31)

Mode/Location: rail, Utrecht - German border, Railway tracks

Keywords: infrastructure bottleneck, missing links, passenger, upgrade measure, under construction, national/regional funds, corridors 6/8

Map



Description of improvement measure:

Starting point: ERTMS compatibility

Improvement measure: improve the conventional line to high-speed standards. Both in infrastructure as in facilities (ERTMS etc.). It is a combination of small measures and projects.

The duration of the work is not known.

Cost: not known

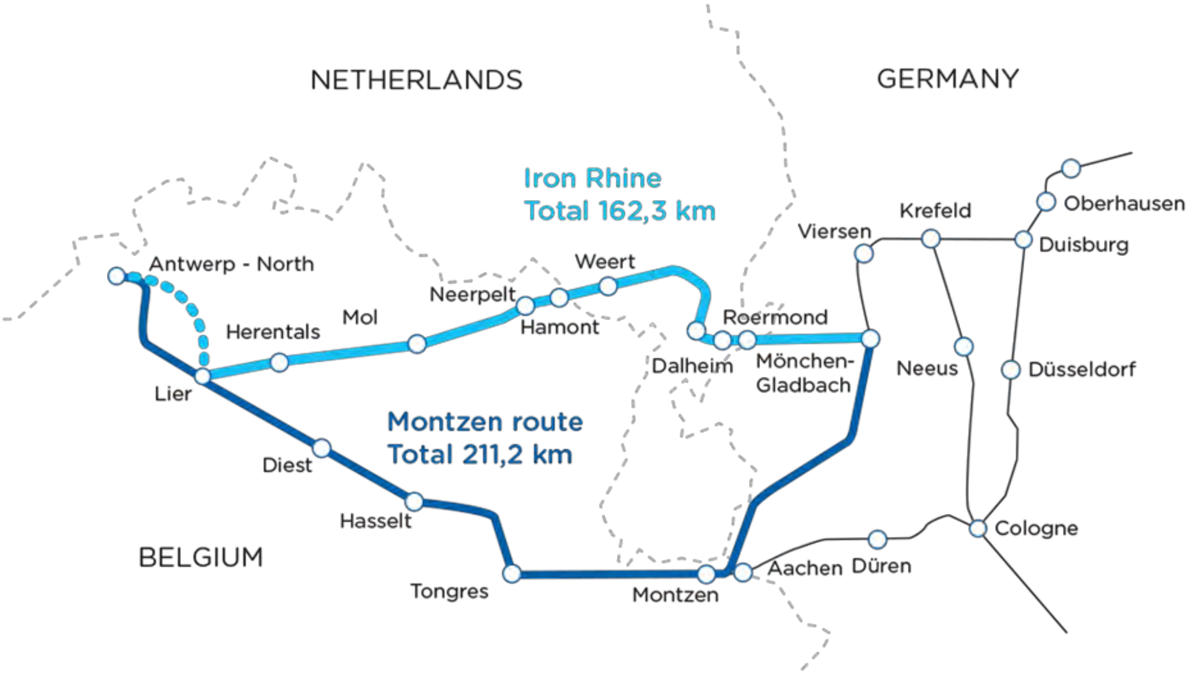
Belgium

Title: Iron Rhine (BE01)

Mode/Location: rail, Core Network, corridor 6/8

Keywords: rail, infrastructure bottleneck, reactivation of Iron Rhine, freight and passenger

Map



Description of improvement measure:

In the long term the region of Flanders is planning to realize the 'Iron Rhine', which offers a faster service via Herentals, Mol and Neerpelt to Mönchengladbach and the Ruhr area in Germany. This connection passes through the Dutch province of Limburg. The Iron Rhine project is not part of this CNC, but is identified as a priority project as defined in Annex III of Decision No 661/2010/EU and as such listed under "Other sections of the Core Network" in Annex 1 of the CEF Regulation. The Iron Rhine project is included in the list of pre-identified projects on the Core Network in part 1 of annex 1 of Regulation no 1316/2013 (CEF), and has also been identified as a missing link in RFC8 and RFC1. Different Belgian actors are currently initiating a process with German and Dutch partners to investigate all critical aspects of a new rail freight connection linking Antwerpen to the Ruhr area via Duisburg.Cost: not specified

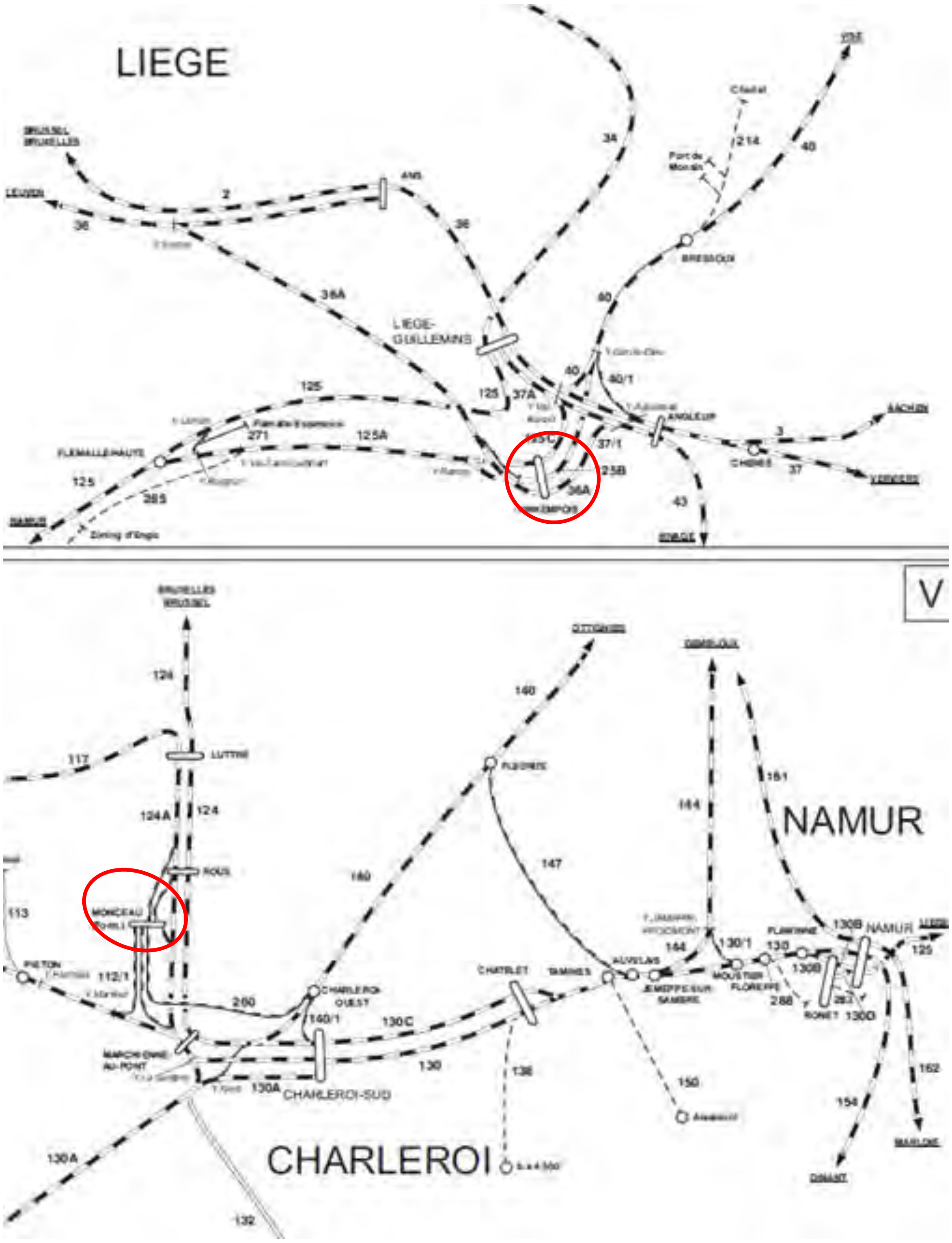
Cost: not specified

Title: Modernisation of marshalling yards located in Walloon Region (BE02)

Mode/Location: rail, Core Network, corridor 6/8

Keywords: Rail, infrastructure bottleneck, intermodality, freight, upgrade

Map



Description of improvement measure:

Modernisation of marshalling yards located in Monceau (Charleroi) and Kinkempois (Liège).

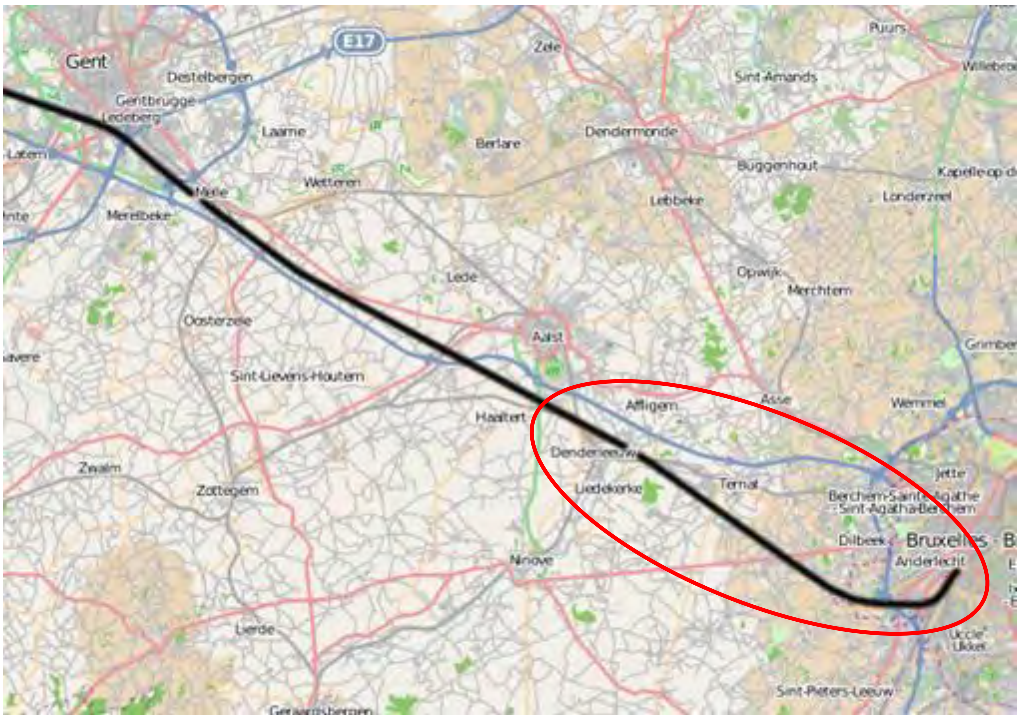
Cost: not specified

Title: L50A: Bruxelles - Denderleeuw (BE03)

Mode/Location: rail, Core Network, corridor 6/8

Keywords: infrastructure bottleneck, capacity, speed, passenger, upgrade

Map



Description of improvement measure:

Upgrade the section L50A: Bruxelles – Denderleeuw with a 3rd and 4th track.

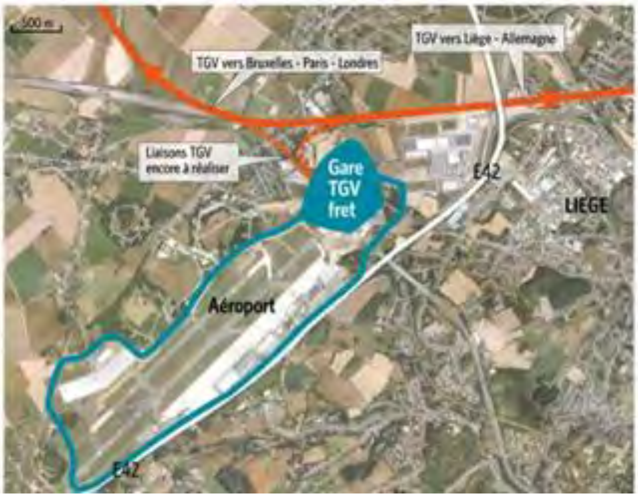
Cost: € 68,800,000

Title: Liège Carex : studies with a view to the construction of a railport on the Liège Airport site

Mode/Location: rail, Core Network, corridor 6/8

Keywords: rail, Liège Airport, connectivity, freight, new construction

Map



Description of improvement measure:

The proposed Action is composed of 3 activities, covering all the studies that will lead to the completion of the Liège railport. These studies will cover all the technical and financial aspects,
which will create the basis for the future construction works of the Liège Railport. Through this Action, Liège takes a lead role in the Euro CAREX Network, by being the first site to propose the finalisation of the studies and the concrete implementation of the terminal. This study is cofinanced by the TEN-T program (2011-BE-91083-S)

Costs: 2.200.000 €

Title: Liège Carex (BE04)

Mode/Location: rail, Core Network, corridor 6/8

Keywords: rail, Liège Airport, connectivity, freight, new construction

Description of improvement measure:

Rail connection of the future Liège-Carex terminal and adaptation of existing HSL to allow the circulation of high-speed night freight trains. Studies that will lead to the completion of the Liège railport are currently under way. These studies will cover all the technical and financial aspects, which will create the basis for the future construction works of the Liège Railport. Budgetary and technical planning for the connection of the terminal will be formally approved in a later stage.

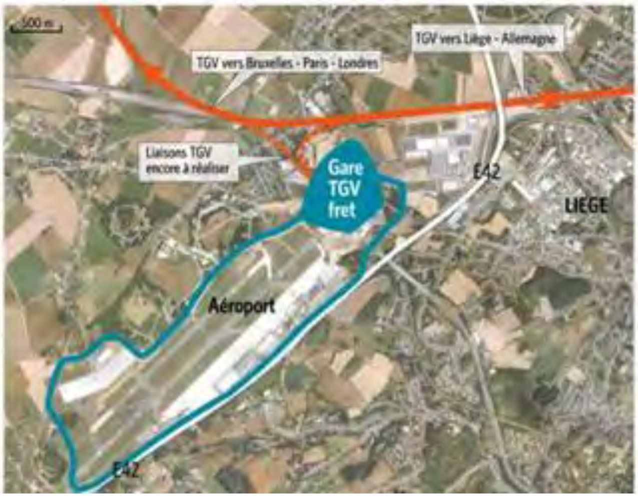
Cost: € 90,000,000

Title: Liège Carex (BE05)

Mode/Location: rail, Core Network, corridor 6/8

Keywords: rail, Liège Airport, connectivity, freight, study

Map



Description of improvement measure:

The study evaluates the technical practicability and the organisation of the railport project as well as its financial profitability. In order to assess the financial profitability, four different scenarios have been identified. The initial investments are heavy. The financial evaluation showed that the four scenarios are profitable.

Cost: € 19,190,000

Title: Socio-economic study of rehabilitation of wallonnian motorways (BE06)

Mode/Location: rail, Core Network, corridor 6/8

Keywords: rail, Liège Airport, connectivity, freight, study

Description of improvement measure:

This study aims at finding out the optimal internal organization of the railport and external connections. The study assess the needs to size the infrastructure and gives some guidelines for the design of the railport in terms of road connections, HSL connection, air connection, handling equipment and handling time.

Cost: unspecified

Title: Trilogiport (BE07)

Mode/Location: IWW/rail/road, Core Network, corridor 6/8

Keywords: lack of multimodal solutions, infrastructure bottleneck, freight, new construction

Map

Description of improvement measure:

Trilogiport : build a trimodal container port in north of Liège.

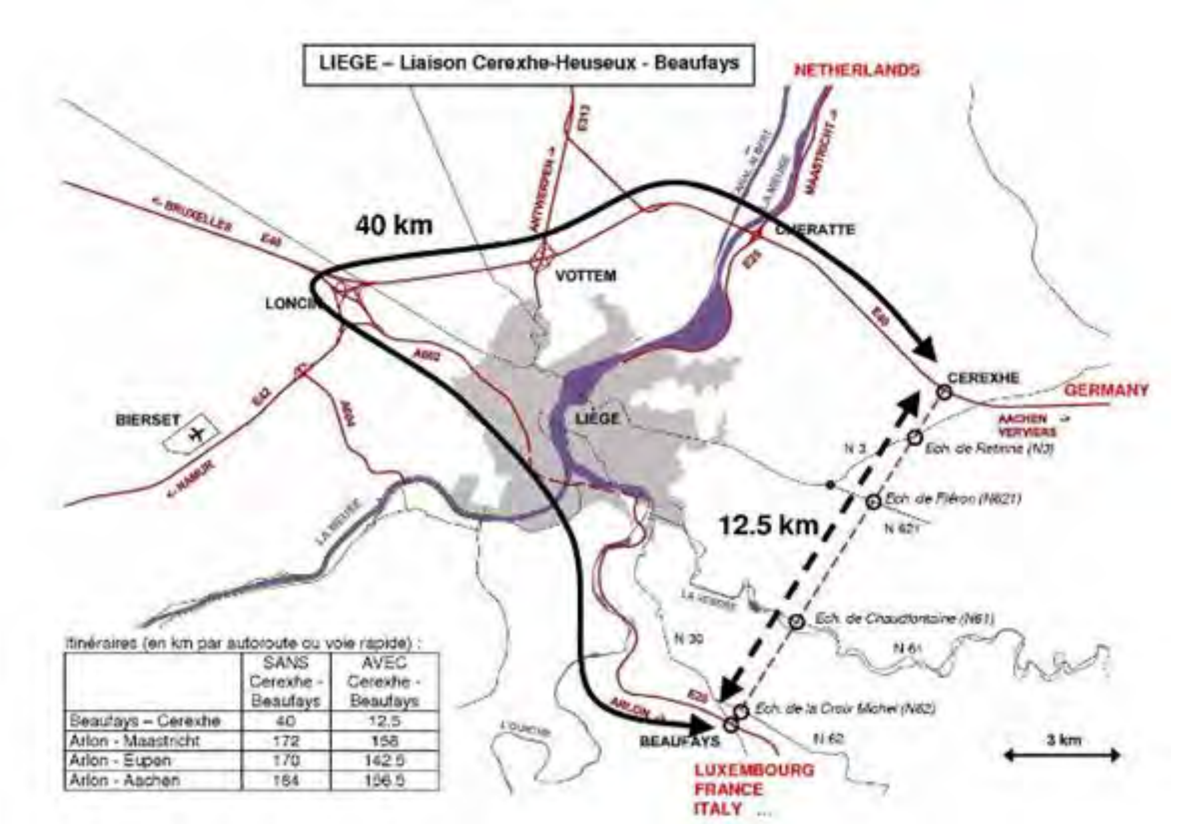
Cost: not specified

Title: Motorway link between Cerexhe–Heuseux and Beaufays (BE08)

Mode/Location: road, Core Network, corridor 6/8

Keywords: connectivity, infrastructure bottleneck, new construction, freight and passenger

Map



Description of improvement measure:

The road connection E40-E25 (A605) between Cerexhe-Heuseux and Beaufays aims at completing the ring of Liege, in the East of the city.

Cost: not specified

Title: Traffic pricing by kilometer for trucks for SANEF (BE09)

Mode/Location: road, Core Network, corridor 6/8

Keywords: operational bottleneck, upgrade, freight

Description of improvement measure:

Lower the congestion on Beligan motorways by internalizing the external congestion costs of road mode.

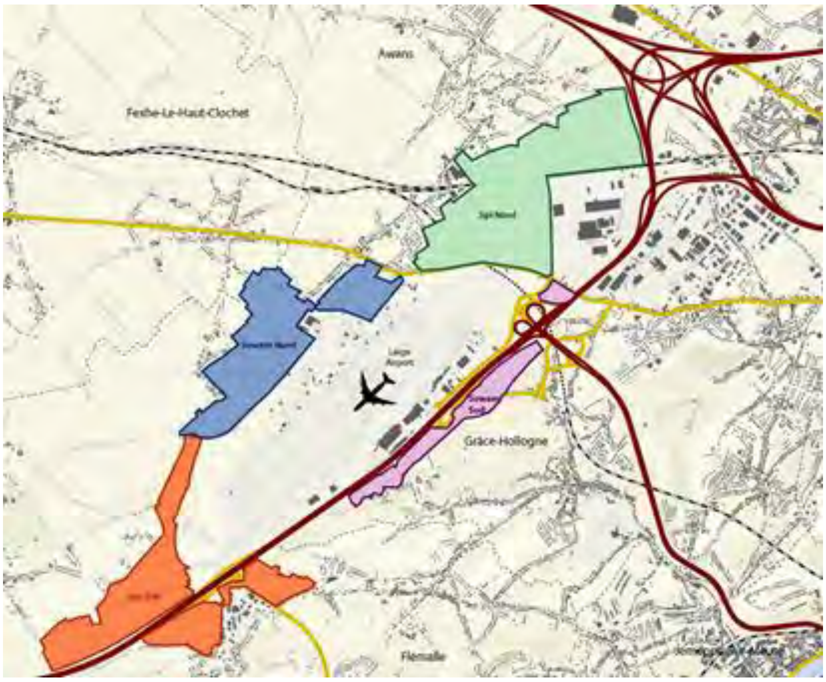
Cost: not specified

Title: Mobility in Logistics areas of Liège Airport (BE10)

Mode/Location: Core Network, corridor 6 /8

Keywords: Connectivity and capacity barrier, existing infrastructure bottleneck, freight and passenger transport, new construction measure

Map



Description of improvement measure:

The increase of 360 acres of logistics activities in Liège airport area will generate traffics and will need additional capacity and connectivity to road. The study recommends medium-term measures to improve accessibility of planned economic activities areas.

Cost: not specified

Title: FERRMED (BE11)

Mode/Location: Core Network, corridor 6 /8, Barcelona – Stockholm - Scandinavia-Rhine-Rhone Western Mediterranean

Keywords: Interoperability, cross-border network connections, existing infrastructure, operational bottleneck, freight transport, upgrading measure

Map

Description of improvement measure:

The overall objective of the project is to optimize traffic between the different modes of transportation in view of taking up 30-35% of the land traffic by rail by implementing FERRMED Standards and improving the conditions of capacity, inter-modality and interoperability of the rail in this Great Axis Network.

Cost: not specified

Title: Optimisation of the Brussels Ring road (BE12)

Mode/Location: road, Core Network, Brussels Ring

Keywords: upgrading, capacity, safety, passenger and freight traffics

Map

Source: TEN-T Executive Agency

Description of improvement measure:

Instead of opting for a broadening of the Brussels ring road, the Flemish Government chooses a functional reorganization : the transit and local traffic are physically separated. Thanks to this adaptation, the width of the current Brussels ring road can be largely preserved, but safety and traffic flow will increase thus allowing traffic to flow more easily.

Cost: € 2,000,000 (only studies)

Title: Stad van Antwerpen (BE13)

Mode/Location: road, Ring of Antwerp, Core Network

Keywords: upgrading, capacity, safety, passenger and freight traffics

Map

Source: Stad van Antwerpen

Description of improvement measure:

The City of Antwerpen identifies several major road projects supposed to improve road traffic on the ring road of Antwerpen.

- A102 and R11bis: extra road connection in the East;
- Reconstruction of the E313 between the junctions in Wommelgem and Ranst (2 x 5 lanes);
- Reconstruction of the Noorderlaan;
- Construction of the Osterweel connection.

Cost: not specified

Title: A11 Zeebrugge (BE14)

Mode/Location: road, Zeebrugge, Core Network

Keywords: capacity, passenger and freight traffics

Map

Description of improvement measure:

New 12km long A11 motorway link between Brugge and Westkapelle. Once complete the A11 will provide a direct motorway connection between the port of Zeebrugge and the European motorway network.

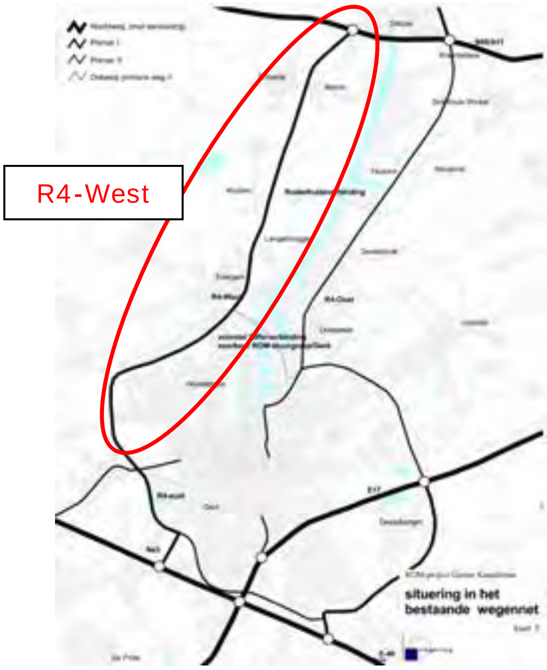
Cost: € 578,000,000

Title: Upgrade of the Ring road of Ghent (BE15)

Mode/Location: road, Ring of Ghent, Core Network

Keywords: upgrading, capacity, safety, passenger and freight traffics

Map



Source: http://www.gentsekanaalzone.be

Description of improvement measure:

On Friday, October 18, 2013 the Flemish government gave the go-ahead for the conversion of the remaining junctions. The junctions at street level will be converted into complexes on different levels in order to improve the traffic circulation in the region. This will also ensure the accessibility of the port, as well as a smooth flow of traffic from and to the E17, E34 and E40 motorways.

On both sides of the Ghent-Terneuzen Canal, the R4 will be converted into a primary road.

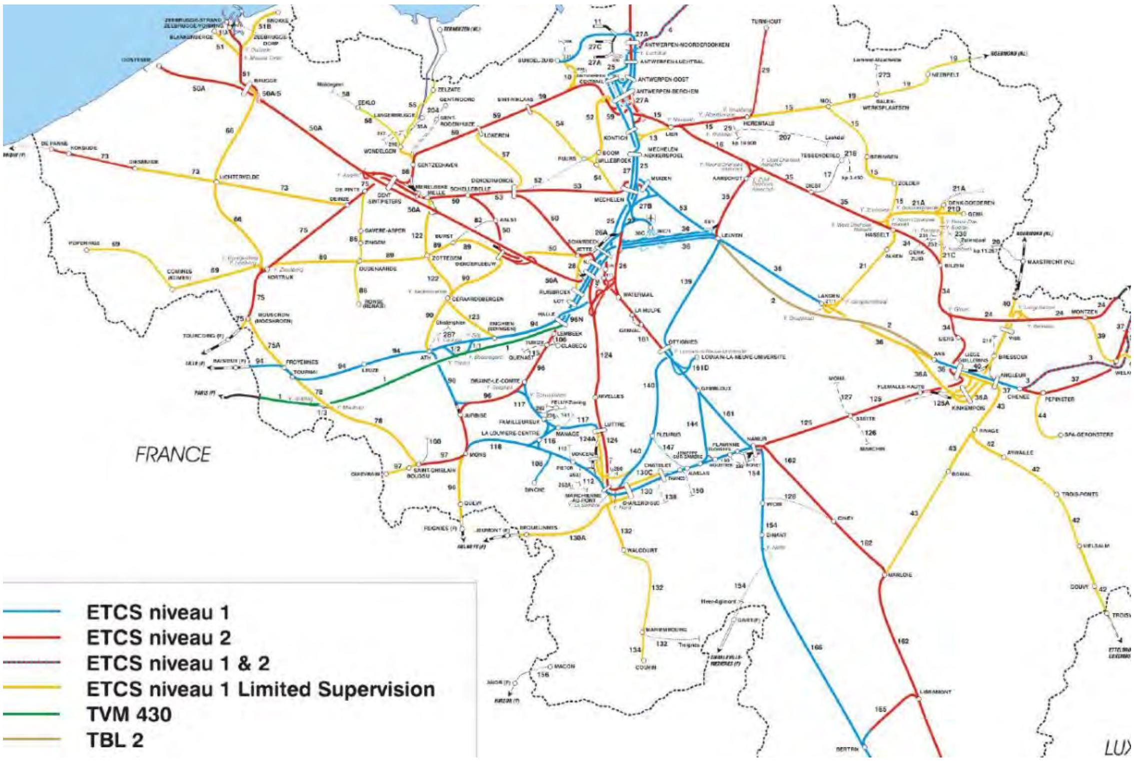
Cost: € 58,500,000

Title: Deployment of ETCS on railway lines in Belgium (BE16)

Mode/Location: rail, Core Network

Keywords: upgrading, capacity, interoperability (cross-border), safety, passenger and freight traffics

Map



Description of improvement measure:

This programme has multiple objectives:

- Major improvement in the level of safety on the entire network;
- Improvement in the interoperability of the Belgian network situated in the heart of the European railway network for freight (connection of three railway freight corridors to the port of Antwerpen and Zeebrugge) and for passengers (European high-speed network);
- Meeting European requirements set by TS CCS and by the European deployment plan for ERTMS;
- Equipping the Belgian Core Network with ERTMS by 2022;
- Improving the management of the network and quality of service;
- Optimising the use of energy for railway traffic, particularly freight convoys.

Cost: € 936,000,000

Title: Ghent - Zeebrugge line: increase in capacity (BE17)

Mode/Location: rail, Core Network, Ghent-Zeebrugge

Keywords: capacity, port connection to inland network, freight traffic

Map

Description of improvement measure:

To cope with increase of traffics in Zeebrugge and ensure that trains can move around smoothly in the future, Infrabel is investing in the creation of a 3rd and 4th track between Ghent and Brugge. Express trains will then travel on the central tracks and slower train will travel on the outer tracks, preventing the different trains from hindering one another. A 3rd track is also programmed between Brugge and Dudzele. Finally various investments in the railway infrastructure of the Port of Zeebrugge (new sidings for splitting, extension and modernisation of sidings,...) and Ghent are needed to support the development of intermodality between rail, sea and inland waterway.

Sub-projects :

(1) L50A Ghent - Brugge : 3rd and 4th tracks (253.6 millions eur2012)

(2) L51, L51A et L51C - Brugge-Dudzele : 3rd track (75.2 millions euro2012)

(3) Masterplan Zeebrugge - SPV Zwankendamme (100.6 millions euro2012)

(4) Bifurcation Ledeberg, Melle and Schellebelle (21.5 millions euro2012)

(5) Port of Zeebrugge : various extension works (10.4 millions euro2012)

(6) Port of Ghent: various extension works (1.5 millions euro2012)

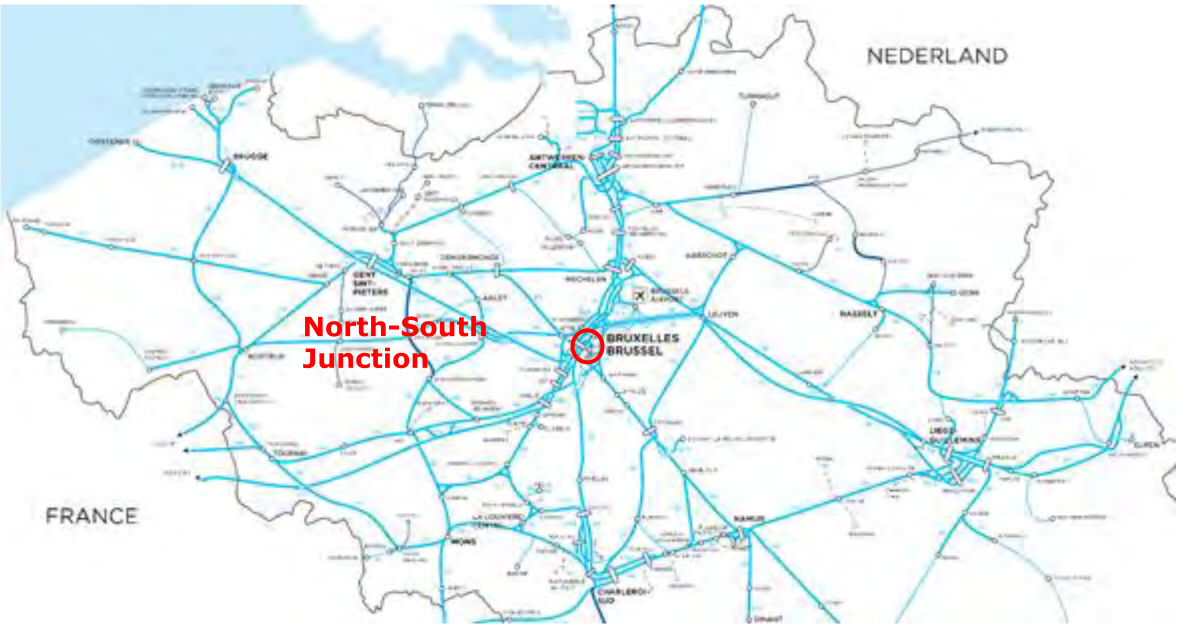
Cost: € 463,000,000

Title: Capacity increase of the North-South Junction in Brussels (BE18)

Mode/Location: rail, Brussels, Core Network

Keywords: upgrading, capacity, safety, passenger traffic

Map



Source: Infrabel

Description of improvement measure:

This program involves infrastructure or new equipment, in particular beyond the North-South Junction.

(1) Track and bifurcation of HSL in the North of the Brussels-Capital region (38 M€2012)

(2) Measures to increase capacity in the Brussels-South area (69 M€2012)

(3) Measures to increase capacity in the Brussels-North – Schaerbeek area (137,7 M€2012)

(4) Business Continuity Plan - Preventive measures for the North-South Junction (44,2 M€2012)

(5) Brussels-South Station: interior renovation works and urban integration with the surrounding neighborhoods (budgetary and technical planning of subproject 5 will be formerly approved in a later stage).

Cost: € 289,000,000

Title: Removal of level crossings (BE19)

Mode/Location: rail, Core Network

Keywords: upgrading, capacity, speed, safety, passenger and freight traffics

Map

Description of improvement measure:

This program aims to increase the capacity and safety of the Belgian railway network by systematically reducing the number of level crossings. The elimination of the level crossings involves the construction of bridges, tunnels or roads where necessary, in consultation with local authorities. In addition others measures will be implemented to improve the level of safety of some level crossings which can not be removed.

Cost: € 329,000,000

Title: Diabolo project (BE20)

Mode/Location: rail, Core Network

Keywords: passenger traffic, accessibility, Core airport connection to the railway infrastructure

Map

Description of improvement measure:

This programme concerns the rail connection of the Brussels Airport with the international railway axes Frankfurt – Liege – Brussels – Paris and Amsterdam – Antwerpen – Brussels – Paris.

Sub-projects :

(1) North rail link of the airport of Zaventem - Diabolo Project- section L25N (Bd. de la Woluwe - Mechelen)

(2) North road and rail connection of the airport of Zaventem - section: E19 - Brussels National Airport station

(3) North rail link of the airport of Zaventem (Diabolo) - Schaerbeek-Formation – Avenue de la Woluwe

Cost: € 64,000,000

Title: Increase in the capacity of access to the port of Antwerpen (BE21)

Mode/Location: rail, Port of Antwerp, Core Network

Keywords: Core port, capacity, port connection to inland network, freight traffic

Map

Source: Infrabel

Description of improvement measure:

Two sites have been targeted to successively remove cross-overs, namely Oude Landen and Krijgsbaan. Together, they should noticeably increase the port access capacity, while the construction of the second access to the port of Antwerpen is under way, which shall be timetabled in a later date. In addition, this program includes other investment needed to improve the access to the port of Antwerpen.

Sub-projects :

(1) Increase in the capacity of L27A - Y Krijgsbaan (Mortsel) (82,0 M €2012)

(2) Increase in the capacity of L27A - Y 'Oude Landen' (Ekeren) (79,0 M €2012)

(3) Port of Antwerpen : left bank (36,2 M €2012)

(4) Port of Antwerpen : right bank (14,8 M €2012)

(5) Liefkenshoek Raillink (12,4 M €2012)

(6) 3rd track Lokeren – Sint Niklaas.

(7) Signal equipment installation - right bank.

(8) 2nd rail access to the port of Antwerpen / L11.

Budgetary and technical planning for sub-projects (6) to (8) will be formally approved in a later stage.

The sites Oude Landen and Krijgsbaan will be developed before the second rail access

Cost: € 224,000,000

Title: New Deurganckdok lock to upgrade access to Waasland Port (BE22)

Mode/Location: seaport/IWW, Port of Antwerp, Core Network

Keywords: accessibility, capacity, freight traffic

Map

Source: TEN-T Executive Agency

Description of improvement measure:

The new lock in Deurganckdok will enable the Flemish Region and the Antwerpen Port Authority to guarantee access to the docks on the left bank of the Scheldt. A lock allows ships to travel from the Scheldt with its tidal activity to the port docks, where the water level is always as high.

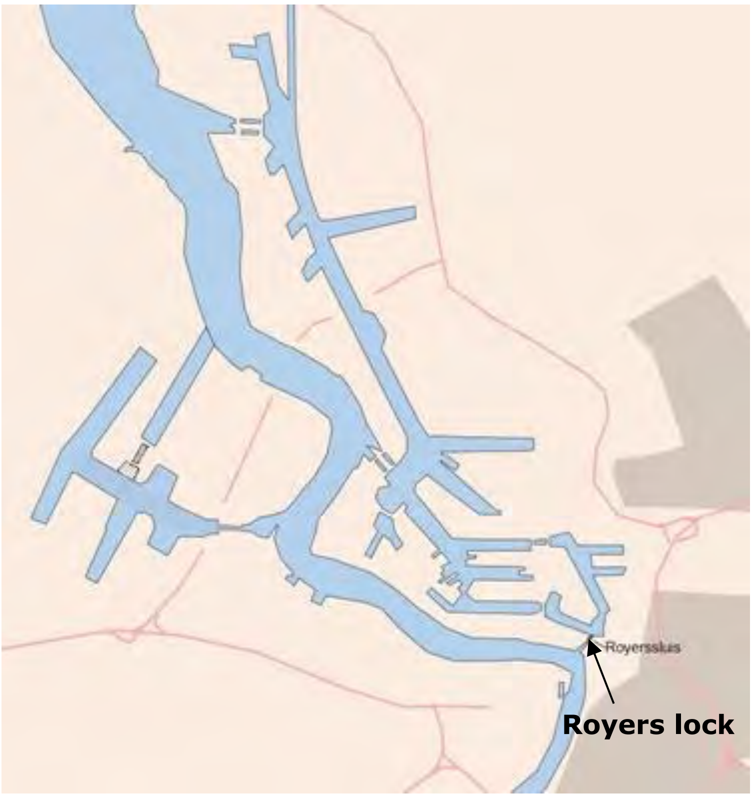
Cost: € 382,000,000

Title: Upgrade of the Royers lock in Port of Antwerpen (BE23)

Mode/Location: seaport/IWW, Port of Antwerp, Core Network

Keywords: accessibility, capacity, freight traffic

Map



Description of improvement measure:

Global Project aiming to renovate the Royers lock and improve accessibility for inland vessels to the Port of Antwerpen and to the Albertkanaal.

Cost: € 140,000,000

Title: SHIP - Replacement of the existing Visart lock (BE24)

Mode/Location: seaport/IWW, Core Network

Keywords: accessibility, capacity, freight traffic

Map

Description of improvement measure:

Within the frame of the "Strategical Port Infrastructure Project" (SHIP) the Flemish government has decided to convert the port area near the current Visart lock and the old inner port into a "limited open tidal zone". Concretely this means that the existing Visart lock will be replaced with an open access channel and that a new sea lock is built more inland. The sea lock of 1907 has become obsolete and no longer meets the demands of present-day maritime navigation. The new sea lock will be constructed north of the old Carcoke site. The Prince Philip dock and the Ferry dock will be filled up, creating new terrains for the development of shortsea activities. The project also includes the creation of a tunnel for the busy coastal road. Currently the possible tunnelling the coastal tram is also being studied. For rail traffic to the Northern Inlet dock a separate moveable bridge over the open access channel is foreseen. New terminals are still being created in the inner port. This means that in the future, more ships will sail towards the inner port. As a result, the accessibility of this port zone, but also of the port of Bruges, must be improved. A second sea lock is therefore nothing less than a necessity. Currently nearly all shipping to the inner port goes via the Pierre Vandamme lock, which is already working at maximum capacity.

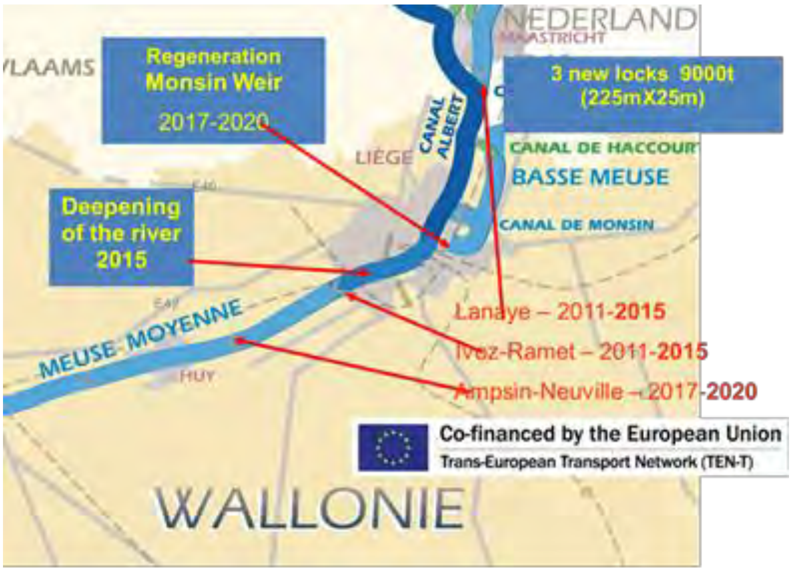
Cost: not specified

Title: Meuse Basin general upgrade under corridor NSMED (BE25)

Mode/Location: IWW, Core Network

Keywords: capacity, bottleneck gauge upgrade, Meuse, freight traffic

Map



Description of improvement measure:

The construction of two225mx25m locks at Ivoz-Ramet and Ampsin-Neuville would increase the capacity of both lock keepers complex, provide more fluid traffic and upgrade the CEMT gauge to class VIb between Namur and Liège. In addition, this programme includes other investments needed to improve the capacity of the Meuse: upgrade of the depth of the Meuse between Flémalle and Seraing, upgrade of Monsin Dam and ports infrastructure and navigation equipment.

Cost: € 212,000,000

Title: Construction of the fourth lock at Lanaye, the key lock along the Albertkanaal at the Belgian-Dutch border (BE26)

Mode/Location: IWW, Core Network

Keywords: capacity, bottleneck gauge upgrade, Meuse, freight traffic

Map

Source: TEN-T Executive Agency

Description of improvement measure:

Construction of the fourth lock at Lanaye, the key lock along the Albertkanaal at the Belgian-Dutch border. The project also includes a pumping station to offset the increase in water consumption, and a hydroelectric power plant to capitalise on the available fall of water.

Cost: € 150,000,000

Title: Seine-Scheldt East (BE27)

Mode/Location: IWW, Core Network

Keywords: capacity, capacity, bottleneck gauge upgrade, Cross border (BE-FR), freight traffic

Map

Source: Service Public de Wallonie

Description of improvement measure:

a) Lys	Improvement of the Lys in the crossing of Comines
	Enhancement of the bridge Comines
	Deepening and shoreline development
b) Upper Scheldt	Adaptation of crossing Tournai including the Pont des Trous
	Modernization dams and Kain Hérinnes
c) Pommeroeul-Condé canal	Construction of a pier at Lock Hensies
	Renovation of locks and Hensies Pommeroeul
	Dredging sediment
d) Nimy-Blaton Canal	Enlargement of the canal and modification of certain curves.
e) Canal du Centre	Construction of a new lock to class Va Obourg
f) Charleroi-Brussels canal	Construction of new locks to Viesville, Gosselies and Marchienne-au-Pont.
	Modernization of Ronquières Inclined Plane.
g) Basse Sambre	Lowering the threshold of the lock Auvelais.
h) Bridges	Upgrading of the bridges program (up to 7m gauge)
i)Inland ports j) Navigability equipment	Port infrastructure equipment Turning points/mooring equipments/adaptation of locks

Cost: € 330,000,000

Title: Seine-Scheldt network in Flanders (BE28)

Mode/Location: IWW, Core Network

Keywords: capacity, capacity, bottleneck, gauge upgrade, Cross border (BE-FR), freight traffic

Map

Source: Waterwegen en Zeekanaal

Description of improvement measure:

a) Belgian River Lys	*Enlargement of the channel*	*231,3 M€*
	Augmentation of the clearance of bridges	
	Enlargement of the locks of St-Baafs-Vijve and Harelbeke in order to get CEMT Vb	
	This river restoration plan entails various interventions in environmental quality and scenic beauty of the river (development of nature-friendly banks, construction of fish passes, reconnecting and upgrading meander cut-offs), as well as of the valley area (development of aquatic, terrestrial nature) – 2017-2020	*25,7 M€*
b) Canal Roeselare-Lys	*Upgrading of the Canal Roeselare-Lys to a class Va waterway (> 2020)*	*31,3 M€*
c) Canal Bossuit-Kotrijk	*Upgrading of the Canal Bossuit-Kortrijk: 8.5% of the total length of this canal does not yet satisfy the characteristics of class IV. It concerns three class I locks at the entrance to the canal from the Lys that need to be removed (>2020)*	*23 M€*
d) Upper-Scheldt	*Locks and weirs on the Upper-Scheldt: The locks on the Upper Scheldt at Asper, Oudenaarde and Kerkhove form a serious bottleneck regarding lock capacity and they are worn down. In order to facilitate future developments the new locks will be constructed at class Vb, like those on the Seine-Scheldt connection via the river Lys. Also the weir at Kerkhove needs to be replaced (> 2020)*	*27,9 M€*
e) Upper-Seascheldt and Southern Ghent Ring Canal	*Upgrade of the Upper-Seascheldt and the Southern section of the Ghent Ring Canal to eliminate bottlenecks hindering class IV vessels. The most important bottlenecks on the Upper-Seascheldt concern limited depth and width, as well as sharp bends. What's more there is a limited vertical clearance under several bridges (> 2020)*	*55,3 M€*
f) Canal Ghent-Oostende	*Upgrade of the Canal to CEMT class Va (2020). Class Va is planned for the Ghent-Ostend Canal downstream from Schipdonk. The rebuilding of the Dammepoort lock and the construction of the new Steenbrugge bridge in the passage through Bruges are expected to be completed by 2020. Both interventions will significantly improve navigability to Zeebrugge and also serve the traffic flow in Bruges.*	*3,2 (studies)*

Cost: € 394,500,000

Title: 'Seine-Schelde-West' project (BE29)

Mode/Location: IWW, Core Network

Keywords: new construction, accessibility, capacity, bottleneck gauge upgrade, Lys Diversion Canal, freight traffic

Map

Source: Waterwegen en Zeekanaal

Description of improvement measure:

The project 'Seine-Schelde-West' aims at giving the ports of Zeebrugge and Ostend a full connection to the Trans-European inland navigation network. The opening-up of Zeebrugge through an upgrade of the existing Lys Diversion Canal, which reaches from Heist to Deinze, is a logical extension of the large-scale European project Seine-Scheldt, which will connect the industrial region of Paris and the north of France with Ghent, Antwerpen and Rotterdam. Just like on the Seine-Scheldt, ships up to 4,500 ton or 300 TEU could be deployed.

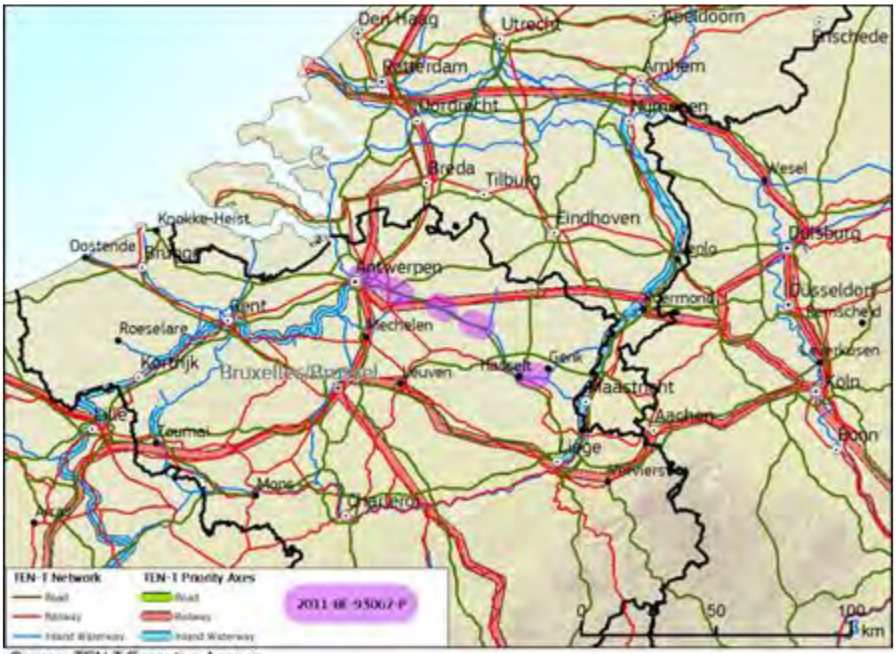
Cost: € 500,000 (only studies)

Title: Lifting of all the bridges over the Albertkanaal to a clearance height of 9,10 m (BE30)

Mode/Location: IWW, Core Network, Albertkanaal

Keywords: capacity, clearance height under bridge, Albertkanaal, freight traffic, containers

Map



Source: TEN-T Executive Agency

Description of improvement measure:

After this bridge elevation, four-layer container transport on the Albertkanaal will be possible, and the Albertkanaal will become more easily accessible for Short Sea Shipping.

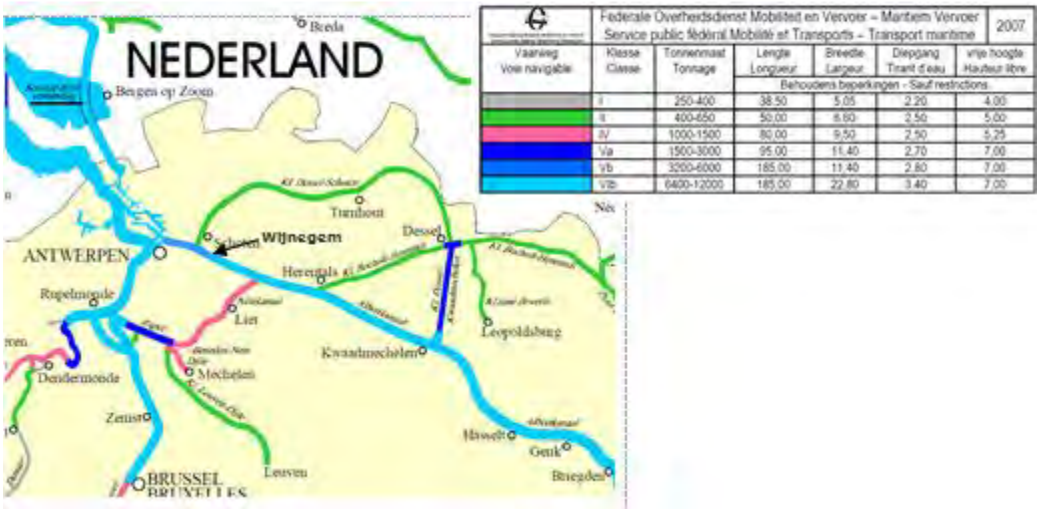
Cost: € 234,000,000

Title: Upgrade of the section Wijnegem-Antwerpen on the Albertkanaal (BE31)

Mode/Location: IWW, Core Network, Albertkanaal

Keywords: capacity, , capacity, bottleneck gauge upgrade, Albertkanaal, freight traffic

Map



Source: SPF Mobilité et Transports

Description of improvement measure:

Eliminating this bottleneck will make the Albertkanaal accessible to larger and wider ships and over its full length can be utilized fully. The project includes both the (re) construction of seven bridges in the canal section and also the widening of the canal section itself.

Cost: € 100,000,000

Title: Extension of the capacity in Wijnegem (BE32)

Mode/Location: IWW, Core Network, Albertkanaal

Keywords: lock capacity, Albertkanaal, freight traffic

Map

Source: nv De Scheepvaart

Description of improvement measure:

Capacity extension of the lock in Wijnegem.

Cost: € 100,000,000

Title: Upgrade of the Bocholt-Herentals Canal between Dessel and Bocholt from CEMT class II to CEMT class IV (BE33)

Mode/Location: IWW, Core Network

Keywords: capacity, bottleneck gauge upgrade, freight traffic, Cross border

Map

Source: www.binnenvaart.be

Description of improvement measure:

Investments to be done are :

- the replacement of three CEMT class II locks on the canal, in Lommel-Mol by one CEMT class IV lock;
- adaptation of the Bocholt-Herentals canal from Lommel to Bocholt;
- replacement of two CEMT class II locks in Bocholt and Lozen (which connect Limburg and Netherlands) by one CEMT class IV lock.

Cost: € 80,000,000

Title: Seacanal Brussels-Scheldt (BE34)

Mode/Location: IWW, Core Network

Keywords: capacity, upgrading, CEMT class Gauge, freight traffic

Map

Source: www.binnenvaart.be

Description of improvement measure:

This project still requires the completion of the canal section Willebroek-Bornem to 10,000 tonnes (class VIb). Here a number of completion works are still necessary, particularly dredging works and works on the canal banks, to enable the Brussels-Scheldt Sea Canal to function satisfactorily.

Cost: € 10,000,000

Title: Upgrade of the vertical clearance to 7m on Beneden-Nete Canal (BE35)

Mode/Location: IWW, Core Network, Beneden-Nete Canal

Keywords: capacity, vertical clearance under bridges, Beneden-Nete Canal, freight traffic, containers

Map

Source: www.binnenvaart.be

Description of improvement measure:

Upgrade the vertical clearance to 7m on Beneden-Nete Canal will enable vessels to go from the Scheldt through the Rupel (class V waterway for ships with a tonnage of 2000 tons) with 3 layers of containers.

Cost: € 5,500,000

Title: Dender, Section Aalst - Dendermonde: upgrading from Class II to Class IV (BE36)

Mode/Location: IWW, Core Network

Keywords: capacity, CEMT class Gauge, Dender, freight traffic

Map

Source: www.binnenvaart.be

Description of improvement measure:

A cost-benefit analysis (2007) showed that an upgrade of the Dender to class IV in one direction to Aalst, combined with the construction of a new container terminal in Aalst, is meaningful and offers best guarantees for the continuation and expansion of the transport function.

The upgrade of the Dender to CEMT class IV includes the renewal of the lock and weir in Denderbelle, widening the turning basin in Hofstade and creating waiting places for boats.

Cost: € 26,000,000

Title: Modernisation of the canal Brussels-Charleroi (E04) between Lembeek and Halle (BE37)

Mode/Location: IWW, Core Network

Keywords: capacity, freight traffic

Map

Description of improvement measure:

Modernisation of canal Brussels-Charleroi between Lembeek and Halle: thorough renovation of the outdated waterway infrastructure and raising of bridges.

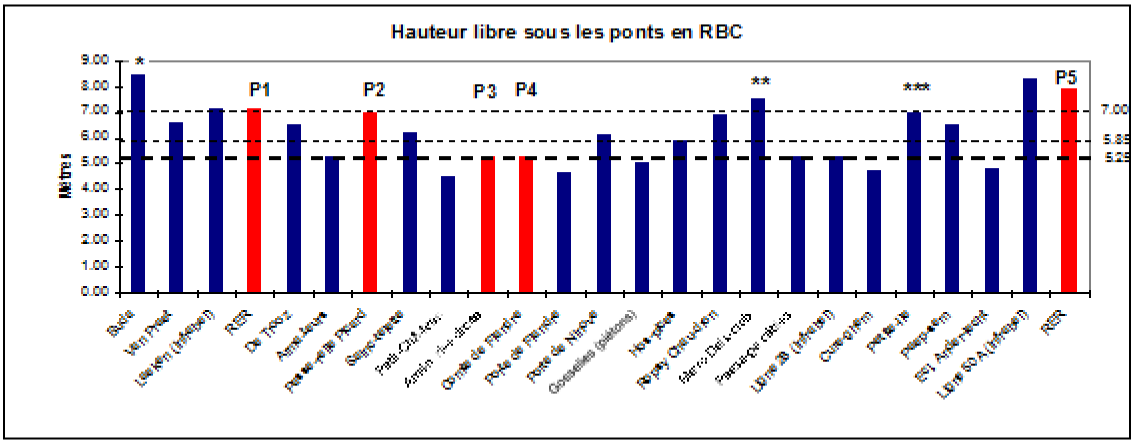
Cost: € 36,000,000

Title: Increase of the clearance of bridges in Brussels (BE38)

Mode/Location: IWW, Core Network

Keywords: capacity, clearance height under bridges, Brussels, freight traffic, containers

Map



Source : tableau synoptique du Port de Bruxelles

* le pont de Buda a une hauteur libre de 2,09m au niveau bas, de 8,45m à un premier niveau de levage et de 34,47m au maxium lorsqu'il est complètement levé

** le pont métro Delacroix a une hauteur libre qui varie de 6,50m à 8,50m (7,50m au milieu de la passe navigable)

*** le pont de Petit-Ile, d'une hauteur libre actuelle de 5,77m, va être remplacé (appel d'offres en cours) par un pont haubanné d'une hauteur libre de 7,00m

Px projets: 1 - Nouveau pont Infrabel pour le RER (idem pont de Laeken existant) sur les piles et culées existantes
2 - Passerelle Picard - Nouveau pont haubanné prévu pour le passage de trams, bus, piétons et cyclistes
3 - Réalisation d'un trottoir en encorbellement sur le canal entre les ponts du Petit-Château et de la Porte de Flandre (rive droite)
4 - Réalisation d'une plate-forme pour piétons et cyclistes, au dessus du canal, en face de la station Comte de Flandre
5 - Nouveau pont Infrabel pour le RER (dédoublement de l'actuel pont de la ligne 50A)

Source: STRATEC

Description of improvement measure:

Studies have been made to compare different scenarios of raising bridges in Brussels. A minimum clearance of 5,25 m is recommended.

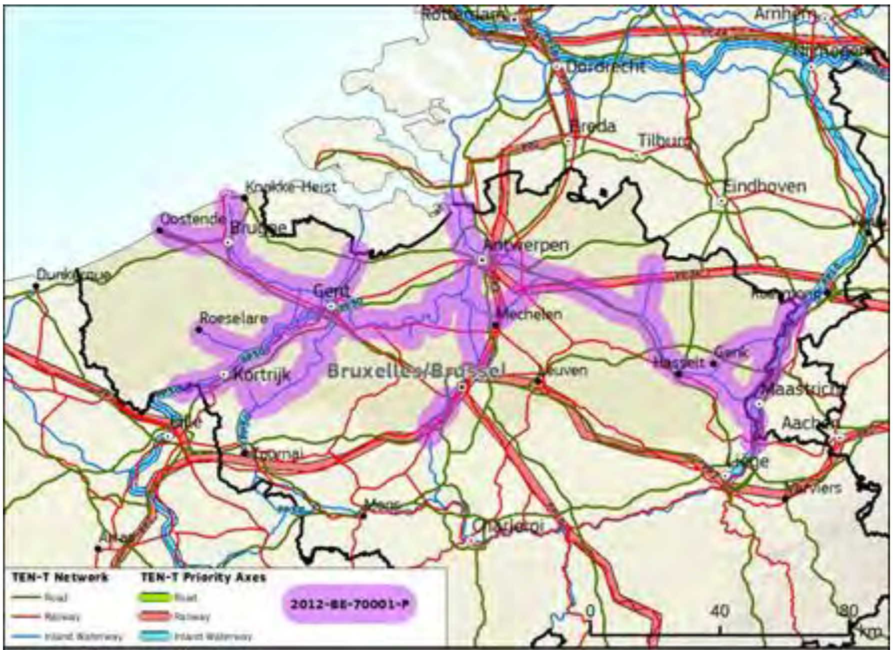
Cost: € 17,700,000 - € 50,600,000

Title: Implementation of River Information Services (RIS) in Flanders (BE39)

Mode/Location: IWW, Core Network

Keywords: River Information Services, freight traffic

Map



Source: TEN-T Executive Agency

Description of improvement measure:

On the Flemish waterways are already implemented many RIS services. The objective of the Global Project "RIS" is to contribute to making inland navigation a safer and more efficient mode of freight transport. In Flanders, RIS is further developed in accordance with European guidelines and standards in order to improve traffic flow, reliability, efficiency and safety of navigation on the Flemish waterways. The before mentioned purpose can be reached by using intelligent and interoperable basic services by the skipper for a fast, accurate and user-friendly communication and information transfer between the waterway manager and all partners in the supply chain.

Cost: € 15,000,000

Title: Implementation of River Information Services (RIS) in Wallonia (BE40)

Mode/Location: IWW, Core Network

Keywords: River Information Services, freight traffic

Map

Description of improvement measure:

Implementation of River Information Services (RIS) in Wallonia – including RIS Center

Cost: € 15,000,000

Title: New, second sea lock in Terneuzen (BE41)

Mode/Location: seaport/IWW, Terneuzen, Core network

Keywords: accessibility, capacity, Cross-border, Ghent-Terneuzen Canal, freight traffic, sea-going vessels

Map

Source: TEN-T Executive Agency

Description of improvement measure:

The Netherlands and Flanders, under the flag of the Flemish-Dutch Scheldt Commission, together prepare the construction of a new sea lock at Terneuzen. The new lock will improve the access for seagoing vessels to the ports of Ghent and Terneuzen and will ensure a smooth transit of inland vessels between The Netherlands, Belgium and France.

Cost: € 930,000,000

France

Title: Upper Rhine a connected corridor - study on capacity and connectivity upgrades for Port autonome de Strasbourg (FR01)

Mode/Location: road-rail-IWW, Mannheim – Basel,Upper Rhine

Keywords: infrastructure and operational/administrative bottleneck, freight, upgrading measure, under study, EU/port funds

Map

Description of improvement measure:

Starting point: communication as well as capacity and connectivity to the 3 modes of inland ports should be upgraded.

Improvement measure:for the purposes of this project, the nine ports of the Upper Rhine Region cooperatively examine possible synergies and operative modalities for the modal shift to develop the water and rail connections among themselves and also with large seaports and all large freight transport corridors that traverse the Upper Rhine.

The project's aim is to obtain a more coherent and more efficient transport policy in the Upper Rhine Region. Especially the already existing long-term strategy documents that were written by infrastructural operators, public authorities and territorial units, shall be combined and complemented by additional studies.For the purposes of this project, the nine ports of the Upper Rhine Region cooperatively examine possible synergies and operative modalities for the modal shift to develop the water and rail connections among themselves and also with large seaports and all large freight transport corridors that traverse the Upper Rhine.

The starting year for construction is 2015.

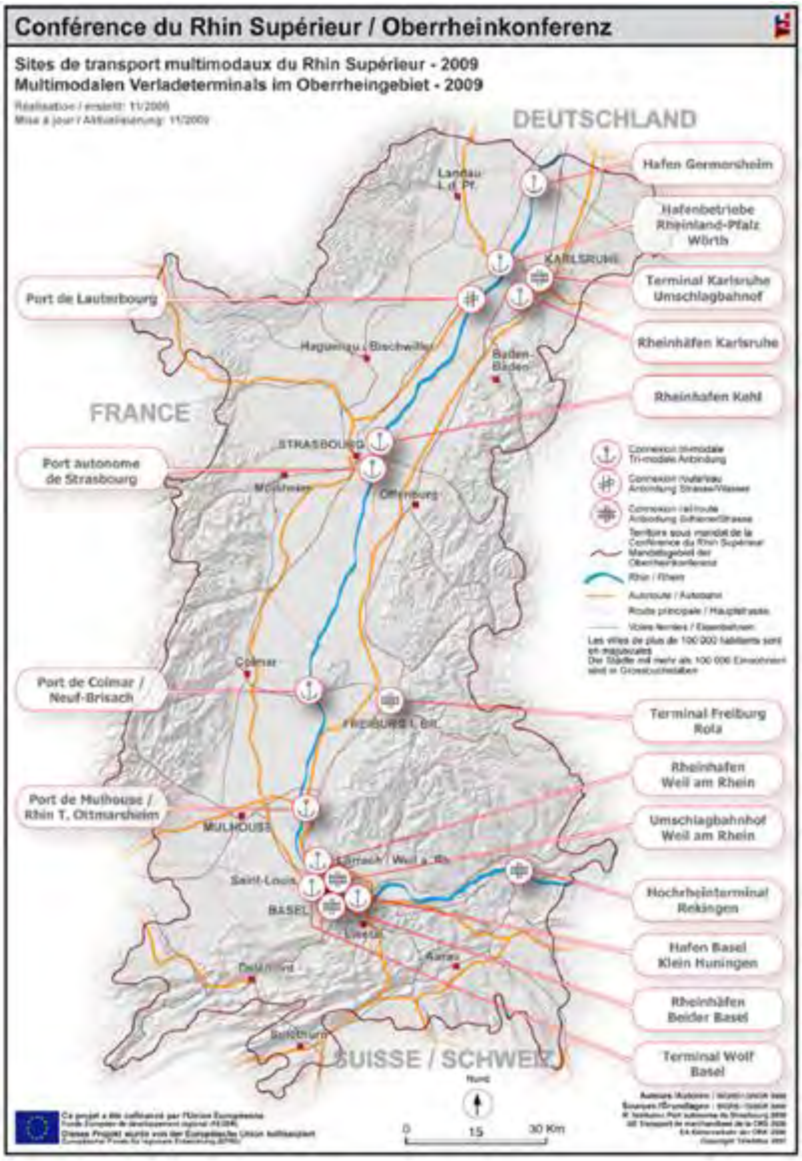
Cost: under study

Title: Etude approfondie portant sur l'élaboration d'un concept pour la navigation et les ports intérieurs du Bade-Wurtemberg for Bade-Wurtemberg Minister of the Interior (FR02)

Mode/Location: road, rail, IWW / Ludwigshafen - Basel- Upper Rhine (FR – DE – CH)

Keywords: 2010, corridor 6/8, business, capacity barrier, existing infrastructure, operational, administrative bottleneck, freight transport, upgrading measure, under study

Map



Description of improvement measure:

Starting point: Due to residual capacity of inland waterways and inland ports in Upper Rhine, the Minister of Interior of Bade-Wurtemberg commissioned a study to design a concept for boosting IWW transport and freight traffics in inland ports in Bade-Wurtemberg.

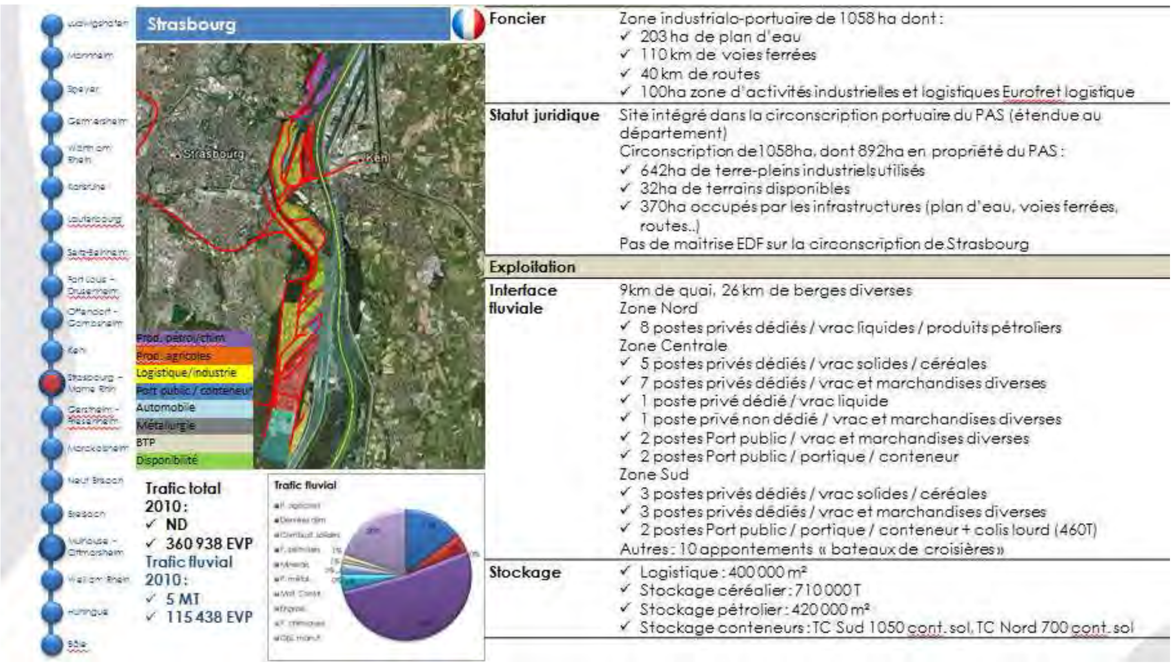
Cost: not specified

Title: Schéma d'orientation portuaire du bassin du Rhin (FR03)

Mode/Location: road, rail, IWW (FR – DE)

Keywords: 2013, rhine, masterplan

Map



Description of improvement measure:

The French Rhine ports are considered both as transport infrastructure aspiring to revitalize the river freight and railway, but also as a vehicle for economic development, including industrial, to have a positive impact in terms of jobs. By 2025, significant potential trafficking were identified for ports French Rhine (+ 67.5%, with a 3.5-fold increase in container traffic). There realization of this potential depends, essentially, on the realization of shares proactive. reflections on the evolution of governance Rhine ports French to close the model "landlord" dominant on the Rhine, strengthen their performance and increase their vitality, in conjunction with neighboring ports German and Swiss and seaports (French and European). these reflections today moving towards the creation of river port companies. It is also important to create all the conditions for ports to establish when relevant, cross-border partnerships with neighboring ports. Coordination at the basin scale, initiated under this scheme, should help ensure the consistency of the strategy between ports share objectives at all local actors, monitoring plans shares, or to wear certain actions pooled. This coordination is intended to involve all stakeholders Rhine higher from Basel to Karlsruhe through Mulhouse, Colmar and Strasbourg. it today is already engaged in the framework of the TEN-T study of nine ports French, German and Swiss on "consolidation and strengthening of the Rhine corridor higher as the central hub for the TEN-T network

Cost: not specified

Germany

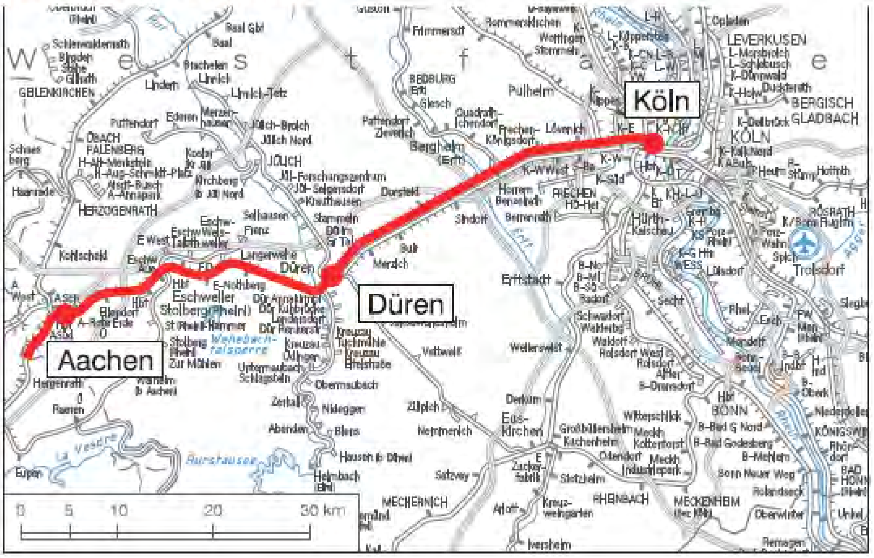
Title: Verkehrsinvestitionsbericht 2011 Schiene (DE01)

Mode/Location: rail, Aachen-Köln

Keywords: infrastructure bottleneck, passenger/freight, upgrading measure, under construction

Map

B.4.14 Projekt Nr. 15 – ABS Köln–Aachen



Description of improvement measure:

ABS Köln -Aachen (project No. 15): upgrade for high speed, extension partly 3 tracks

Construction started in 1996.

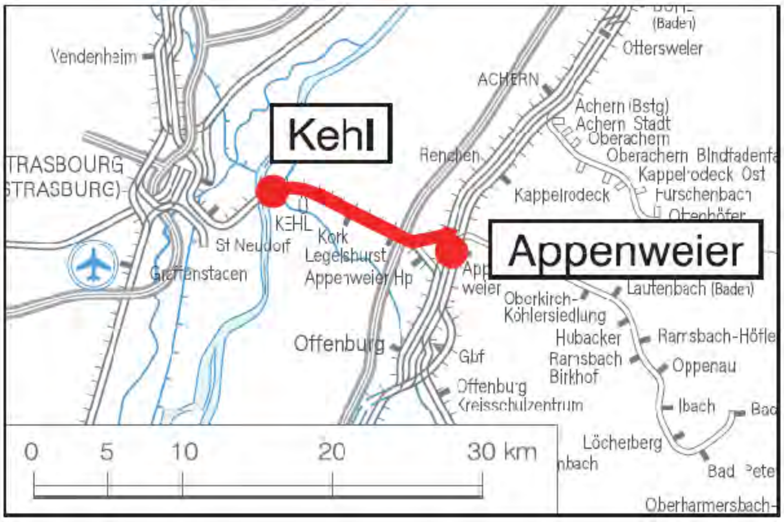
Cost: € 952.000.000

Title: Verkehrsinvestitionsbericht 2011 Schiene (DE02)

Mode/Location: rail, Kehl-Appenweier

Keywords: infrastructure bottleneck, passenger/freight, upgrading measure, under construction

Map



Description of improvement measure:

ABS Kehl-Appenweier (project No. 17): upgrade for 160 km/h, construction of a new bridge across the Rhine.

The study covers both corridors 6 and 9.

Construction started in 2008.

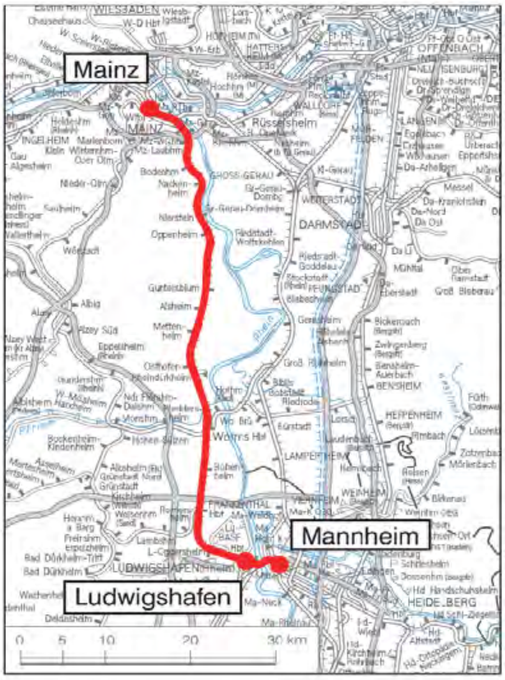
Cost: € 145,000,000

Title: Verkehrsinvestitionsbericht 2011 Schiene (DE03)

Mode/Location: rail, Mainz-Mannheim

Keywords: infrastructure bottleneck, passenger/freight, upgrading measure, under construction

Map



Description of improvement measure:

ABS Mainz-Mannheim (project No. 18): capacity extension.

Construction started in 1997 and is expected to end in 2015.

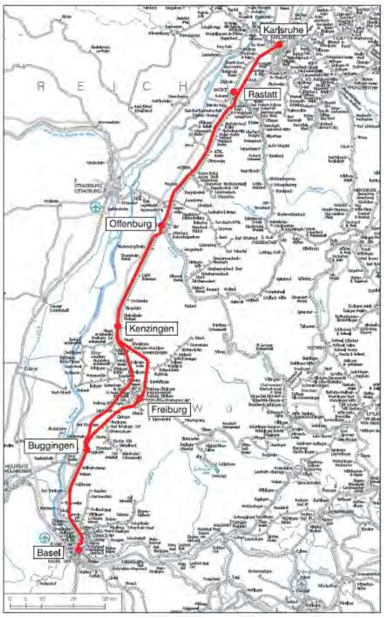
Cost: € 235,000

Title: Verkehrsinvestitionsbericht 2011 Schiene (DE04)

Mode/Location: rail, Karlsruhe - Offenburg- Freiburg - Basel

Keywords: infrastructure bottleneck, passenger/freight, upgrading measure, under construction

Map



Description of improvement measure:

ABS/NBS Karlsruhe - Offenburg- Freiburg - Basel (project No. 25): capacity extension and reduction of travel time (3rd and 4th track).

Construction started in 1990.

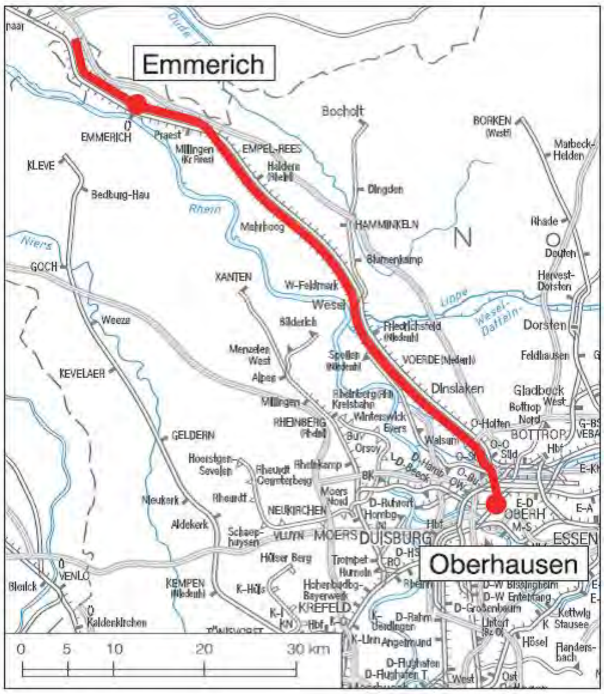
Cost: € 6,172,000,000

Title: Verkehrsinvestitionsbericht 2011 Schiene (DE05)

Mode/Location: rail, Emmerich - Oberhausen

Keywords: infrastructure bottleneck, passenger/freight, upgrading measure, under construction

Map



Description of improvement measure:

Emmerich - Oberhausen (project No. 9): improvement of the Dutch-German passenger and freight traffic by extension of capacity (third track Oberhausen-Emmerich and new curve Oberhausen, electronic control centre, concentration of train succession)

Construction started in 2005.

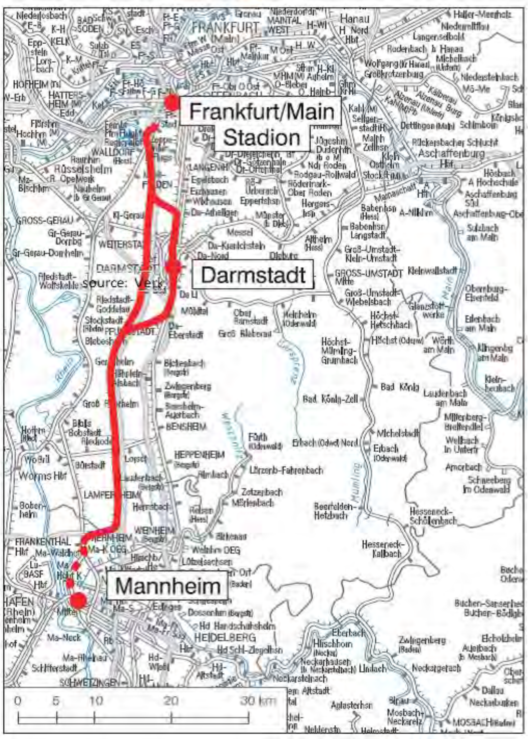
Cost: € 1,711,000,000

Title: Verkehrsinvestitionsbericht 2011 Schiene (DE06)

Mode/Location: rail, Frankfurt – Mannheim (Rhein/Main - Main-Rhein/Neckar)

Keywords: infrastructure bottleneck, passenger/freight, upgrading measure, planned

Map



Description of improvement measure:

NBS Rhein/Main - Main-Rhein/Neckar (project No. 13): reduction of travel times, elimination of bottlenecks, construction of new double track Zeppelinheim-Mannheim incl. integration of Darmstadt (1 track).

The construction works are planned to start in 2017.

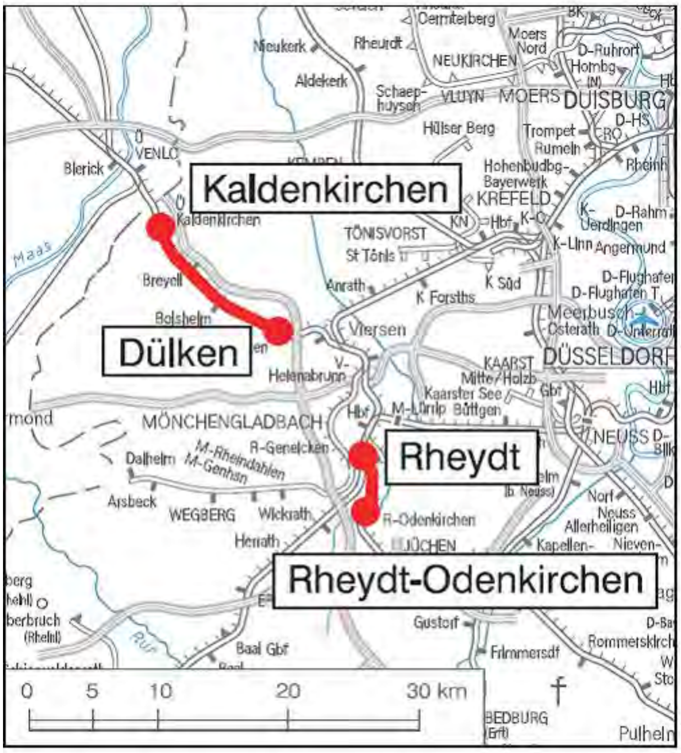
Cost: € 2,183,000,000

Title: Verkehrsinvestitionsbericht 2011 Schiene (DE07)

Mode/Location: rail, Venlo - border NL/DE - Kaldenkirchen - Viersen/Rheydt-Reydt-Odenkirchen

Keywords: infrastructure bottleneck, passenger/freight, upgrading measure, planned

Map



Description of improvement measure:

ABS Venlo - Kaldenkirchen - Viersen/Rheydt-Rheydt-Odenkirchen (project No. 19): capacity extension (second track between Kaldenkirchen-Dülken and Rheydt-Rheydt-Odenkirchen).

The upgrading works have not yet started (planned).

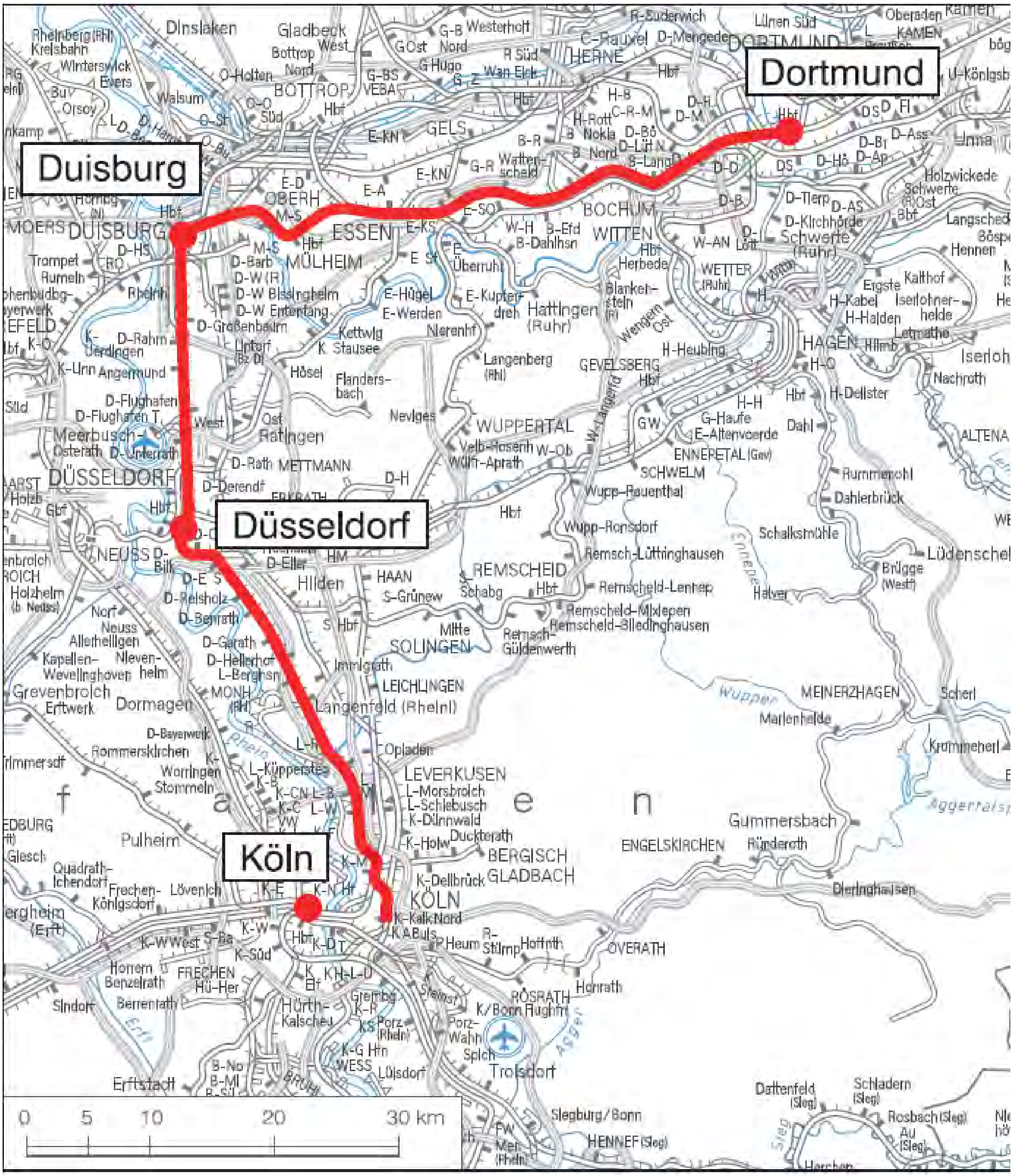
Cost: € 140,000,000

Title: Verkehrsinvestitionsbericht 2011 Schiene (DE08)

Mode/Location: rail, Duisburg-Köln

Keywords: infrastructure bottleneck, passenger, upgrading measure, under construction

Map



Description of improvement measure:

ABS Düsseldorf-Duisburg and extension of nodes between Köln and Dortmund (project No. 20): addtional tracks: six tracks between Düsseldorf and Duisburg, four tracks between Köln and Düsseldorf-Benrath.

The upgrading works have not yet started (planned).

Cost: € 140,000,000

Title: Fünfjahresplan für den Ausbau der Bundesfernstraßen 2011 – 2015 - Projektliste und Erläuterungen – for BMVBS (DE09)

Mode/Location: roads:

A5 (AS Offenburg - AS Baden-Baden, 6-lane upgrade);

A3 (AS Köln/Dellbrück - AS Köln/Mülheim, 8-lane upgrade);

A4 (AS Düren - AS Kerpen, 6-lane upgrade);

A3 (AS Köln/Mülheim - AS Leverkusen, 8-lane upgrade);

A3 (AS Leverkusen - AK Leverkusen, 8-lane upgrade)

Keywords: extension of traffic lanes, infrastructure bottleneck, passenger/freight, upgrading measure, several works, under construction/planned, public private partnership

Map

Description of improvement measure:

The objective of the improvement measures is mainly extension of traffic lanes in order to reduce travel times, eliminate bottlenecks, avoid traffic jams

Different construction planning; some works have already started while others are planned.

Investment costs :

€ 126,300,000 for A5

€ 75,650,000 for A3

€ 84,200,000 for A4

€ 32,100,000 for A3

The last upgrade for A3 investment costs is not yet identified.

Title: Lkw-Parken in einem modernen, bedarfsgerechten Rastanlagensystem – for BMVBS (DE10)

Mode/Location: all roads:

A5 (km 561.80 Wachenburg, km 615.50 Höfenschlag, km 664.20 Oberfeld, km 675.40 Feldmatt, km 794.10 Bad Bellingen)

A3 (km 140.20 Theißtal)

Keywords: increasing parking capacities, infrastructure bottleneck, passenger/freight, new construction measure, several works, completed/under construction/planned, public private partnership

Map

Description of improvement measure:

The objective of the improvement measure is to increase the number of parking areas on main traffic routes mentioned above.

Different construction planning; some works are already completed while others are planned.

Investment costs : circa €250,000,000

Title: Erstellung eines Entwicklungskonzeptes KV 2025 in Deutschland als Entscheidungshilfe für die Bewilligungsbehörden – for BMVBS (DE11)

Mode/Location: Terminals in different countries/terminal areas in Basel, Duisburg, Frankfurt am Main/Mainz, Karlsruhe, Koblenz, Köln, Mannheim/Ludwigshafen, Neuss/Düsseldorf, Stuttgart

Keywords: increasing terminal handling capacity according to market needs, infrastructure bottleneck, freight, upgrading/new construction measure, under construction/planned, state and private budget

Map

Description of improvement measure:

Elaboration of a development strategy for combined transport in Germany until 2025 as decision basis for the grant authorities for the funding of building or the extension of terminals.

Different construction planning: some works have already started while others are planned.

Investment costs: depending on the applicant

Title: Study on unaccompanied combined transport of semitrailers through Switzerland for UIRR (DE12)

Mode/Location: Rail / Southern-feeder route to the Gotthard Base Tunnel (DE – IT – CH)

Keywords: 2012, freight and passenger transport, infrastructure bottleneck, upgrading measure, under study

Map

Description of improvement measure:

Study on unaccompanied combined transport of semitrailers through Switzerland. The study provides a comparison of costs for new transhipment and wagon technologies with costs of infrastructure investments

Starting point: If the feeder routes to the major CT terminals in the Milano area have not been upgraded appropriately by completion of Gotthard tunnel, it will not be possible to exploit the full capacity of the Gotthard line. This applies not only to route capacity as such, but also – and chiefly – to the loading gauge, which currently does not allow the transportation of semitrailers with a height of four meters, in contrast to the situation on the Lötschberg axis where limited line capacity is available.

Investment cost: 950 million CHF (of which about 30% are for passenger transport)

Title: Entwicklungskonzept Kombinierter Verkehr 2025 in Deutschland for Bundesministerium für Verkehr, Bau- und Stadtentwicklung (DE13)

Mode/Location: Rail, IWW, intermodal terminals / Germany

Keywords: All corridors, freight transport, infrastructure bottleneck, upgrading measure, completed in 2025

Map

Description of improvement measure:

Bottleneck analysis for 2010 and 2025 and deduction of necessary capacity development

Investment costs: n/a

Title: Evaluierung der KV Förderrichtlinie for the Bundesministerium für Verkehr, Bau- und Stadtentwicklung (DE14)

Mode/Location: Rail, IWW, intermodal terminals / Germany

Keywords: All corridors, freight transport, infrastructure bottleneck, (existing and forecasted), upgrading measure, completed in 2025

Map

Description of improvement measure:

Development of necessary investments for intermodal terminals based on bottleneck analysis for 2010 and 2025 and deduction of necessary capacity development

Investment cost: n/a

Title: Evaluierung Gleisanschlussförderrichtlinie for the Bundesministerium für Verkehr, Bau- und Stadtentwicklung (DE15)

Mode/Location: Rail / Germany

Keywords: All corridors, freight transport, infrastructure bottleneck, upgrading measure, completed in 2025

Map

Description of improvement measure:

Development of single wagon traffic

Investment cost: n/a

Title: Masterplan Güterverkehr und Logistik Deutschland for the Bundesministerium für Verkehr, Bau- und Stadtentwicklung (DE16)

Mode/Location: All modes / Germany

Keywords: All corridors, freight transport, infrastructure bottleneck, completed

Map

Description of improvement measure:

Study on the development of the logistics market in Germany.

Investment cost: n/a

Title: Prognose der deutschlandweiten Verkehrsverflechtungen 2025 for the Bundesministerium für Verkehr, Bau- und Stadtentwicklung (DE17)

Mode/Location: All modes / Germany

Keywords: All corridors, freight and passenger transport, existing and future infrastructure bottlenecks, completed

Map

Description of improvement measure:

Study on bottleneck analysis and development of traffic infrastructure in Germany by 2025.

Investment cost: n/a

Title: Grundkonzeption für den Bundesverkehrswegeplan 2015 for the Bundesministerium für Verkehr, Bau- und Stadtentwicklung (DE18)

Mode/Location: All modes / Germany

Keywords: All corridors, freight and passenger transport, existing and future infrastructure bottlenecks, completed

Map

Description of improvement measure:

The study provides the basis analysis for the next German Bundesverkehrswegeplan 2030.

Investment cost: n/a

Title: Investitionsrahmenplan 2011 – 2015 für die Verkehrsinfrastruktur des Bundes (IRP) for the Bundesministerium für Verkehr, Bau- und Stadtentwicklung (DE19)

Mode/Location: All modes / Germany

Keywords: All corridors, freight and passenger transport, existing and future infrastructure bottlenecks, completed

Map

Description of improvement measure:

Definition of infrastructure development projects in Germany 2011-2015

Investment cost: n/a

Title: Sozio-ökonomische und verkehrspolitsche Rahmenbedingungen der Verkehrsprognose im Rahmen der Verkehrsverflechtungen 2030 sowie Netzumlegungen der Verkehrsträger for the Bundesministerium für Verkehr, Bau- und Stadtentwicklung (DE20)

Mode/Location: All modes / Germany

Keywords: All corridors, freight and passenger transport, existing and future infrastructure bottlenecks, completed

Map

Description of improvement measure:

Definition of infrastructure development projects in Germany 2011-2015.

Investment cost: n/a

Title: Fünfjahresplan für den Ausbau der Bundesfernstraßen 2011 – 2015 - Projektliste und Erläuterungen - for the Bundesministerium für Verkehr, Bau- und Stadtentwicklung (DE21)

Mode/Location: Road / Germany

Keywords: All corridors, freight and passenger transport, existing and future infrastructure bottlenecks, completed

Map

Description of improvement measure:

Determination of road infrastructure projects in Germany

Investment cost: n/a

Title: Fünfjahresplan für den Ausbau der Schienenwege des Bundes 2011-2015 (Projektliste mit

Erläuterungen) for the Bundesministerium für Verkehr, Bau- und Stadtentwicklung (DE22)

Mode/Location: Rail / Germany

Keywords: All corridors, freight and passenger transport, existing and future infrastructure bottlenecks, completed

Map

Description of improvement measure:

Determination of road infrastructure projects in Germany

Investment cost: n/a

Title: Verkehrsverflechtungsprognose 2030 - Los 2 - Seeverkehrsprognose - Eckwerte derHafenumschlagsprognose for the Bundesministerium für Verkehr, Bau- und Stadtentwicklung (DE23)

Mode/Location: Sea ports / Germany

Keywords: All corridors, freight transport, existing and future infrastructure bottlenecks, completed

Map

Description of improvement measure:

Basis for the next German Bundesverkehrswegeplan 2030, focus on maritime transport and seaport infrastructure

Investment cost: n/a

Title: Die zukünftige Rolle des Schienenverkehrs in einer nachhaltigen Mobilität - Potenziale, Risiken und Handlungsoptionen for the Bundesministerium für Verkehr, Bau- und Stadtentwicklung (DE24)

Mode/Location: Rail / Germany

Keywords: All corridors, freight transport, infrastructure bottlenecks, completed

Map

Description of improvement measure:

Study on the future role of rail transport in sustainable mobility - Potential, Risks and Policy Options

Investment cost: n/a

Title: Gutachten zur Erhöhung der Wettbewerbsfähigkeit der Binnenhäfen for Hans Böckler Stiftung (DE25)

Mode/Location: Inland ports / Germany

Keywords: All corridors, freight transport, existing and future infrastructure bottlenecks, completed

Map

Description of improvement measure:

Study on the development of inland ports.

Investment cost: n/a

Title: Verkehrsinvestitionsbericht für das Berichtsjahr 2012 for the Bundesministerium für Verkehr, Bau- und Stadtentwicklung (DE26)

Mode/Location: All modes / Germany

Keywords: All corridors, freight and passenger transport, existing and future infrastructure bottlenecks, completed

Map

Description of improvement measure:

Definition of infrastructure development projects in Germany 2012-2015

Investment cost: n/a

Title: Projekt "Langstreckenverkehre optimieren" Schlussbericht for the Bundesministerium für Verkehr, Bau- und Stadtentwicklung (DE27)

Mode/Location: All modes / Germany

Keywords: All corridors, freight and passenger transport, existing and future infrastructure bottlenecks, completed

Map

Description of improvement measure:

International freight transport through Germany 2007-2025

Investment cost: n/a

Title: Reducing Railway Noise Pollution (DE28)

Mode/Location: Rail / Germany

Keywords: All corridors, freight and passenger transport, existing and future infrastructure bottlenecks, completed

Map

Description of improvement measure:

Study on the heavy noise pollution due to rail freight transport

Investment cost: n/a

Switzerland

Title: FABI: Botschaft zur Initiative "Für den öffentlichen Verkehr" und zum direkten Gegenentwurf for the Federal Government (CH01)

Mode/Location: rail, Basel-Simplon-Domodossola-Corridor, Sections Basel-Pratteln, Liestal, Gümligen-Münsigen, Cantons Baselstadt, Baselland and Bern

Keywords: infrastructure and operational bottleneck (forecasted), passenger/freight, upgrading measure, planned, federal funding

Map

Description of improvement measure:

Starting point: combined expected growth in passenger and freight services will result in bottlenecks.

Improvement measure: planning foresees construction of flyovers in the Basel-Pratteln area, an extended station in Liestal, measures to adapt capacity in the Berne area (e.g. fly-over in Berne-Wankdorf) and additional tracks between Gümligen and Münsingen. Longterm-planning includes also further double-tracking in the Lötschberg base tunnel.

The work is planned to start in 2014.

Cost: 5,370,000,000€

Title: Federal Government of Switzerland: FABI - Botschaft zur Initiative "Für den öffentlichen Verkehr" und zum direkten Gegenentwurffor the Federal Government (CH02)

Mode/Location: rail, Basel-Gotthard-Ticino-Corridor, 4m-corridor Basel-Bözberg-Chiasso, extension of Lugano station,

Keywords: infrastructure and operational bottleneck (forecasted), passenger/freight, upgrading measure, planned, federal funding

Map

Description of improvement measure:

Starting point: combined expected growth in passenger and freight services will result in bottlenecks.

Improvement measure: to enable the transport of 4m high road vehicles on rails, a large number of adaptions are necessary along the line. This includes the construction of a new Bözberg-tunnel replacing the existing one, which doesn't have the adequate profile. The extension of the Lugano station will be for passenger trains.

The work is planned to start in 2014.

Cost: 5,370,000,000€

Title: Federal Office of Transports / Ports of Switzerland: Rheinschifffahrt und Schweizerische Verlagerungspolitik for BAV Federal Office of Transport / Ports of Switzerland (CH03)

Mode/Location: inland waterway port, Rotterdam-Basel-Italy, Basel/Birsfelden/Muttenz,

Keywords: none

Map

Description of improvement measure:

Starting point: harbour infrastructure in Basel/Birsfelden/Muttenz, road and rail access to Swiss midland logistic centre, to a lesser extend also transalpine rail axis.

Improvement measure: Swiss ports cater mainly to the Swiss import-export market and are only responsible for 7% of the goods ferried onwards on transalpine transports on road or rail. According to the study this will not be changed in the future. The most relevant road and rail links are thus those which connect Basel to the Swiss midlands + harbour infrastructure. Note: it should be mentioned that this study has been realized in 2010. Since then, the idea of the construction of a new trimodal container terminal in Basel-Kleinhünigen has been introduced.

The work plan is not known.

Cost: not known

Title: Federal Goverment: Botschaft zum Bau und zur Finanzierung eines 4m-Korridors auf den Zufaufstrecken der NEAT zum Gotthard for the Federal Government (CH04)

Mode/Location: rail, Basel-Gotthard-Ticino-Corridor, 4m-corridor Basel-Bözberg-Chiasso, extension of Lugano station,

Keywords: infrastructure bottleneck (forecasted), passenger/freight, upgrading measure, planned, federal funding

Map

Description of improvement measure:

Starting point: 4m-allowance expected to boost transfer of trucks from road to rail

Improvement measure: currently 4m high lorries may only be transported on piggyback-trains on the Lötschberg-corridor. This line is used by other services - both freight and passenger. As a result, capacity is restricted and train paths allocated to operators do not always suffice the quality standards. By upgrading the Gotthard-line to that same standard additional capacity and flexibility is been created. As opposed to the Lötschberg-line, the Gotthard-line has very low gradients and there is no requirement for zigzag-railroading.

The work is planned to start in 2020.

Cost: 1,000,000,000€

Title: IVT Institute for Transport Planning and Systems / ETH Zürich:Studie Infrastruktur Landverkehr - Modul 1: Engpassanalyse Infrastruktur for Verband der verladenden Wirtschaft VAP / CargoForum Schweiz (CH05)

Mode/Location: rail / road, Basel-Simplon-Domodossola-Corridor, Sections Liestal-Olten, Bern-Thun and Lötschberg base tunnel, Cantons of Baselland, Solothurn, Bern and Valais

Keywords: infrastructure and operational bottleneck (forecasted), passenger/freight, upgrading measure, planned, federal funding

Map

Description of improvement measure:

Starting point: two sections between Liestal and Olten are expected to be beyond capacity by 2030 if no measures are undertaken (especially Tecknau to Olten = 101%). Between Frutigen and St. German (Lötschberg base tunnel on the Bern-Brig-Line) capacity will also be tight.

Improvement measure: currently no measures planned (however adjacent section in Liestal will be extended from 2 to 4 tracks by 2030). The Lötschberg base tunnel can be bypassed by the old line via Kandersteg (longer and more sinuous).

The work plan is not known.

Cost: not known

Title: Federal Office of Transports: Eisenbahn-Grossprojekte – Standbericht - Federal Government - Federal Office of Transport (BAV) (CH06)

Mode/Location: rail, several locations

Keywords: infrastructure and operational bottleneck (forecasted), passenger/freight, upgrading measure, planned, federal funding

Map

Description of improvement measure:

Starting point: Gotthard base tunnel (57 km, two tubes). Boring of the tunnel and construction has been completed, track-laying and installation of technical equipment is under way. The Ceneri base tunnel (15km, two tubes) is 2/3 completed. It allows the operators to run train on low gradients through Chiasso. As opposed to the existing Luino-line, this line is entirely double-tracked and currently handles 2/3 of the freight volume.

Improvement measure: the new Gotthard base tunnel will enable the operators to use an entirely flat line between Basel and the southern Italian border. Before the opening of the Ceneri base tunnel, this is being achieved by travelling through Luino. In addition, the Ceneri base tunnel will allow operators to run their trains on a flat line between Basel and Chiasso.

The work is planned to start in 2020.

Cost: € 10,100,000

Title: Bundesbeschluss über das zweite Programm zur Beseitigung von Engpässen im National-strassennetz und über die Freigabe der Mittel (CH07)

Mode/Location: road, Intersection Basel Wiese - Intersection Basel Hagnau, City motorway in Basel

Keywords: infrastructure bottleneck (existing and forecasted), passenger / freight, upgrading measure, under study, state funding

Map

Description of improvement measure:

Starting point: capacity bottleneck. Demand exceeds capacity to 20% or more in 2030

Improvement measure: infrastructure upgrading

The work plan is open.

Cost: not known

Title: Bundesbeschluss über das zweite Programm zur Beseitigung von Engpässen im Nationalstrassennetz und über die Freigabe der Mittel (CH08)

Mode/Location: road, Intersection Basel Hagnau - Intersection Augst, Intersection Hagnau - connection Liestal, Agglomeration Basel

Keywords: infrastructure bottleneck (existing and forecasted), passenger/freight, upgrading measure, under study, state funding

Map

Description of improvement measure:

Starting point: capacity bottleneck. Demand exceeds capacity to 20% or more in 2030

Improvement measure: infrastructure upgrading

The work plan is open.

Cost: not known

Title: Bundesbeschluss über das zweite Programm zur Beseitigung von Engpässen im Nationalstrassennetz und über die Freigabe der Mittel (CH09)

Mode/Location: road, Intersection Härkingen - Intersection Wiggertal, Intersection motorway n. 1 (west - east) and n. 2 (north - south)

Keywords: infrastructure bottleneck (existing and forecasted), passenger/freight, upgrading measure, under construction, state funding

Map

Description of improvement measure:

Starting point: capacity bottleneck. Demand exceeds capacity to 20% or more in 2030.

Improvement measure: infrastructure upgrading.

The work plan is from 2011 to 2014.

Cost: not known

Title: Bundesbeschluss über das zweite Programm zur Beseitigung von Engpässen im Nationalstrassennetz und über die Freigabe der Mittel (CH10)

Mode/Location: road, Intersection Wiggertal - Intersection Rotsee, Connection Sempach - Connection Emmen nord, Lucerne back country - agglomeration

Keywords: infrastructure bottleneck (existing and forecasted), passenger/freight, no measure

Map

Description of improvement measure:

Starting point: capacity bottleneck. Demand exceeds capacity up to 10% in 2030.

Improvement measure: no measures are taken/planned.

Title: Bundesbeschluss über das zweite Programm zur Beseitigung von Engpässen im Nationalstrassennetz und über die Freigabe der Mittel (CH11)

Mode/Location: road, Intersection Rotsee - Intersection Lopper, City motorway in Lucerne

Keywords: infrastructure bottleneck (existing and forecasted), passenger/freight, upgrading measure, under study, state funding

Map

Description of improvement measure:

Starting point: capacity bottleneck. Demand exceeds capacity to 10% up to 20% in 2030.

Improvement measure: infrastructure upgrading.

The work plan is open.

Cost: not known

Title: Botschaft zur Änderung des Bundesgesetzes über den Strassentransitverkehr im Alpengebiet (Sanierung Gotthard-Strassentunnel) (CH13)

Mode/Location: road, Connection Göschenen - Connection Airolo, Gotthard Tunnel, Bidirectional tunnel

Keywords: infrastructure bottleneck (existing and forecasted), passenger / freight, rehabilitation measure, understudy, state funding

Map

Description of improvement measure:

Starting point: seasonal / week-end capacity bottlenecks. Complete rehabilitation of the tunnel necessary (horizon: 2020 - 2025).

Improvement measure: complete structural rehabilitation necessary. Two possibilities: 1) construction of a new tunnel without increasing the transit capacities (closing of the tunnel during 4-5 months), 2) closing of the tunnel during 2.5 up to 3.5 years. Government will support a second tunnel. Referendum almost sure.

The work plan is open.

Cost: not known

Title: Bundesbeschluss über das zweite Programm zur Beseitigung von Engpässen im National-strassennetz und über die Freigabe der Mittel (CH14)

Mode/Location: road, Intersection Bellinzona - CH-I border Chiasso, Connection Lugano sud - Connection Mendrisio, Agglomeration Lugano

Keywords: infrastructure bottleneck (existing and forecasted), passenger/freight, upgrading measure, under study, state funding

Map

Description of improvement measure:

Starting point: capacity bottleneck. Demand exceeds capacity to 10% up to 20% or more in 2030**.**

Improvement measure: infrastructure upgrading.

The work plan is open.

Cost: not known

Title: Media communication Swiss Federal Roads Office (CH15)

Mode/Location: inland waterways, road, CH-D border Basel - Intersection Basel Hagnau (dir. South), Basel - Kleinhüningen

Keywords: new construction measure, under construction, state funding

Map

Description of improvement measure:

Starting point: **-**

Improvement measure: new half connection between rhine port Kleinhüningen and motorway n. 2 Basel-Chiasso

The work plan is from 2013 to 2015.

Cost: not known

Title: Intraplan (München): Monitoring der Wettbewerbsfähigkeit des Schweizer Luftverkehrs for the Federal Office for Civil Aviation (CH16)

Mode/Location: airport, Airport Zürich

Keywords: infrastructure bottleneck (existing and forecasted), passenger/freight

Map

Description of improvement measure:

Starting point: airstrip configuration (no parallel airstrip) penalises Airport Zürich in international comparison. Predicted losses of traffic 2030 due to lack of capacity: up to 5 Mio. Pax. (12%) and 40,000 aircraft movements (15%)

Improvement measure: currently no measures planned. The Federal Department of the Environment, Transport, Energy and Communications (DETEC) judges the possibility of realising a parallel airstrip system in the dense settled Zürich region as very low (Sectoral Aviation Infrastructure Plan - Part III C Sheet Airport Zürich, 26.6.2013).

Title: Intraplan (München): Monitoring der Wettbewerbsfähigkeit des Schweizer Luftverkehrs for the Federal Office for Civil Aviation (CH17)

Mode/Location: airport, Airport Zürich

Keywords: infrastructure/administrative/operational bottleneck (existing and forecasted), freight

Map

Description of improvement measure:

Starting point: low freight transport intensity compared to economic force and trade volume -> air freight utilises airports in foreign countries. The reasons are to search in the Swiss restrictions (night flight interdiction, night travelling interdiction for lorries) and/or customs regulations

Improvement measure: -

Title: Anforderungen der Güterlogistik an die Netzinfrastruktur und die langfristige Netzentwicklung in der Schweiz for UVEK / ASTRA (CH18)

Mode/Location: road/rail, Terminal Basel Area

Keywords: infrastructure bottleneck (existing and forecasted), freight, planning

Map

Description of improvement measure:

Starting point: lack of terminal capacity: 50 to 100% missing capacity in the Basel area.

Improvement measure: Terminal Basel Nord in planning.

Title: Anforderungen der Güterlogistik an die Netzinfrastruktur und die langfristige Netzentwicklung in der Schweiz for UVEK / ASTRA (CH19)

Mode/Location: road/rail, Terminal Aarau Area

Keywords: infrastructure bottleneck (forecasted), freight

Map

Description of improvement measure:

Starting point: lack of terminal capacity; 0 to 20% missing capacity in the Aarau area (Terminal Aarau)

Improvement measure: -

Title: Anforderungen der Güterlogistik an die Netzinfrastruktur und die langfristige Netzentwicklung in der Schweiz for UVEK / ASTRA (CH20)

Mode/Location: road/rail, Terminal Rekingen Area

Keywords: infrastructure bottleneck (forecasted), freight, new construction measure, planned, State funding

Map

Description of improvement measure:

Starting point: **l**ack of terminal capacity; 40 to 70% missing capacity in the Rekingen/Zürich area (Terminal Rekingen/Zürich) (depending on the development of Swiss internal intermodal services and the split of the gateway function between Basel and Zürich)

Improvement measure: new terminal infrastructure: Gatewayterminal Limmattal

The work are expected to start in 2018.

Cost: not known

Title: Anforderungen der Güterlogistik an die Netzinfrastruktur und die langfristige Netzentwicklung in der Schweiz for UVEK / ASTRA (CH21)

Mode/Location: road/rail, Terminal Chiasso Area

Keywords: Infrastructure bottleneck (forecasted), freight

Map

Description of improvement measure:

Starting point: lack of terminal capacity; 70 to 140% missing capacity in the Chiasso area (depending on the development of Swiss internal intermodal services).

Improvement measure: currently no measures planned.

Title: Grossterminalstudie for the Swiss Ministry of Transport (CH22)

Mode/Location: rail/road, gateway terminal Limmattal

Keywords: infrastructure bottleneck (forecasted), freight, new construction measure, planned, state and private funding

Map

Description of improvement measure:

Starting point: from 264,000 TEU (2020) to 348,000 TEU (2030)

Improvement measure: intermodal road/rail gateway terminal for transhipment import/export traffic from the seaports.

The works are expected to start in 2019 (delayed).

Contribution to terminal based on a law (Verordnung über die Förderung des Bahngüterverkehrs (BGFV))

Cost: not known

Title: Studie Terminal Basel Nord (Capacity Calculation) for SBB Cargo / Port of Switzerland (CH23)

Mode/Location: rail/road/inland waterways, Terminal Basel Nord

Keywords: infrastructure bottleneck (forecasted), freight, new construction measure, planned, state and private funding

Map

Description of improvement measure:

Starting point: lack of terminal capacity: 180,000 to 210,000 TEU/year

Improvement measure: trimodal terminal which should be realised in two phases. Phase 1 is the rail/road part and phase 2 is the connection to inland waterways (Rhine).

The works are expected to start in 2016 (phase 1) and 2019 (phase 2).

Contribution to terminal based on a law (Verordnung über die Förderung des Bahngüterverkehrs (BGFV))

Cost: not known

Italy

Title: **Genova-Rotterdam: Un corridoio sostenibile & Corridoio 6 "Genova - Rotterdam" - Dossier 2012 (IT01)**

Mode/Location: all modes

Keywords: freight, under construction

Map

Description of improvement measure: GIOVI PASS (Terzo Valico): the project consists of an about 53 km long line, a relevant part of which in tunnels. The technical requirements meet those of a high speed (HS)/high capacity (HC) line. The realisation of the new pass will allow re-planning the rail traffic of the area around the port of Genoa, considerably improving the rail freight connection from the maritime area to the European hubs and main destinations in Italy.

Cost: € 6,200,000

6. Annex: Technical study review – EC studies

Title: ERTMS development and consolidation 2006-EU-93001-S (EU01)

Mode/ Location: rail, all

Keywords: operational bottleneck, passenger/freight, new construction, completed

Description of improvement measure: European Rail Traffic Management System (ERTMS), composed of a unique European Train Control System (ETCS) and radio system GSM-R, is designed to gradually replace the existing incompatible national systems throughout Europe. The project encompasses three main groups of activities:

- project management
- upgrading the specifications, in particular test specifications
- test campaign to validate the specifications and the products

Cost: €5,000,000 (€2,500,000 TEN-T funding)

Title: Feasibility study on international rail real time traffic monitoring and electronic path request systems 2008-EU-90000-S (EU02)

Mode/ Location: rail, All

Keywords: operational/administrative bottleneck, freight, new construction, completed

Description of improvement measure: preparatory work for the implementation of the technical specification for interoperability, relating to the telematic applications for freight subsystem of the trans-European conventional rail system (TAF TSI).

The main objectives and goals of the Action are:

- to agree on common processes and procedures together with the Railway Undertakings in the scope of short/long term path requests, train running forecasts and train running information
- to define, on the basis of the processes, detailed functional requirement specifications
- to amend, on the basis of the processes and of the functional requirements, the TAF TSI data flow and format
- to validate, on the basis of the specifications, the results: this will be done by several pilots in the field of short/long term path request, train running forecast and train running information
- to analyse the feasibility of the different processes and evaluation of data quality used to fulfil the data exchange required for this process

Cost: € 3,279,014 (€ 1,639,507 TEN-T funding)

Title: Studies on improving the Freight Corridor Concept by using Telematic Applications for Freight, and methods, tools and procedures developed by RNE for rail corridors 2010-EU-92240-S(EU03)

Mode/ Location: rail, all

Keywords: operational / administrative bottleneck, freight, new construction, completed

Description of improvement measure: the project supports the European Corridor Concept for by using the methods, tools and procedures already developed by the RailNetEurope organisation on defined RailNetEurope corridors. This project represents the continuation of the activities already started and carried out within the framework of the EU cofounded TEN-T project 2008-EU-90000-S.

The Action includes two activities:

- Activity I deals with evaluating and improving a harmonised timetabling process for international trains;
- Activity II tackles improving international cooperation between dispatching centres and railway companies. This shall be done by implementing the international operational processes to ensure a good service and production quality in the international rail business

Cost: € 2,423,546 (€ 1,211,773 TEN-T Multi-annual Programme)

Title: Betuwe Line for Rail Freight IPOL-TRAN_ET(2013)495838_EN.pdf (EU04)

Mode/ Location: rail, Rotterdam - Border NL/DE

Keywords: infrastructure bottleneck, freight, new construction, completed

Description of improvement measure: dedicated rail freight line to link Port of Rotterdam with the Dutch-German border. The Betuwe Line is designed for a capacity of 10 trains per hour per direction

Cost: € 4,705,000,000 (€ 197,000,000 TEN-T Funding)

Title: Freight Corridor Betuweroute - South-East Netherlands–Germany 2011-NL-93022-S (EU05)

Mode/ Location: rail, Utrecht-Eindhoven

Keywords: infrastructure bottleneck, freight, upgrading measure, under study

Description of improvement measure: this Action is part of the Dutch High-Frequency Rail Transport Programme (PHS in Dutch), which aims at increasing passenger and freight rail capacity in the busiest routes of The Netherlands as to meet increasing rail transport demand by 2020.

Concerning freight transport, the objective is to diversify the freight routes. To this end, the Betuweline (Priority Project 5), the double track freight line from Rotterdam to Germany, will be optimised by deviating other routes to this freight corridor.

The present co-financed studies will include:

• An analysis of the alternatives

• An Environmental Impact Assessment

• A detailed design of the preferred variant

Cost: € 7,500,000 (€ 3,750,000 TEN-T Multi-annual Programme)

Title: Studies concerning the extension railway yard Maasvlakte West - Phase 1 2010-NL-92227-S (EU06)

Mode/ Location: rail, Rotterdam-Nijmegen

Keywords: infrastructure bottleneck, freight, upgrading measure, completed

Description of improvement measure: the Action consists of the studies relating to the designs and procurement procedures necessary to increase the railway yard capacity of Rotterdam port.

The studies are preparing the following railway components that will be added to the existent layout of Maasvlakte West, located on the west side of the port of Rotterdam:

• 10 yard tracks of 750 metres each

• 11 tracks used for the storage of locomotives

• Train Control System on each of the new tracks

• 25kV traction power on each of the new tracks

• Service paths and roads

Cost: € 2,953,200 (1,476,600 TEN-T Multi-annual Programme)

Title: ERTMS implementation the Railway Corridor Rotterdam-Genoa- Netherlands part – Section Port Railway of Rotterdam 2007-NL-60310-P (EU07)

Mode/ Location: rail, Rotterdam - Border NL/DE

Keywords: infrastructure bottleneck, freight, upgrading measure, completed

Description of improvement measure: European Rail Traffic Management System (ERTMS), composed of a unique European Train Control System (ETCS) and radio system GSM-R, is designed to gradually replace the existing incompatible national systems throughout Europe.

This project, part of the TEN-T Priority Project 24 railway axis Lyon/Genoa-Basel-Duisburg-Rotterdam/Antwerp, deals with the deployment of ERTMS/ETCS Level 1, SRS 2.3.0, on the Port Railway (Betuweroute - Priority Project 5), a 48 km freight railway track.

Cost: € 9,000,000 (€ 4,500,000 TEN-T Funding)

Title: Upgrade of ETCS system to 2.3.0d in the Betuwe Route 2009-NL-60123-P (EU08)

Mode/ Location: rail, Rotterdam - Border NL/DE

Keywords: infrastructure bottleneck, freight, upgrading measure, under construction

Description of improvement measure: the main objective of the Action is to upgrade the Betuwe Route trackside ETCS system to become compliant with the ETCS 2.3.0d specifications. The upgrade includes replacement of the present software in two Radio Block Centres (RBC) by a 2.3.0d-compliant software version. It includes reprogramming a limited number of balises and the performance of tests and updating the documentation.

The Action includes two sub-activities:

1. Upgrade of trackside ETCS elements to comply with 2.3.0d specification

2. Implementation of the testing strategy

Cost: € 2,000,000 (€ 1,000,000 TEN-T Multi-annual Programme)

Title: ERTMS implementation on the railway corridor Rotterdam-Genoa- Netherlands Part - Kijfhoek & Zevenaar 2007-NL-60060-P (EU09)

Mode/ Location: rail, Rotterdam - Border NL/DE

Keywords: infrastructure bottleneck, freight, upgrading measure, under construction

Description of improvement measure: European Rail Traffic Management System (ERTMS), composed of a unique European Train Control System (ETCS) and radio system GSM-R, is designed to gradually replace the existing incompatible national systems throughout Europe.

In this Action, the 62-km Kijfhoek and Zevenaar sections on the Dutch part of the corridor A Rotterdam-Genoa will be equipped with the ERTMS/ETCS. State of progress on 31 December 2012: The implementation of the Action is ongoing. Design phases are in progress on both sections.

Cost: € 9,300,000 (€ 4,650,000 TEN-T Multi-annual Programme)

Title: Preparatory studies for the implementation of additional measures on ERTMS Corridor Rotterdam-Genoa and ERTMS Corridor Antwerp-Basel-Lyon 2011-EU-60005-S (EU10)

Mode/ Location: rail,: Rotterdam - Genova

Keywords: operational / administrative bottleneck, freight, upgrading measure, under study

Description of improvement measure: the aim of the action is to elaborate a study contributing to the successful implementation of the provisions of the Regulation (EU) No 913/2010 of the European Parliament and of the Council of 22 September 2010 concerning a European rail network for competitive freight (the Regulation).

In particular, the action covers preparation of the following documentation: transport market studies (art. 9(3) of the Regulation) for Corridors A/1 and C/2 a concept study documentation contributing to draw up the corridor A/1 implementation plan (art. 9 of the Regulation) a study on operation of longer trains (>=740m) on the corridor A/1.

Cost: € 1,650,000 (€ 825,000 TEN-T Multi-annual Programme)

Title: Studies concerning the construction of the third Track Zevenaar-German border 2010-NL-92226-S (EU11)

Mode/ Location: rail, Nijmegen – Border NL/DE

Keywords: infrastructure bottleneck, freight, upgrading measure, under construction

Description of improvement measure: : in order to provide sufficient capacity to the existing double track line, a third track between Zevenaar and Oberhausen will be built in order to meet potential future demand in international freight and passengers trains on Priority Project 24 (Railway axis Lyon/Genova-Basel-Duisburg-Rotterdam/Antwerpen).

On the Dutch side of the border the third track will start from the connection to the Betuweline (Priority Project 5) to the existing double track line in Zevenaar and then continue up to the German border.

Cost: € 1,605,000 (€ 802,500 TEN-T Multi-annual programme)

Title: Planning for the upgrading of the railway connection line NL/D border – Emmerich-Oberhausen 2005-DE-90308-S (EU12)

Mode/ Location: rail, Border NL/DE - Duisburg

Keywords: infrastructure bottleneck, freight, upgrading measure, completed

Description of improvement measure: this project is focusing on basic preparatory studies for upgrading the capacity of the rail track between Oberhausen and Emmerich. It anticipates additional freight traffic arising from the completion of the Betuwe Line (Priority Project 5) linking the port of Rotterdam with its hinterland.

The studies and pre-design planning focus on three different elements:

- Construction of a new third track between Oberhausen and the Dutch-German border;
- Capacity improvement of the station of Emmerich;
- Construction of a second track between Oberhausen-Sterkrade-Abzw Grafenbusch

Cost: € 10,100,000 (€ 5,000,000 TEN-T Funding)

Title: Studies for the removal of the level crossings on the section Oberhausen-Emmerich 2008-DE-91003-S (EU13)

Mode/ Location: rail, Border NL/DE - Duisburg

Keywords: infrastructure bottleneck, freight, upgrading measure, under study

Description of improvement measure: this project aims to prepare for the upgrade and widening of the rail track between Oberhausen and Emmerich. It will address the additional freight traffic arising from the completion of the Betuwe double track rail line (Priority Project 5) which links the port of Rotterdam with the Dutch-German Border at Emmerich. It focuses on the removal of 55 level crossings, which could have an effect on the overall quality of the rail service, on the 72 km stretch between the municipalities of Oberhausen, Dinslaken, Voerde, Wesel, Hamminkeln, Rees and Emmerich. The studies have been divided into 12 rail sections between Oberhausen and Emmerich

Cost: € 10,173,000 (€ 5,000,000 TEN-T Funding)

Title: Studies and works for the upgrading of the high speed railway line Duisburg-Emmerich 2007-DE-24040-P (EU14)

Mode/ Location: rail, Border NL/DE - Duisburg

Keywords: infrastructure bottleneck, freight, new construction / upgrading measure, under construction/under study

Description of improvement measure: this project aims at upgrading the capacity of the rail track between Emmerich at the Dutch-German border and Oberhausen. These works will address the additional freight traffic arising from the completion since 2007 of the Betuwe Line (Priority Project 5), which now links the port of Rotterdam with the Dutch-German border.

It mainly comprises the following components:

- Studies for the construction of a new triple track line for the rail section between Oberhausen railway station and the German-Dutch border;
- Studies and works for the installation of ETCS equipment/electronic interlocking in rail section Emmerich;
- Studies and works for increasing the capacity of Emmerich railway station by converting the electric systems;
- Studies for the construction of a double tracks line for the rail section between Oberhausen-Sterkrade railway station and Grafenbusch

Cost: € 159,084,300 (€46,981,302 TEN-T Multi-annual Programme)

Title: Equipment with electronic interlocking of the railway line between Emmerich (Dutch-German border) and Basel (German-Swiss border), within Corridor A Rotterdam-Genoa 2009-DE-24070-E (EU15)

Mode/ Location: rail, Border NL/DE - Border DE/CH (Emmerich - Basel)

Keywords: infrastructure bottleneck, passenger/ freight, upgrading measure, under construction

Description of improvement measure: this project aims at installing European Train Control System (ETCS) equipment on the rail section on the German territory between Emmerich at the Dutch-German border and Basel at the German-Swiss border. It aims at setting up interlockings on several rail sections as a fundamental basis for ETCS.

Level 2 equipment with following objectives:

- Replacement or inter-connection of 29 old interlockings with new compatible electronic interlockings and remote control systems in 11 rail sections;
- Completion of the preconditions for the installation of ETCS Level 2 equipment resulting in a mandatory implementation plan for the line;
- Installation of ETCS Level 2 equipment on the entire line

Cost: € 198,660,000 (€ 39,732,000 European Economic Recovery Plan)

Title: Iron Rhine 2007-EU-24090-S (EU16)

Mode/ Location: rail, Antwerpen - Duisburg

Keywords: infrastructure bottleneck, freight, upgrading measure, under study

Description of improvement measure: this project concerns studies to reactivate the line in order to create a direct freight rail link for the Port of Antwerpen to its hinterland connections; similar to the Betuwe Line in The Netherlands (Priority Project 5).

Several elements pose technical problems to the line which will be investigated in particular in the studies. The most difficult will be the crossing of the Meinweg National Park, which will be realised as a tunnel. Another challenge is the diversion east of Roermond, The Netherlands, to avoid reactivating the historical section crossing the city.

Other elements such as construction of passing tracks on single track sections, creation of level-free crossings and noise mitigation measures will also be investigated as part of the studies.

Cost: € 5,261,000 (€ 2,630,500 TEN-T Funding)

Title: Studies for the construction of the high speed section between Frankfurt and Mannheim 2007-DE-24030-S (EU17)

Mode/ Location: rail, Mainz (Frankfurt?) - Mannheim

Keywords: infrastructure bottleneck, passenger, new construction, under study

Description of improvement measure: this project aims to prepare for the construction of a double tracks high speed rail section of 300 km/h between Frankfort and Mannheim, with connections to the railways stations of Darmstadt and Mannheim and pooling it to the existing motorway. The study project has been divided into 5 subsections: Frankfurt Stadium-Mörfelden/Walldorf; Mörfelden/Walldorf-Gernsheim; Gernsheim-Einhausen; Einhausen-Viernheim; Viernheim-Mannheim.

Each study encompasses the following activities:

• Preparing for the requirements of the land use planning procedure and update of the preliminary design study of 2003, including

assessment of the different alignment variants and their environmental impact;

• Drafting the design study for launching the procedure of approval of the plans;

• Carrying out the procedure for approval of the plans, including public consultation;

• Completion of the detailed design study for approval by the German Federal Railway Office (EBA)

Cost: € 30,812,000 (€ 15,406,000 TEN-T Multi-annual Programme)

Title: Works for the construction and upgrade of the railway section between Karlsruhe and Basel 2007-DE-24060-P (EU18)

Mode/Location: rail, Karlsruhe - Basel

Keywords: infrastructure bottleneck, passenger and freight, upgrade, under construction

Map

Description of improvement measure:

This rail project will create additional capacities on the railway section between Karlsruhe and Basel, which receives daily around 250 freight and passengers' trains and experiences bottlenecks. With the upgrade and partial new construction of this section, its rail efficiency will be improved in time and capacity.

182 km of existing tracks will be upgraded to a maximum speed of 200 km/h and, in addition, two tracks newly built with a maximum speed of 250 km/h. This includes four tunnels with a total length of 17 km. Some construction works for this line were already funded under the 2000-2006 TEN-T Programme. The travel time between Karlsruhe and Basel will be reduced from 100 to 69 minutes.

The planning process for upgrading the stretch Karlsruhe and Rastatt-South is being finalized, including the Rastatt Tunnel. For the stretch Rastatt-South to Offenburg and the one from Offenburg to Basel the planning process is ongoing.

For all southern sections between Offenburg and Auggen, the requests for the work permits have been launched. After the inauguration of the Katzenbergtunnel in December 2012, works around the Katzenberg tunnel, between Schliengen and Eimeldingen as well as Haltlingen and Weil am Rhein are ongoing.

Cost: € 560,010,000 (€ 89,652,000 TEN-T Multi-annual Programme)

Title: Adaptation of the existing line between Mulhouse and the border for use by highspeed (TGV) or intercity express (ICE) trains on the Mulhouse-Mullheim (Freiburg) corridor2010-FR-92204-P (EU19)

Mode/ Location: rail, Mulhouse (FR) – Müllheim (DE)

Keywords: infrastructure bottleneck, passenger, upgrading measure, under construction

Description of improvement measure: the cross-border railway between Mulhouse and Müllheim is a single-track line whose French section is 17.5 km long. The railway connects then with the Karlsruhe-Freiburg-Basel line, part of the Priority Project 24. The Action is implemented in the French section and concerns:

- The upgrade of the signalling equipment on the line to allow an higher return traction currents;
- The strengthen of the track foundations by replacing the ballast to enable continuous speeds of up to 90 km/h;
- The automation of three level crossings

Cost: € 3,600,000 (€ 720,000 TEN-T Multi-annual Programme)

Title: Trackside ERTMS equipment on Italian part of Corridor A (600 km) 2007-IT-60360-P (EU20)

Mode/ Location: rail, (1) Brig – Genoa, (2) Lugano - Milano

Keywords: operational / administrative bottleneck, passenger/ freight, upgrading measure, under construction

Description of improvement measure: the objective of the project is to migrate a significant portion of the Trans-European Network to ERTMS within a 10-12 year period. This Action covers ERTMS deployment on Italian sections of Corridor A Rotterdam-Genoa in a total length of 600 km.

Cost: € 66,000,000 (€ 33,000,000 TEN-T Multi-annual Programme)

Title: Malpensa 2000 Airport IPOL-TRAN_ET(2013)495838_EN.pdf (EU21)

Mode/ Location: airport, Milano

Keywords: infrastructure bottleneck, passenger/ freight, upgrading measure, completed

Description of improvement measure: the project Malpensa 2000 included renewing and extending the old runways, building new taxiways, aprons, a new passenger terminal, a new control tower, a cargo centre, a train station and an access road from the old terminal. This first stage was necessary for ensuring the new terminal operations; later stages, which are still ongoing, are dealing with capacity extensions for both passenger and cargo transport.

Cost: € 945,000,000 (26,800,000 TEN-T Funding)

Title: Cargo City Development - Railway Tunnel 2007-IT-91502-P (EU22)

Mode/ Location: airport, Milano

Keywords: infrastructure bottleneck, freight, upgrading measure, completed

Description of improvement measure: the main goal of the project is to provide Milan's Malpensa Airport with a multimodal logistics park that integrates cargo traffic and offer benefits for the entire region. The global project for the development of the Cargo City at Malpensa Airport encompasses the following projects: a new railway tunnel, new aprons for cargo aircraft, new first line warehouses, new second line forwarder warehouses, and urbanisation of cargo areas. This project involves development of the railway tunnel, which will be done prior to the implementation of other works. Covering the railway tracks, the surface can be utilised for aircraft and vehicle movements.

Cost: € 21,500,000 (€ 1,710,000 TEN-T Annual Programme)

Title: MXPT2LINK-UP (EU23)

Mode/ Location: airport, Milano

Keywords: infrastructure bottleneck, passenger/freight, new construction, under construction

Description of improvement measure: the Action consists of the final design of the railway link between the Malpensa Intercontinental Airport Terminal 1 and the Airport Terminal 2, for a length of about 3.8 km, including a new railway station to be located at the Airport Terminal 2. The T1-T2 link will allow Malpensa airport to cope with the forecast increase of traffic (9.9 million passengers are expected in 2015), contribute to lower operations and maintenance costs and save around 20 minutes in connection time for passengers. Overall, the improvement of the rail connection will increase Malpensa catchment area (main cities of Northern Italy and the neighbouring Switzerland cantons) and reduce the share of less environmentally friendly transport modes.

Cost: € 2,592,490 (€ 1,296,490 TEN-T Annual Programme)

Title: MXPT2(Railink) - UP 2012-IT-24071-P (EU24)

Mode/ Location: rail, Milan-CH

Keywords: infrastructure bottleneck, passenger, new construction, under construction

Description of improvement measure: The Global Project (MXP North Rail Access) aims to connect Malpensa Airport with the Simplon and Gotthard international railway lines. The Action constitutes the first phase towards the Global Project, by enabling an electrified rail link between Terminal 1 (T1) and Terminal 2 (T2) of the Malpensa airport, the first missing chain to reach the northern rail network.

Cost: € 115,000,000 (€ 23,000,000 TEN-T Annual Programme)

Title: Upgrade of the Tortona-Voghera section, Priority Project 24, Final Design 2009-IT-91404-S (EU25)

Mode/ Location: rail, Milan-Genova

Keywords: infrastructure bottleneck, passenger/ freight, upgrading measure, completed

Description of improvement measure: the Tortona-Voghera section, part of Priority Project 24 (Railway axis Lyon/Genova-Basel-Duisburg-Rotterdam/Antwerpen) is part of two distinct railway routes: Milan-Genova and Turin-Piacenza. This overlap of traffic flows makes it necessary to quadruple the current double-track line. The total length of the section is 16 km, and the upgrade also requires the reconfiguration of the rail scheme at the Tortona station and additional works in the Voghera station for laying the new pair of tracks. The global scope of the upgrade is to increase the railway infrastructure capacity and remove the existing bottleneck. In particular, specific objectives are:

- increase the capacity of the lines
- increase commercial speed
- improve service quality in terms of regularity and flexibility

Cost: € 5,100,000 (€ 2,550,000 TEN-T Annual Programme)

Title: Genoa rail node: Improvement of the traffic management system 2011-IT-93096-P (EU26)

Mode/ Location: rail, Novara/Milano - Genoa

Keywords: infrastructure bottleneck, passenger/ freight, upgrading measure, under construction

Description of improvement measure: the Action aims at improving the Genoa Railway Node, starting point of Priority Project 24 Lyon/Genova-Basel-Duisburg-Rotterdam/Antwerpen by separating the metropolitan and regional rail system from long-distance (passenger/cargo) traffic flows, and enhancing inter-modality by improving the freight service connection with the maritime trade traffic. More in detail, the Action concerns the following works:

- Civil works, tracks and preparatory activities for the 'automatic computerized multi-station interlocking' (ACCM) in Voltri;
- Installation of the 'automatic computerised multi-station interlocking' (ACCM) in Voltri;
- Civil works, tracks and technology equipment in the existing S. Limbania-Campasso connection

Cost: € 40,000,000 (€ 5,000,000 TEN-T Annual Programme)

Title: Railway node of Genova - Study for upgrading the section Genova Voltri-Genova Brignole 2007-IT-24010-S (EU27)

Mode/ Location: rail, Novara/Milano - Genova

Keywords: infrastructure bottleneck, passenger/ freight, upgrading measure, completed

Description of improvement measure: the objective of the project is to eliminate existing bottleneck points and the adverse effect of interaction between long distance (passengers/goods) and short distance traffic (urban/regional). The studies look at the upgrading of the railway corridor from Genova Voltri to Genova Sanpierdarena station, the upgrading of these stations themselves and the functioning of six tracks between Genova Brignole and Genova Principe stations

Cost: € 10,100,000 (€ 5,050,000 TEN-T Funding)

Title: Type approval of the first locomotive equipped with ETCS 2005-NL-91102-S (EU28)

Mode/ Location: rail, Rotterdam - Border NL/DE

Keywords: infrastructure bottleneck, passenger/ freight, upgrading measure, completed

Description of improvement measure: new types of locomotives, which were expected to operate on the Betuweroute, had to be fitted with ETCS and admitted on the Dutch rail network. The scope of the project covered engineering tasks, installation of the ETCS devices, tests and authorisation of pilot locomotives. The completion of the project contributes to further increase of the ERTMS equipped locomotives in the country.

Cost: € 8,400,000 (€ 4,200,000 TEN-T Funding)

Title: Retrofit of 90 Siemens ES64F4 E-locomotives with Alstom ETCS L2 equipment for usage on EU freight corridors and various conventional networks 2007-NL-60380-P (EU29)

Mode/ Location: rail, Rotterdam - Border NL/DE

Keywords: infrastructure bottleneck, passenger/freight, upgrading measure, completed

Description of improvement measure: this action concerns the serial fitment of ETCS Level 2, SRS 2.3.0d in 90 type ES64F4/BR189 multi-system electrical locomotives. The action is split into seven activities corresponding to the retrofit and new build of a given number of locomotives of a specific type. The ETCS Level 2 on-board equipment will be designed to fulfil the specifications of the Betuwe line (Priority Project 5). The upgrade of the ETCS device will be compliant with the Technical Specifications for Interoperability (TSI) in force and is included in the scope of supply.

Cost: € 18,000,000 (€ 9,000,000 TEN-T Funding)

Title: Equipment of the Railion Deutschland AG locomotives 2007-DE-60490-P (EU30)

Mode/ Location: rail, Nijmegen/Arnhem - Basel

Keywords: infrastructure bottleneck, passenger/freight, upgrading measure, completed

Description of improvement measure: European Rail Traffic Management System (ERTMS), composed of a unique European Train Control System (ETCS) and radio system GSM-R, is designed to gradually replace the existing incompatible national systems throughout Europe. The project deals with the equipment with ETCS Level 2 of 48 BR189 series locomotives. The locomotives, to be equipped by the end of 2009, will circulate mainly on the German and Dutch sections of the freight Corridor A (Rotterdam-Genova).

Cost: € 9,600,000 (€ 4,800,000 TEN-T Funding)

Title: EEIG: ERTMS Users Group - testing activities 2007-EU-60040-P (EU31)

Mode/ Location: rail, all countries

Keywords: infrastructure bottleneck, passenger/freight, upgrading measure (testing), completed

Description of improvement measure: European Rail Traffic Management System (ERTMS), composed of a unique European Train Control System (ETCS) and radio system GSM-R, is designed to gradually replace the existing incompatible national systems throughout Europe. The project focuses on activities related to testing and achieving interoperability of the European railway system.

Cost: € 12,400,000 (€ 6,000,000 TEN-T Multi-annual Programme)

Title: Programme Management Office for the ERTMS deployment on the corridor Rotterdam-Genoa 2007-EU-60410-S (EU32)

Mode/ Location: rail, Rotterdam - Genoa

Keywords: infrastructure bottleneck, passenger/freight, upgrading measure, completed

Description of improvement measure: European Rail Traffic Management System (ERTMS), composed of a unique European Train Control System (ETCS) and radio system GSM-R, is designed to gradually replace the existing incompatible national systems throughout Europe. This project concerns the overall coordination of all ERTMS-related activities on the corridor A from Rotterdam-Genoa. It looks at the interoperability and competitiveness of cross-border, long-distance rail freight services on the corridor, and how to manage the measures and activities between the implementing bodies of ProRail (The Netherlands), DB Netz (Germany), BLS and SBB (Switzerland) and RFI (Italy).

Cost: € 2,260,000 (€ 1,130,000 TEN-T Funding)

Title: Programme management office for the ERTMS deployment on the corridor from Rotterdam to Genoa 2009-EU-60146-S (EU33)

Mode/ Location: rail, Rotterdam - Genoa

Keywords: infrastructure bottleneck, passenger/freight, upgrading measure, under construction

Description of improvement measure: this Action deals with the overall project coordination of all ERTMS-related activities on the corridor A from Rotterdam to Genoa. It looks at the interoperability and competitiveness of cross-border, long-distance rail freight services on the corridor, and how to manage the measures and activities between the implementing bodies of ProRail (The Netherlands), BLS and SBB (Switzerland) and RFI (Italy) in order to ensure the migration to ERTMS technology on Corridor A.

Cost: € 5,392,000 (€ 2,696,000 TEN-T Multi-annual Funding)

Title: Serial fitment of onboard ETCS equipment SRS 2.3.0 in 109 freight locomotives 2007-NL-60160-P (EU34)

Mode/ Location: rail, Rotterdam - Border NL/DE

Keywords: infrastructure bottleneck, passenger/freight, upgrading measure, completed

Description of improvement measure: this project concerns the serial fitment of ETCS Level 2 equipment in 109 locomotives (72 existing and 37 new). Some of these locomotives have been operational since the end of 2008; they are all in conformity with the prototypes certified under the previous and completed Action 2005-NL-91102. This implementation is mainly done for Betuwe line (Priority Project 5). As phase two, it will be available for the remaining Dutch part of the Freight Corridor A.

Cost: € 18,100,000 (€ 9,050,000 TEN-T Funding)

Title: Equipment of freight locomotives with ETCS on-board-units according to SRS 2.3.0.d 2009-DE-60120-P (EU35)

Mode/ Location: rail, DE, NL, CH, AT, IT

Keywords: infrastructure bottleneck, passenger/ freight, upgrading measure, completed

Description of improvement measure: the Action will allow the beneficiary to equip 17 locomotives for international freight transport with ETCS Level 2, version 2.3.0.d. These Traxx F140 MS locomotives will run on part of the TEN-T Priority Projects 1, 5, 17 and 22. Following the completion of the Action, the locomotives will obtain the relevant authorisation for entry into into service in The Netherlands, Germany, Switzerland, Austria and Italy from the respective National Safety Authorities.

Cost: € 1,700,000 (€ 850,000 TEN-T Multi-annual Funding)

Title: Upgrade of locomotives with onboard ETCS equipment 2009-EU-60138-P (EU36)

Mode/ Location: rail, NL, BE, DE, AT

Keywords: infrastructure bottleneck, passenger/ freight, upgrading measure, under construction

Description of improvement measure: the Action aims at upgrading the ETCS onboard equipment of the locomotive fleet of RBS Asset Finance Europe Ltd, which will enable the latter to offer leases of locomotives suitable to operate on ERTMS fitted lines and in particular the corridors set out in the European Deployment Plan. Precisely, the Action will make it possible for 33 existing locomotives to operate across all SRS version 2.3.0d fitted routes (at L1 and 2 with interoperable ETCS) thereby allowing the effective use of ETCS.

Cost: € 1,590,000 (795,000 TEN-T Multi-annual Programme)

Title: ERTMS upgrade of existing locomotives to ensure compatibility with SRS 2.3.0d for use in the Betuwe line 2009-NL-60124-P (EU37)

Mode/ Location: rail, Rotterdam - Border NL/DE

Keywords: infrastructure bottleneck, passenger/freight, upgrading measure, completed

Description of improvement measure: this project consists of the deployment of ERTMS (ETCS Level 2) in the Betuwe route (A-15 and harbour line). It foresees making the ERTMS on-board equipment of the existing locomotives fully interoperable with baseline 2.3.0.d and compatible with all ERTMS functionalities. The Betuwe route is part of Corridor A. ERTMS projects will play a pivotal role in the trans-European network, enabling the rail sector to compete more successfully in a number of growing market segments. ERTMS is also a catalyst for the development of interoperable and competitive freight transport corridors.

Cost: € 4,000,000 (€ 2,000,000 TEN-T Multi-annual Programme)

Title: Fitting of ETCS onboard equipment to Traxx DABNLs 2009-NL-60128-P (EU38)

Mode/ Location: rail, NL, BE, DE, AT

Keywords: infrastructure bottleneck, passenger/freight, upgrading measure, completed

Description of improvement measure: the project aims at upgrading onboard equipment to ETCS Level 2, SRS 2.3.0.d, for 10 Traxx locomotives especially designed for freight cross-border operation in Germany, Austria, Belgium and The Netherlands.

Cost: € 1,000,000 (€500,000 TEN-T Multi-annual Programme)

Title: Retrofitting of ETCS onboard equipment for locomotives to run in ERTMS Corridor A 2009-NL-60142-P (EU39)

Mode/ Location: rail, NL, BE, DE

Keywords: infrastructure bottleneck, passenger/freight, upgrading measure, under construction

Description of improvement measure: this Action aims at retrofitting and upgrading of on-board equipment and foresees the following activities:

1. Retrofit of onboard equipment in 15 Siemens locomotives with ETCS L1/L2;
2. Retrofit of onboard equipment in 4 Vossloh locomotives with ETCS L1/L2;
3. Upgrade of software and re-authorisation of 25 EVC-based ETCS L2 locomotives;
4. Upgrade of software and re-authorisation of 70 IVC-based ETCS L2 locomotives;

Cost: € 6,600,000 (3,300,00 TEN-T Multi-annual Programme).

Title: MOS 24 2010-EU-21101-S (EU40)

Mode/ Location: seaport

Keywords: infrastructure bottleneck, passenger/ freight, upgrading measure, under study

Description of improvement measure: main objective of the action is to enhance the strategic role of the Priority Project 24 (Railway axis Lyon/Genova-Basel-Duisburg-Rotterdam/Antwerpen) of the TEN-T network, as main gate to Europe for the traffic of goods transported via the Mediterranean Motorways of the Sea (MedMos). The goal is to create a unique ICT multimodal corridor between northern and southern Europe by connecting virtually the PP 24 with MedMoS. The Action will analyse the bi-directional transfer of goods from central Europe to Med Countries and to Med ports through the combination of PP24 and the network of MoS. The Pilot Action will develop the demonstrator of an interoperability platform (MoS24) for interconnecting existing ICT modules and making them interoperable, and will deliver a service to users through the virtual MoS24 Comodality Promotion Centre (CPC). The action will be carried out in three main phases, namely:

- analysis of the demand along the corridor
- review of existing subsystems and missing links, followed by the development and testing of an early version
- the pilot demonstrator, consisting of the virtual CPC for the Southern Gateway

Cost: € 4,905,000 (€ 2,452,500 TEN-T Multi-annual Programme)

Title: West Med Corridors 2006-EU-93016- (EU41)

Mode/ Location: sea, western Mediterranean region

Keywords: infrastructure bottleneck, freight, upgrading measure, completed

Description of improvement measure: the aim of the study is to develop a master plan for the definition and implementation of the Motorways of the Sea in the western Mediterranean region. Motorways of the Seas aim to re-create the road and rail network on the water, by concentrating flows of freight in viable, regular sea routes. It includes setting up the overall project management, conducting preliminary studies (market survey and review of available and planned infrastructure), planning the operational aspects of motorways of the seas, and dissemination activities.

Cost: € 1,682,238 (€ 800,878 TEN-T Funding)

Title: Motorways of the Sea Esbjerg-Zeebrugge 2008-EU-21020-P (EU42)

Mode/ Location: sea Port, Zeebrugge

Keywords: infrastructure bottleneck, passenger/ freight, upgrading measure, under construction

Description of improvement measure: the maritime link between Esbjerg, Denmark and Zeebrugge, Belgium, in service since 2005, has provided an intermodal alternative to truck transport between Denmark and the Benelux countries. This project will be further developed into a Benelux-Scandinavia short sea bridge. The upgrade of the service will consist of the coordinated increase of the frequency on the Zeebrugge-Esbjerg route, investment in infrastructure and facilities and the adoption of accompanying measures to foster integration of various parts of the intermodal chain. This includes an increase in service by doubling of the capacity of the ro-ro (roll on, roll off) connection between Esbjerg and Zeebrugge.

Cost: € 23,790,000 (€ 4,758,000 TEN-T Multi-annual Programme)

Title: NETLIPSE 2008-EU-91901-S (EU43)

Mode/ Location: rail, all countries

Keywords: infrastructure bottleneck, passenger/freight, upgrading measure, completed

Description of improvement measure: the main objective of the NETLIPSE project is to improve the management, organisation and execution of Large Infrastructure Projects (LIPs), and in particular TEN-T projects.

The NETLIPSE project will:

- Expand and support the NETLIPSE network by organising activities to actively promote knowledge exchange regarding execution LIPs through various communication means and publications;
- Develop a model (Infrastructure Project Assessment Tool - IPAT), with the objective to increase the effectiveness of large infrastructure project by reducing the risk of cost overruns and time delays, and improving the implementation of transport infrastructure policies.

The IPAT will be open and free of charge (or at a reasonable cost) to the public. The NETLIPSE network focuses on creating added value through knowledge exchange by sharing, discussing and disseminating best practices and lessons learnt. The information gathered will be used in the development of the Infrastructure Project Assessment Tool.

Cost: € 1,164,212 (€ 580,000 TEN-T Annual Programme)

Title: Prototyping, testing, renewed authorisation for placing in service and the retrofit of Siemens ES64U2 locomotives with ETCS L1/L2 2.3.0.d for Corridor A, B and E networks in DE, AT, HU and CH 2011-NL-60003-P (EU44)

Mode/ Location: rail, border NL/DE - border CH/IT

Keywords: infrastructure bottleneck, passenger/freight, upgrading measure, under construction

Description of improvement measure: this Action concerns the prototyping, testing, certifying and serial retrofitment of 55 Siemens ES64U2 locomotives with ETCS Level 1 and Level 2, SRS 2.3.0d. The retrofitted locomotives will circulate on a significant part of Corridors A, B and E, including the connecting networks in Germany, Austria, Hungary and Switzerland. The interoperability will be extensively tested both in laboratory and on-site during the prototype phase. The Action includes the following activities:

- Prototyping, testing and certifying;
- Interoperability test in independent EU certified laboratories;
- Retrofitting.

Cost: € 13,680,000 (€ 6,840,000 TEN-T Multi-annual Programme)

Title: CIM West Terminal expansion 2012-IT-24116-P (EU45)

Mode/ Location: rail/Road-Terminal, border CH-IT- Genoa

Keywords: infrastructure bottleneck, freight, upgrading measure, under construction

Description of improvement measure: the Action is the first phase of the Global project aiming at the upgrading of Novara Intermodal Terminal, in Northern Italy. The Action concerns the expansion of the capacity and the rail accessibility of CIM West terminal, in order to remove the current technical bottlenecks hindering the development of intermodal traffic and the consequent opportunity of modal shift on TEN T n.6 and n.24 corridors. The Action will be implemented through the Installation of a 600 meter long track, the Revamping and increase of the intermodal yard, and the Installation of fixed equipment for ITU transhipment.

Cost: € 10,000,000 (€ 2,000,000 TEN-T Multi-annual Programme)

Title: RIS enabled IWT corridor management 2012-EU-70004-S (EU46)

Mode/ Location: IWW, AT, NL, BE, DE, LU

Keywords: infrastructure bottleneck, freight, upgrading measure, under study

Description of improvement measure: the Action aims to develop the definition and implementation of a RIS corridor approach to strengthen the position of inland navigation within the transport chain. The Action will facilitate the establishment of a structured dialogue between public and private stakeholders across national borders. In addition to that the study will investigate how to foster interoperability and compatibility between the different deployed technologies. The project's activities in the context of the global project shall focus on the deployment of intelligent infrastructure so as to enable the efficient RIS implementation at corridor level.

Cost: € 2,814,000 (€ 1,407,000 TEN-T Multi-annual Programme)

Title: LNG Masterplan for Rhine-Main-Danube 2012-EU-18067-S (EU47)

Mode/ Location: IWW, Rhine, Danube

Keywords: infrastructure bottleneck, freight, upgrading measure, under study

Description of improvement measure: the Action's overall objective is to prepare and to launch the full-scale deployment of LNG as environmental friendly and efficient fuel in the inland navigation sector within the Priority Project 18 Rhine/Meuse-Main-Danube axis. It is a combined effort from sea and inland ports, authorities and barge and terminal operators, as well as logistic service providers, which will remove market barriers and take the first steps in realising a new LNG supply chain.

Cost: € 80,260,000 (€ 40,260,000 TEN-T Multi-annual Programme)

Title: Support to implementation of Corridor A/1 Rotterdam - Genoa as required by the Regulation (EU) No. 913/2010 and conversion of governance structure to a European Rail Freight Corridor 1 2012-DE-94085-S (EU48)

Mode/ Location: rail, NL, BE, DE, CH, IT

Keywords: infrastructure bottleneck, passenger/freight, upgrading measure, under study

Description of improvement measure: the Action forms part of the Global Project, the implementation of the Rail Freight Corridor Rotterdam - Genoa as required by Regulation (EU) No. 913/2010 concerning the European rail network for competitive freight. The Action includes :

1) Studies covering the development of the corridor information system;

2) Improvement of quality of operations within the corridor;

3) Establishment of an integrated corridor management system.

Cost: € 3,220,000 (€ 1,610,000 TEN-T Multi-annual Programme)

Title: Consolidation and strengthening of the corridor Upper Rhine as a central hub for the TEN-T network 2011-EU-95029-S (EU49)

Mode/ Location: inland port, Rhine

Keywords: infrastructure bottleneck, freight, upgrading measure, under study

Description of improvement measure: the Action has 3 main objectives:

- having a comprehensive and complete overview of the existing and the future needs regarding transport infrastructure in the coming years and decades;
- contribute to the improvement of the ports' accessibility and connectivity by water and rail as well as the region's accessibility to the European corridors;
- to support the TEN-T network and its development by developing an integrated and efficient multimodal transport strategy with the related governance structure and master-plan for investments at the upper-Rhine level.

Cost: € 1,700,000 (€ 850,000 TEN-T Multi-annual Programme)

Title: Genoa Airport / TEN-T railway corridor link 2012-IT-91009-S (EU50)

Mode/ Location: airport, Genoa Airport

Keywords: infrastructure bottleneck, passenger/freight, upgrading measure, under study

Description of improvement measure: Feasibility study concerning the construction of a new railway passenger station to serve Genoa airport and of a cable car infrastructure to connect the new rail station with the airport passenger terminal. The project is part of the Airport Master Plan which aims at expanding the catchment area by improving accessibility and intermodal connections for passengers.

Cost: € 1,152,000 (€ 576,000 TEN-T Multi-annual Programme)

Title: Follow up Actions Zürich Process (EU51)

Mode/ Location: rail, road, CH, DE, AT, FR

Keywords: operational/administrative bottleneck, freight, planned

Description of improvement measure: Heavy vehicles traffic management system TOLL+ chosen achter evaluation of different systems. Further activities include incident management on the road, safety in railway tunnels and joint data collection in the alpine countries.

Title: UNECE blue book (EU52)

Mode/ Location: IWW, All

Keywords: infrastructure bottleneck, passenger/freight, completed

Description of improvement measure: Inventory of main standards and parameters of the waterway network. Existing and future bottlenecks.

Title: Platina project (EU53)

Mode/ Location: IWW, All

Keywords: infrastructure bottleneck, passenger/freight, completed

Description of improvement measure: Analysis of bottlenecks and missing links for IWW. Existing and future bottlenecks.

Title: Market Observation (EU54)

Mode/ Location: IWW, All

Keywords: infrastructure bottleneck, freight, completed

Description of improvement measure: Analysis of the IWW market 2012. Existing and future bottlenecks.

Title: ERTMS implementation plan update (EU55)

Mode/ Location: rail, EU

Keywords: missing link, freight, upgrade, under construction

Description of improvement measure: ERTMS is not universally deployed. Rail freight corridors have been asigned where ERTMS should be implemented.

Title: RIS Upper Rhine (EU56)

Mode/ Location: IWW, upper Rhine

Keywords: operational/administrative bottleneck, freight, upgrade, under study

Description of improvement measure: Improve IWT quality with RIS to achieve modal shift.

Cost: €2,814,000 (€1,407,000 TEN-T Multi-annual Programme)

Title: Deployment of Inland AIS transponders in Flanders and The Netherlands (EU57)

Mode/ Location: IWW, lower Rhine

Keywords: operational/administrative bottleneck, freight, upgrade, completed

Description of improvement measure: Improve IWT quality to achieve modal shift. Also AIS is a tool to improve traffic management. Equip vessel with AIS transponders to facilitate RIS deployment.

Cost: €3,885,500 (€777,000 TEN-T Multi-annual Programme)

Title: Elaboration du Schéma de référence portuaire du bassin du Rhin (EU58)

Mode/ Location: Road, Rail, IWW, Ludwigshafen - Basel

Keywords: Infrastructure, operational, administrative bottleneck, freight, upgrade, under study

Description of improvement measure: Recomandations for future infrastructure, services and business developments of platforms/inland ports on the Upper Rhine.

Title: Upper Rhine a connected corridor - study on capacity and connectivity upgrades (EU59)

Mode/ Location: Road, Rail, IWW, Upper Rhine

Keywords: Infrastructure, operational, administrative bottleneck, freight, upgrade, under study

Description of improvement measure: Capacity and connectivity upgrades for Port Autonome de Strasbourgh. Cooperation with other Rhine ports.

Title: Upgrade of the Tortona-Voghera section (EU60)

Mode/ Location: rail, Milano - Genoa

Keywords: Infrastructure bottleneck, freight, upgrade, completed

Description of improvement measure: the Tortona-Voghera section, part of Priority Project 24 (railway axis Lyon/Genova-Basel-Duisburg-Rotterdam/Antwerpen) is part of two distinct railway routes: Milan-Genova and Turin-Piacenza. This overlap of traffic flows makes it necessary to quadruple the current double-track line. The total length of the section is 16 km, and the upgrade also requires the reconfiguration of the rail scheme at the Tortona station and additional works in the Voghera station for laying the new pair of tracks. The global scope of the upgrade is to increase the railway infrastructure capacity and remove the existing bottleneck. This project has been completed in 2010**.**

Cost: € 5,100,000 (€2,550,000 TEN-T Multi-annual Programme)

Title: 2006-IT-90906-S: Study on the migration from the system SCMT to ETCS (EU61)

Mode/Location: rail, Genoa-Milan-Chiasso / Genoa-Novara-Domodossola

Keywords: passenger and freight, under study

Map

Description of improvement measure: the aim of the project is to realise, both track-side and on-board, the prototype of ERTMS Level 1 with GSM/R radio infill function. SRS ERTMS/ETCS Version 230d and SRS ERTMS/ETCS Version 300 would be tested on trackside, while the on-board part would be created solely in compliance with the baseline 3. It will take place on a ca. 40km long section of the Italian part of the ERTMS Corridor A. This project has been completed in 2011.

Cost: € 3,200,000 (amount of funding € 1,500,000)

7. Annex: Comprehensive project list

No.	Trans-port mode		Location	Studies or work	Description of project	Project promoter	Timing	Costs (Mio €)	Financing sources
1	Rail	NL	Amsterdam	Works	Increase capacity /reliability of railway station Amsterdam Central for both rail freight and rail passenger transport	MinIenM	start before 2020	431	State budget
2	Rail	NL	Utrecht - Arnhem	Works	PHS (Programme High-Frequent Rail Services) to increase the capacity/reliability on the section Driebergen-Zeist; Ede	MinIenM	start before 2020	20	State budget
3	Rail	NL	Utrecht - Arnhem - German border	Works	Improve the conventional line capacity	MinIenM	2009 - unknown	234	State budget
4	Rail	NL	Meteren	Works	Building Meteren Boog to connect the Betuweroute with existing network to intensify rail freight on the Betuweroute	MinIenM	start before 2020	703	State budget, regional bugdet
5	Rail	NL	Rotterdam Port (europort) - Zwijndrecht	Study and works	Caland railway bridge, upgrade, new construction or diverting route (incl. study and works)	MoT & Port or Rotterdam	2015-2020	157 - 420	Reservation in national budget of 157 million. Whether or not Port of Rotterdam contributes is dependent on which option is used.
6	Rail	NL	Vlissingen - Moerdijk; Utrecht – Arnhem – Zevenaar; Utrecht - Geldermalsen	Works	ERTMS deployment	ProRail	2014-2030	235	State budget
7	Rail	BE	Belgian railways	Works	Removal of level crossings	INFRABEL	2014-2025	329.4	State budget, EU funding
8	Rail	BE	Belgian railways	Works	ETCS deployment on Core Network	INFRABEL	2014-2022	935.5	State budget, EU funding
9	Rail	BE	Brussels railways	Works	Capacity increase of the North-South Junction in Brussels	INFRABEL	2014-2025	288.9	State budget, EU funding
10	Rail	BE	Brussels-Denderleeuw (L50A)	Works	Increase in capacity of the Brussels - Denderleeuw line: building of 3rd and 4th tracks	INFRABEL	2014-2017	68.8	State budget, EU funding
11	Rail	BE	Gent - Zeebrugge	Works	Increase in capacity of the Gent-Zebrugge line: creation of 3rd and 4th track between Gent and Brugge and a third tracks between Brugge and Dudzele and various extension works (ports of Zeebrugge and Gent)	INFRABEL	2014-2025	462.8	State budget, EU funding
12	Rail	DE	(Amsterdam)-Zevenaar-Emmerich-Oberhausen (1. stage)	Works	Upgrade of existing line (third track)	Public-owned undertaking or body (DB Netz)	2005-2023	2,012	State budget
13	Rail	DE	Zevenaar-Oberhausen (existing line)	Works	Development of traffic management system (ERTMS)	Public-owned undertaking or body (DB Netz)	unknown	n/a	State budget
14	Rail	DE	Basel-Oberhausen	Works	ERTMS Implemenation Emmerich-Basel	DB Netz AG	2013-unknown	284	State budget co-financed by TEN-

No.	Trans-port mode		Location	Studies or work	Description of project	Project promoter	Timing	Costs (Mio €)	Financing sources
									T CEF (34 Mio.)
15	Rail	DE	Düsseldorf-Duisburg a. nodes Rhein-Ruhr-Express	Works	Resolution of physical bottlenecks (passenger) and upgrade of nodes	Public-owned undertaking or body (DB Netz)	unknown	2,000	State budget
16	Rail	DE	Duisburg-Moers, Düsseldorf, Haan-Leichlingen, Hürth, Köln, Mühlheim-Oberhausen	Works	Noise reduction measures	Public-owned undertaking or body (DB Netz)	unknown	n/a	State budget
17	Rail	DE	Frankfurt/Main Stadion (2. stage)	Works	Upgrading and new construction of two additional tracks	Public-owned undertaking or body (DB Netz)	2008-2014	911	State budget
18	Rail	DE	Karlsruhe-Offenburg-Freiburg-Basel (1.stage)	Works	New line and upgrade of existing line (third and fourth track)	Public-owned undertaking or body (DB Netz)	started-unknown	6,172	State budget, TEN-T (89.65)
19	Rail	DE	Karlsruhe-Offenburg-Freiburg-Basel (2.stage)	Works	New line and upgrade of existing line (third and fourth track)	Public-owned undertaking or body (DB Netz)	unknown	n/a	State budget
20	Rail	DE	Knoten Basel Bad Bf (existing line)	Works	Development of traffic management system (ERTMS)	Public-owned undertaking or body (DB Netz)	unknown	n/a	State budget
21	Rail	DE	Mannheim (2.stage)	Works	Additional platform, upgrade of station infrastructure	Public-owned undertaking or body (DB Netz)	unknown	160	State budget
22	Rail	DE	NBS Rhein/Main - Rhein/Neckar	Works	Construction of a high-speed passenger line	Public-owned undertaking or body (DB Netz)	unknown	2,183	State budget
23	Rail	DE	German Rail Network	Works	Noise reduction upgrade of rail vehicles (noised-reduced brakes "LL-Sohle")	Member State	2012-2021	152	State budget
24	Rail	IT	Genoa	Works	The proposed Action is the Global Project "Voltri-Brignole Infrastructural Upgrading", aiming at improving the Genoa railway node by separating the metropolitan and regional rail system from long-distance traffic flows and enhancing intermodality by improving the freight service connection with the maritime trade traffic.	RFI S.p.A.	2012-2020	642	National budget + EU contribution
25	Rail	IT	Genoa - Tortona	Works	High speed railway link "Terzo valico dei Giovi" - The new "Terzo Valico dei Giovi" line runs between Liguria and Piedmont, through twelve municipalities in the provinces of Genoa and Alessandria. It is approximately 53 kilometres long, including 39 km of tunnels, and also has 14 km of interconnections with the existing rail network, for a total of 67 km of new infrastructure. The new line will integrate existing lines and it will be compliant with TEN regulation standards among which gradient and loading gauge requirements that would be difficult to implement on the old lines . "Terzo Valico dei Giovi" line will permit a significant expansion in freight transport between Genoa and northern Tyrrhenian port system, northern Italy and Europe.	RFI S.p.A.	2011-2025	6,197	National budget + EU contribution
26	Rail	IT	Milan: Rho-Gallarate	Study and works	The project involves the installation of a fourth track, alongside the railway line between the stations of Rho and Parabiago. The upgrading of the railway link allows to increase the current capacity.	RFI S.p.A.	2014-2020	402	State budget + EU Contribution
27	Rail	IT	Chiasso - Milano	Study and works	Technology upgrade regarding headways for additional capacity, needed for the traffic increase forecasted by an IT-CH forecast	RFI S.p.A.	2016	30	National budget + EU contribution

No.	Trans-port mode		Location	Studies or work	Description of project	Project promoter	Timing	Costs (Mio €)	Financing sources
28	Rail	IT	Parabiago-Gallarate	Study and works	Technology upgrade regarding headways for capacity increase	RFI S.p.A.	until 2020	70	National budget + EU contribution
29	Rail	IT	Genoa-Milan; Genoa-Novara	Study and works	Speed upgrade (infrastructure and technology) in order to reduce travel time between the main urban nodes.	RFI S.p.A.	until 2020	n/a	National budget + EU contribution
30	Rail	IT	Genoa-Milan; Milan-Chiasso; Genoa-Novara; Novara-Domodossola	Study and works	Upgradings regarding command and control systems in the stations and other traffic management systems (no ERTMS)	RFI S.p.A.	until 2025	n/a	National budget + EU contribution
31	Rail	IT	Genoa-Milan; Milan-Chiasso; Genoa-Novara; Novara-Domodossola	Study and works	Implementation of the technical standards (defined by STI): completion of interventions realised until 2020	RFI S.p.A.	until 2030	n/a	National budget + EU contribution
32	Rail	IT	Tortona - Voghera	Study and works	Upgrade to 4 tracks	RFI S.p.A.	until 2025	600	National budget + EU contribution
33	Rail	IT	Chiasso - Milano Smistamento	Study and works	Upgrade power supply	RFI S.p.A.	until 2020	21	National budget + EU contribution
34	Rail	IT	Novara - Oleggio	Study and works	2nd track Vignale - Oleggio	RFI S.p.A.	until 2020	371	National budget + EU contribution
35	Rail	IT	Oleggio - Arona	Study and works	2nd track	RFI S.p.A.	until 2030	164	National budget + EU contribution
36	Rail	IT	Genoa - Milan	Study and works	Upgrade to 4 tracks on link Milano Rogoredo - Pieve Emanuele	RFI S.p.A.	until 2020	300	National budget + EU contribution
37	Rail	IT	Milano-Tortona-Genova; Genova - Novara; Domodossola-Milano; Luino-Novara; Domodossola-Novara	Study and works	Upgradings current technological system (headway and interlocking) in ordender to increase the affidability and allow the ERTMS deployement/upgrading	RFI S.p.A.	until 2020	n/a	National budget + EU contribution
38	Rail	IT	Milan Node	Works	Node upgrade (node technologies, traffic management)	RFI S.p.A.	until 2020	444	National budget + EU contribution
39	Rail	IT	Novara - Domodossola ; Milano - Chiasso	Study and works	Upgrade for 740m on railway access to the Simplon tunnel and the Gotthard tunnel (Phase 1)	RFI S.p.A.	until 2016	30	National budget + EU contribution
40	Rail	IT	Novara - Domodossola ; Milano - Chiasso	Study and works	Upgrade for 740m on railway access to the Simplon tunnel and the Gotthard tunnel (Phase2)	RFI S.p.A.	until 2020	70	National budget + EU contribution
41	Rail	IT	Genova-Arquata-Novara; Genova-Tortona	Study and works	Upgrade for 740m	RFI S.p.A.	until 2020	100	National budget + EU contribution
42	Rail	IT	Chiasso - Milano	Study and works	Upgrade to PC80 loading gauge on railway access to the Gotthard tunnel	RFI S.p.A.	until 2016	40	National budget + EU contribution
43	Rail	IT	Luino - Novara/Milano	Study and works	Upgrade to PC80 loading gauge on railway access to the Simplon pass	RFI S.p.A.	until 2020	120	National budget + EU contribution
44	Rail	IT	Genova-Arquata-Novara/Milano	Study and works	Upgrade to PC45 loading gauge on Genova - Arquata - Tortona - Alessandria links	RFI S.p.A.	until 2020	40	National budget + EU contribution

No.	Trans-port mode		Location	Studies or work	Description of project	Project promoter	Timing	Costs (Mio €)	Financing sources
45	Rail	IT	Novara - Domodossola ; Milano - Chiasso	Study and works	Infrastructures upgrade aimed at rail noise reduction and resolution of interference with road access to the Alpine passes.	RFI S.p.A.	until 2020	100	National budget + EU contribution
46	Rail	IT	Milano - Chiasso; Tortona - Milano; Genoa - Tortona; Domodossola-Novara	Works	ERTMS deployment phase 1	RFI S.p.A.	until 2020	55	National budget + EU contribution
47	Rail	IT	Genoa - Novara; Sesto Calende - Milano	Works	ERTMS deployment phase 2	RFI S.p.A.	until 2025/30	100	National budget + EU contribution
48	Rail	IT	Genoa - Milan; Genoa - Novara; Novara - Domodossola ; Milano - Chiasso	Works	Interventions on various stations aimed at enhancing the quality of service and accessibility	RFI S.p.A.	until 2020	100	National budget + EU contribution
49	Rail	IT	Genoa Node	Study and works	Upgrading of Genoa Campasso station. The station is functional for the rail connection to the port of Genoa	RFI S.p.A.	until 2020	26	National budget + EU contribution
50	Rail	IT	Genoa - Milan; Genoa - Novara; Novara - Domodossola; Milano - Chiasso	Study and works	Removal of critical rail crossings on various sections	RFI S.p.A.	until 2020	160	National budget + EU contribution
51	Rail	IT	Genoa - Milan	Study and works	Upgrade to 4 tracks on link Pavia - Pieve Emanuele	RFI S.p.A.	until 2025	600	National budget + EU contribution
52	Rail	IT	Milano-Tortona; Novara-Alessandria	Study and works	Upgrade for 740m	RFI S.p.A.	until 2025	112	National budget + EU contribution
53	Rail	IT	Genoa - Milan; Genoa - Novara	Study and works	Upgrade to PC80 loading gauge on railway access to the tunnel foreseen by "Terzo Valico" project including accessibility to the port of Genoa.	RFI S.p.A.	until 2025	n/a	National budget + EU contribution
54	Rail	IT	Rho - Gallarate	Study and works	Stations and headway upgrades for capacity increase	RFI S.p.A.	2025/2030	n/a	National budget + EU contribution
55	Rail	IT	Novara Node	Study and works	Completions Vignale and Novara Boschetto station and intervention on Novara Central station.	RFI S.p.A.	until 2030	493	National budget + EU contribution
56	Rail	IT	Rho - Gallarate	Study and works	Upgrade to 3 tracks on the railway line between the stations of Parabiago and Gallarate, and completion of "Y link" ("Raccordo Y") in Busto Arsizio. The project aims to improve rail service to Malpensa Airport and along the rail line Rho-Gallarate.	RFI S.p.A.	after 2030	326	National budget + EU contribution
57	Rail	IT	Chiasso - Milano	Study and works	Upgrade to 4 tracks on the railway line between the stations of Chiasso and Monza. The project allows an increase of capacity, in view of the expected traffic from Gotthard tunnel.	RFI S.p.A.	after 2030	1,412	National budget + EU contribution
58	Rail	NL, DE	Border "NL/DE" - Duisburg	Works	Resolution of physical bottlenecks, actions concerning rail cross-border sections, actions enhancing rail interoperability and interventions concerning compliance with Core Network standards on train length (740m), development of traffic management systems	Public-owned undertaking or body (DB Netz)	2007-2015	159.1	co-financed by TEN-T CEF (47 Mio €)
59	Rail	NL, BE, DE, CH,	Rotterdam - Genoa	Works	Support to the long term implementation of the TEN-T network in the development of Corridor A/1 Rotterdam–Genoa required by the regulation (EU) no. 913/2010 and conversion of governance structure to a European Rail Freight Corridor 1	Public-owned undertaking or body (EEIG)	2013-2015	3.2	Co-financed by TEN-T CEF (1.6 Mio €)

No.	Trans-port mode		Location	Studies or work	Description of project	Project promoter	Timing	Costs (Mio €)	Financing sources
		IT							
60	Rail	IT, CH	Simplon pass	Study	The study is aimed at defining solutions to make rail infrastructure compliant with TEN-T standards in terms of loading gauge, train length and gradient.	Piedmont Region	2018-open	100	No resource allocated yet
61	Road	NL	Rotterdam - Duisburg	Works	A50, More lanes, extra bridge, improved junction A15	Rijkswaterstaat	2011-2015	276	State budget
62	Road	NL	Rotterdam	Works	Maasvlakte-Vaanplein. A15 motorway upgrade. Including Botlek bridge.	Rijkswaterstaat	2011-2015	2,031	State budget
63	Road	NL	Rotterdam - Duisburg	Works	Extend A15 motorway (missing link south of Arnhem)	Rijkswaterstaat	2016-2019	822	State budget, Regional contribution, contribution of future toll collection of infrastructure
64	Road	BE	Brussels	Study and works	Optimisation of the Brussels Ring road	Agentschap Wegen en Verkeer	2012-2022	183	Member State funding, EU funding
65	Road	DE	A3 / A 4 / A44 / A5	Works	Capacity expansion of lorry parking positions (A3: Hösel Ost, Hünxe Ost, Hünxe West, Königsforst Ost, Königsforst West, Ohligser Heide West, Siegburg Ost (2), Stinderhof, Stindertal, Sülztal Ost (alte Polizeistation), Johannespfad, Oberbach, Tilsit Ost, Tilsit West, A4: Frechen Nord, Rur-Scholle Süd, Rur-Scholle Nord A44 Lichtenbusch Nord, A 44 Lichtenbusch Süd A5: Alsbach W (2), Bad Camberg W, Bergstraße O (2), Bernd Rosemeyer, Bühl O, Kreuzlach W, Limburg O, Limburg W, March, Mönchberg, Scheidweg, Weilbach W)	Member State	2014-2020	93.3	State budget
66	Road	DE	A1: Köln-Leverkusen (8 lanes)	Works	Upgrade to 8 lanes	Member State	2017-2023	240	State budget
67	Road	DE	A1: Köln-Leverkusen (Rhine bridge)	Works	Construction of a replacement bridge for the currently over-utilised A1 Rhine bridge near Leverkusen (first part 2017-2020; second part 2020-2023)	Member State	2017-2023	180	State budget
68	Road	DE	A1: Leverkusen (8 lanes)	Works	Upgrade to 8 lanes	Member State	2019-2023	250	State budget
69	Road	DE	A3: Köln-Leverkusen (8 lanes)	Works	AS Köln-Mühlheim - AS Leverkusen (2015-2018): upgrade to 8 lanes AS Leverkusen - AK Leverkusen (2019-2023): upgrade to 8 lanes	Member State	2015-2023	202	State budget
70	Road	DE	A5/A6: Walldorf (bridge)	Works	Upgrade of the bridge	Member State	2018-unknown	5.8	State budget
71	Road	DE	A5: Heidelberg (bridge)	Works	Upgrade of the bridge	Member State	2016-unknown	2	State budget
72	Road	DE	A5: Weil am Rhein (bridge)	Works	Upgrade of the bridge	Member State	2016-unknown	20	State budget
73	Road	IT	IT-CH Border	Study and works	The proposed action aims at mitigating the congestion of the road access to the Simplon pass from Italy (SS 33 del Sempione) by the implementation of a new layout of the area.	ANAS SpA	open	35	ANAS SpA
74	Road	IT	Milan Node	Study and works	Maintenance works on SS36. This road ensure the last mile connection to Malpensa airport in Milan	ANAS SpA	2014-2020	11.6	ANAS SpA
75	Road	IT	Genoa	Study and works	Gronda of Genova: Design and construction of a new orbital motorway aimed at separating long-distance traffic flows from urban traffic. Project is expected to reduce congestion as well as to enhanance accessibility to both urban node and seaport.	Autostrade per l'Italia SpA	2013-2025	3,266	Project financing scheme
76	IWW	NL	Amsterdam	Study	Phase 2 Implementation study to prepare the start of the PPP procurement to improve maritime access to the TEN-T network at Amsterdam	MinIenM	2013-2014	5.4	Co-financing from TEN-T
77	IWW	NL	Dordrecht -	Works	Future vision Waal. Short term dredging to extend the dimensions. Finding a long	Rijkswaterstaat	2006-2021	131	State budget

No.	Trans-port mode		Location	Studies or work	Description of project	Project promoter	Timing	Costs (Mio €)	Financing sources
			Emmerich		term geological solution. Finally increasing the number of mooring places.				
78	IWW	NL	Ijmuiden - Amsterdam	Works	Build a new lock (upgrading). Increase port handling capacity and safety. New lock also needed to comply with large dimensions of vessels.	Rijkswaterstaat	2015-2019	891	State budget, Regional contribution
79	IWW	NL	Moerdijk	Study	Traffic management system Hollandsch Diep-Dordtsche Kil	Rijkswaterstaat	2025-unknown	10	State budget
80	IWW	NL	Dutch IWW Core Network	Study	LNG Masterplan for Rhine-Main-Danube	Pro Danube Management GmbH	2013-2015	80	50% Co-financing from TEN-T
81	IWW	NL	Dutch IWW Core Network	Works	Subsidy Quick Wins Binnenhavens. Subsidy to local goverment for Dutch ports to increase the modal share of IWT.	MinIenM	2008-2015	162	State budget
82	IWW	NL	Dutch IWW Core Network	Works	Verbeterprogramma Waterkwaliteit. Aimed at improving chemical and ecological quality of water, reducing water pollution	MinIenM	2009-2015	570	State budget
83	IWW	NL	Rotterdam - Gorinchem	Works	Increase the number of mooring locations	Rijkswaterstaat	2016-2017	29	State budget
84	IWW	NL	Volkerak	Study and works	Options for increasing traffic throughput in Volkeraklock, Kreekaklock, and Krammerlock.	Rijkswaterstaat	2014-2026	157	State budget
85	IWW	BE, NL	Terneuzen	Works	New lock in Terneuzen	Vlaams Nederlandse Schelde Commissie (VNSC)	2015-2021	930	State funding (The Netherlands, Flanders region, Belgian state), EU funding
86	IWW	BE, NL	Westerscheldt River	Works	Implementation of RIS on the Westerscheldt River II	Beheer en Exploitatieteam Schelderadar (VTS Scheldt)	2012-2014	2.7	National (2.12), TEN-T (0.53)
87	IWW	BE, NL	Westerscheldt River	Works	Implementation of RIS on the Westerscheldt River III	Beheer en Exploitatieteam Schelderadar (VTS Scheldt)	2013-2015	4.8	National (4.35), TEN-T (0.475)
88	IWW	NL, DE	Rhine	Study	Vessel Traffic Management Centres of the Future RIS	European Commission, DG Move	2011-2014	7.7	State budget (50%), TEN-T (50%)
89	IWW	DE	Rhine (Bonn-Koblenz 2,5 m)	Works	Extend fairway depth	Member State	2019-2020	n/a	State budget
90	IWW	DE	Rhine (Iffezheim-Swiss border 3,5 m)	Works	Extend fairway depth	Member State	2019-2020	1,172	State budget
91	IWW	DE	Rhine (Koblenz-Iffenheim 2,1 m) (Kaub-Budenheim 1,9 m)	Works	Extend fairway depth	Member State	2019-2020	n/a	State budget
92	IWW	DE	Rhine (Krefeld-Bonn 2,8 m)	Works	Extend fairway depth	Member State	2019-2020	n/a	State budget
93	IWW	DE	Rhine (Lobith-Krefeld 2,8 m)	Works	Extend fairway depth	Member State	2019-2020	n/a	State budget
94	IWW	DE	Neckar	Works	Upgrade locks for 135m barges	Member State	started-unknown	830	State budget
95	IWW	DE	Trier (Moselle)	Works	Second lock Trier	Member State	2011-2017	540	State budget
96	IWW	DE	Plochingen (Neckar)	Works	Landfilling of an unused harbour basin to create additional port areas	Stadt Plochingen /	2016-2018	9	

No.	Trans-port mode		Location	Studies or work	Description of project	Project promoter	Timing	Costs (Mio €)	Financing sources
						Neckarhafen Plochingen GmbH			
97	IWW	DE	Plochingen (Neckar)	Works	Construction of a trimodal multifunctional area to also allow container handling	Neckarhafen Plochingen GmbH	2015-2017	5	
98	IWW	DE, FR, CH	Rhine	Study	Consolidation and strenghtening of the Upper Rhine as a central hub for the TEN-T network	Public-owned undertaking or body (Ports of Ludwigshafen, Mannheim, Karlsruhe, Strasbourg, Kehl, Colmar, Rhine Ports Basel-Mulhouse-Weil)	2012-2014	1.7	co-financed by TEN-T CEF (0.85 Mio €)
99	IWW	FR	Upper Rhine	Works	Development of a common and unique information system (Port Community System) to optimise the use of all existing tools with a slot booking system for loading and unloading	Port Autonome de Strasbourg, Upper Rhine Ports	2015-2020	1	
100	IWW	FR	Gambsheim (Rhine)	Works	Upgrading of Gambsheim locks, including the replacement of the control center and the replacement of gates	Voies Navigables de France	open	n/a	
101	IWW	FR	Upper Rhine	Works	Development of traffic management system (RIS)	Voies Navigables de France	2015-2020	n/a	
102	IWW	FR	Gambsheim (Rhine)	Works	CARING (Centre d'Alerte Rhénan d'Informations Nautiques de Gambsheim) reconstruction and Gambsheim subdivision	Voies Navigables de France	2014-2020	5	
103	Inland Port	BE	Maas basin	Works	Building of a trimodal platform in Liège including a rail link in Chertal (Trilogiport)	Port o f Liège	2013-2015	2.5	
104	Inland Port	DE	Düsseldorf Reisholz	Study	Study on infrastructure development	Port Authority Düsseldorf	2014-2015	0.7	State budget
105	Inland Port	FR	Strasbourg	Works	Increasing capacity at the Port du Rhin station ; Upgrading rail access to the port; Upgrading signalling and points equipments; Rail access to the port from the German network	Port Autonome de Strasbourg	2015-2025	17	
106	Inland Port	FR	Strasbourg	Works	North road access to the port of Strasbourg	Port Autonome de Strasbourg	2015-2020	10	
107	Inland Port	FR	Strasbourg	Works	Increasing the size of entry locks to the port	Port Autonome de Strasbourg	2020 - unknown	7	
108	Inland port	FR	Strasbourg	Works	Study and work on a new terminal for empty containers to be shared with Kehl port (Germany) ; Development of a container terminal and development of the Lauterbourg container terminal	Port Autonome de Strasbourg, Port of Kehl	2015-2020	61	
109	Inland Port	FR	Strasbourg	Works	Improving rail capacity of the Lauterbourg-Woerth line; rail connection to Lauterbourg station	Port Autonome de Strasbourg	open	n/a	
110	Inland port	FR	Ottmarsheim	Study and works	Study and work on a new container terminal and a logistics zone in Ottmarsheim (Port of Mulhouse) shared with Basel and Weil am Rhein	Port de Mulhouse	2015-2020	25	
111	Inland port	FR	Mulhouse	Works	Development of a new port area in Mulhouse agglomeration (Île Napoléon)	Port de Mulhouse	2015-2020	7	
112	Seaport	NL	Ijmuiden - Amsterdam	Works	New location for transhipment; Northern Sealock, Averijhavendepot.	Rijkswaterstaat	2014-2017	65	State budget
113	Seaport	NL	Rotterdam Port (europort) -	Works	Upgraded along port railway line (junctions and shunting yards).	Rijkswaterstaat	2013-2020	290	State budget 217, Port of Rotterdam 73

No.	Trans-port mode		Location	Studies or work	Description of project	Project promoter	Timing	Costs (Mio €)	Financing sources
			Zwijndrecht						
114	Seaport	BE	Gent	Works	Infrastructure bottleneck, internal port rail infrastructure, development of multimodal terminal, port connection to inland network, interoperability maritime-inland-rail	Private + port authority	2014-2016	5.5	Private funding
115	Seaport	BE	Antwerp	Study and works	Upgrading shunting yards and junctions; freight transport services	Port of Antwerp	2014-2020	100	
116	Seaport	BE	Antwerp	Works	New lock of Deurganckdok in Port of Antwerp	NV Deurganckdoksluis	2011-2016	382	NV Vlaamse Havens (incl. EIB loan), EU funding
117	Seaport	BE	Antwerp	Works	Renovation of the Royers lock in port of Antwerp	Flemish Ministry of Mobility and Public Works	2016-2019	140	Member State funding, port authority, EU funding
118	Seaport	BE	Antwerp	Works	Construction of a new dock at Noordlandbrug, in order to have sufficient waiting capacity for barges.	NV De Scheepvaart	until 2020	16	Member State funding, port authority, EU funding
119	Seaport	BE	Antwerp	Works	Increase in the capacity of access to the port of Antwerp	INFRABEL	2014-2025	224.4	State budget, EU funding
120	Seaport	IT	Genoa	Works	Electrification of the quays in Genova Voltri - Electricity supply to the ships via connection to the ground grid.	Genoa Port Authority (Other local public authorities)	2015-2019	12	Genoa Port Authority (Other local public authorities)
121	Seaport	IT	Genoa	Works	Improvement of road access to the port (Voltri and Sampierdarena area) – The intervention allows to improve and upgrade the road access and the connection between the toll house and the port, for reducing congestion and remove bottlenecks in relation to the conflicts between port and urban road traffic.	Liguria Region (Other local public authorities) Genoa Municipality (Other local public authorities) Genoa Port Authority (Other local public authorities) Autostrade per l'Italia (Private undertaking) RFI S.p.A.(public-owned undertaking or body – Rail Infrastructure Manager)	2015-2017	50	Genoa Port Authority (Other local public authorities) Private funding BEI loan
122	Seaport	IT	Genoa	Works	"Rail Plan" interventions in the Sampierdarena port basin: - "Fuorimuro" in-port freight yard upgrading and the "Dorsale Ferroviaria" (port	Genoa Port Authority (Other local public	2015-2018	50	Genoa Port Authority (Other local public authorities)

No.	Trans-port mode	Location	Studies or work	Description of project	Project promoter	Timing	Costs (Mio €)	Financing sources
				railway backbone) completion; - Doubling of rail tracks aimed at the connection between the new Ronco-Canepa terminal and the national rail network. - Upgrading of the Voltri Terminal rail freight yard - Upgrading of the Campasso rail freight yard and related connection to the new Bettolo terminal and electrification of the rail tracks.	authorities) RFI S.p.A.(public-owned undertaking or body – Rail Infrastructure Manager) Private operators			Private operators National funds (DL 145/2013 "Destinazione Italia")
123	Seaport	IT Genoa	Study	Re-configuration of Maritime access to Sampierdarena Port Basin and the new Genoa Port Master Plan preparatory studies – the study aims at increasing the efficiency, capacity, safety and interoperability of the port of Genoa and consist of preparatory studies covering infrastructural, logistic and economic and strategic environmental analysis that will constitute the basis of the new Port Master Plan and the final design of the new Sampierdarena basin breakwater.	Genoa Port Authority (Other local public authorities)	2014-2016	11.5	Genoa Port Authority (Other local public authorities) EU TEN-T funds (3,8 mil. Project 2013-IT-91049-S)
124	Seaport	IT Genoa	Works	Re-configuration of maritime access to Sampierdarena Port Basin– the new Sampierdarena basin breakwater works realization.	Genoa Port Authority (Other local public authorities)	2017-2027	500	Genoa Port Authority (Other local public authorities)
125	Seaport	IT Genoa	Study and Works	Pilot project on LNG ship and re-fuelling (1st step) – Study and pilot actions aiming at assessing and analyse the economic-safety-environmental-regulatory aspects and possible localisations of an LNG bunkering station in the Port of Genoa. Pilots will deal with real testing of LNG bunkering and storage in-port operations.	Genoa Port Authority (Other local public authorities)	2015-2018	5	Genoa Port Authority (Other local public authorities)
126	Seaport	IT Genoa	Works	New ecological platform – new waste reception facilities realization	Genoa Port Authority (Other local public authorities)	2015-2017	11	Genoa Port Authority (Other local public authorities)
127	Seaport	IT Genoa	Works	Upgrading of port container terminals (Ronco Canepa & Bettolo) - terminal expansion through land reclamation and port terminals upgrading also by ancillary infrastructure improvements.	Genoa Port Authority (Other local public authorities)	2012-2016	140	State Budget Resources from project promoter EU TEN-T Funds (3,8 mil.)
128	Seaport	IT Genoa	Works	Port dredging plan - involves the deepening of the seabed from the mouth of the Levant until the water surface Multedo (750,000 cubic meters). The purpose of this extraordinary intervention is to allow the transit of larger ships, compatible with the existing and future berths and safety requirements.	Genoa Port Authority (Other local public authorities)	2015-2017	22.5	Genoa Port Authority (Other local public authorities)
129	Seaport	IT Genoa	Works	New Porto Petroli offshore platform -Building of the new liquid bulk off-shore station for loading/unloading.	Porto Petroli/private terminal operator Genoa Port Authority (Other local public authorities)	open	n/a	Porto Petroli/private terminal operator Genoa Port Authority (Other local public authorities)
130	Seaport	IT Genoa	Works	Voltri Terminal revamping - complementary works for part of the Voltri terminal operational improvements related to the dock load-bearing capacity, functional adaptation of the quay flooring to higher loads.	Voltri Terminal Operator / Genoa Port	open	30	Terminal Operator (private) / Genoa Port Authority

No.	Trans-port mode		Location	Studies or work	Description of project	Project promoter	Timing	Costs (Mio €)	Financing sources
						Authority (Other local public authorities)			(Other local public authorities)
131	Airport	BE	Brussels	Works	Diabolo project – rail connection of the Brussels airport with the international railway axes Frankfurt – Liège – Brussels - Paris	INFRABEL	2014-2018	64	State budget, EU funding
132	Airport	BE	Liège-Bierset Airport	Works	High speed rail connection and building of the Liège-Carex terminal	Liège Carex, INFRABEL	2015-unknown	34	Liège Carex, Member State, EU funding
133	Airport	IT	Milan	Study and works	Accessibility from the north, rail connection: Simplon – Gottard axis - The final design consists of a double-track main link between the Malpensa terminal and the existing line of Gallarate-Varese, and in two interconnections, each dual track: one is connected to the Gallarate-Domodossola railway link (to and from the north); the other is linked to the Gallarate-Domodossola link (to and from the south). This project will implement long-term strategic goal of creating a link between the Malpensa airport and the territory through the Gotthard and Simplon and, therefore, significantly increasing the amount of users.	RFI S.p.A.	until 2020	n/a	No resource allocated yet
134	Airport	IT	Milan	Works	Rail connection between Terminal 1 and 2 – The project consists of the construction of the rail link between Terminal 1 and Terminal 2 of Malpensa. The design of the project is divided into two lots: - lot 1 which concerns the construction of the underground railway station; - Lot 2 which concerns the continuation of the railway line for approximately 3.4 km long double-track tunnel and trench, and includes the design of railway facilities all along the railway link and within the T2 station.	SEA S.p.A. FERROVIENORD S.p.A.	2013-2015	114 (Resources allocated 69)	EU contribution State Budget (45mil.) Regional Budget
135	Airport	IT	Milan (Malpensa)	Study and works	Connection tunnel terminal 1-satellite, people mover	SEA S.p.A.	2017-2020	225	
136	Airport	IT	Bergamo	Study and works	Rail connection Bergamo-Milan – Railway link between the Orio al Serio Airport and Bergamo city. According to the feasibility study, two solutions are envisaged: extend the regional railway network and set-up a people moving system through a new tram line connected to the station.	RFI S.p.A. SACBO (Private undertaking)	open	170 (incl. study and works)	State budget and private funding
137	Airport	IT	Genoa Node	Works	Construction of a new railway passenger station to serve Genoa airport and of a cable car infrastructure to connect the new rail station with the airport passenger terminal. The project is part of the Airport Master Plan which aims at expanding the catchment area by improving accessibility and intermodal connections for passengers.	Aeroporto di Genova SpA	2017-2022	37	National budget EU contribution Contribution by project promoter Project financing scheme will be expected to cover part of the costs
138	IWW	NL, BE, DE	NL, BE, DE	Study	RIS enabled IWT corridor management	nat. MoT	2013-2015	2.8	National (1.4), TEN-T (1.4)
139	RRT	NL	Rotterdam	Works	Container Logistics Maasvlakte (CLM) - logistical solutions of combining cargo in order to create full trians and reduce turnaround times and nr of calls.	Port of Rotterdam	2015-2017	125	To be decided; decision will be made by end of Novermber 2014
140	RRT	NL, BE, DE, CH,	Rotterdam - Genoa	Study and works	(National study on the) implementation of rail freight line systems connecting rail/road/water-terminals in the Rhine-Alpine Corridor	EGTC Rhine-Alpine (CODE 24)	2015-2020	1.2 - 2	EU funding, INTERREG IVB, regional funding

No.	Trans-port mode		Location	Studies or work	Description of project	Project promoter	Timing	Costs (Mio €)	Financing sources
		IT							
141	RRT	DE	Duisburg (Rhein-Ruhr terminal)	Works	Construction of the intermodal hub Rhein-Ruhr	Public-owned undertaking or body (DB Netz)	2010-unknown	43.5	State budget
142	RRT	IT	Milan Node	Study and works	Milano Smistamento terminal upgrade	RFI S.p.A.	until 2020	50	National budget + EU contribution
143	RRT	IT	Novara Node	Study and works	Novara Boschetto terminal upgrade	RFI S.p.A.	until 2020	90	National budget + EU contribution
144	RRT	IT	Vado Ligure (Genoa node)	Study and works	The proposed action aims at ensuring the seamless freight flow through the multimodal centre of Vado Ligure, improving the control system and road accessibility. The action concerns the realisation of a new access system to the multimodal node of Vado, including the construction of: - Customs Gates - centralised control facilities (veterinary, sanitarian etc) - new road connections between the VIO multimodal centre, the main road network and the port of Vado Ligure.	VIO (Vado Intermodal Operator) Private company controlled by transport and logistics operators and Port Authority of Savona (holds 8% of the shares)	2015-2017	38	VIO; Port Authority of Savona
145	RRT	IT	Vado Ligure (Genoa node)	Study and works	The proposed action aims at boosting railway traffic from the ports of Genoa and Vado Ligure to the hinterland by enhancing modal shift capacity in the VIO intermodal centre of Vado Ligure. The action includes the construction of a new intermodal (rail-road) terminal and the improvement of the rail link between the multimodal node of Vado Ligure and the railway network.	VIO (Vado Intermodal Operator) Private company controlled by transport and logistics operators and Port Authority of Savona (holds 8% of the shares)	2015-2017	25	VIO; Port Authority of Savona
The following Swiss projects will be funded by national financial sources									
2000	Rail	CH	Axen	Works	Resolution of physical bottlenecks		unknown-after 2030	n/a	Public + IM
2001	Rail	CH	Basel - Bellinzona - Chiasso	Works	Other telematic application systems		unknown-2019	230	Public + IM
2002	Rail	CH	Basel - Bellinzona - Chiasso	Works	Intervention concerning profile limitations (upgrade to P400)		unknown-2020	700	Public + IM
2003	Rail	CH	Basel Bad - Basel SBB	Works	Upgrade to 4 tracks		started-2015	40	Public + IM
2004	Rail	CH	Basel East, Ergolztal	Works	Resolution of physical bottlenecks		unknown-until 2025	747	Public + IM
2005	Rail	CH	Basel-Mittelland	Works	Resolution of physical bottlenecks		unknown-after 2030	n/a	Public + IM
2006	Rail	CH	Bellinzona - Lugano, Ceneri Basetunnel	Works	Interventions concerning gradient, speed limitations, resolution of physical bottlenecks		started-2019	2,048	Public + IM
2007	Rail	CH	Bellinzona - Tenero	Works	Resolution of physical bottlenecks		unknown-until 2022	124.5	Public + IM
2008	Rail	CH	Bern - Thun	Works	Other telematic application systems (Headway 2')	Public+IM	started-	18	Public + IM

No.	Trans-port mode		Location	Studies or work	Description of project	Project promoter	Timing	Costs (Mio €)	Financing sources
2009	Rail	CH	Corridor A/1 lines	Works	Development of traffic management system (ERTMS Lvl 1)		2014 started-2015	115	Public + IM
2010	Rail	CH	Erstfeld - Biasca (Gotthard base tunnel)	Works	Interventions concerning gradient, speed limitations, Resolution of physical bottlenecks		started-2016	8,235	Public + IM
2011	Rail	CH	Ferden - Mitholz (Lötschberg base tunnel)	Works	Resolution of physical bottlenecks		unknown-after 2025	n/a	Public + IM
2012	Rail	CH	Frutigen - Visp	Works	Base tunnel, 2 tracks (2nd phase)		unknown-after 2025	640	Public + IM
2013	Rail	CH	Gümlingen - Münsingen	Works	Resolution of physical bottlenecks		unknown-until 2025	522	Public + IM
2014	Rail	CH	Liestal	Works	Resolution of physical bottlenecks	Public-owned body	unknown-2026	124.5	
2015	Rail	CH	Lugano	Works	Resolution of physical bottlenecks		unknown-until 2025	83	Public + IM
2016	Rail	CH	Mägenwil - Lupfig	Works	Resolution of physical bottlenecks		unknown-until 2019	83	Public + IM
2017	Rail	CH	Railnode Bern	Works	Resolution of physical bottlenecks		unknown-until 2025	515	Public + IM
2018	Rail	CH	Walchwil - Arth-Goldau	Works	Resolution of physical bottlenecks	Public-owned body	unknown-2018	74.7	
2019	Rail	CH	Pratteln-Brugg (Bözberg Tunnel)	Works	Intervention concerning profile limitations (upgrade to P400)		2015-2018	70.6	Public + IM
2020	Rail	CH	Olten-Aarau	Works	4 track line		2014-2020	664	Public + IM
2021	Rail	CH	Altdorf	Works	Upgrade of station		2020-2022	37.4	Public + IM
2022	Rail	CH	Simplon Tunnel	Works	Complete structural rehabilitation necessary		2011-2016	141.1	Public + IM
2023	Road	CH	CH-D border Basel - Intersection Basel Hagnau (dir. South)	Works	Upgrading of ordinary road to connect node to motorway		2013-2015	47	Public, National funding for upgrading and maintenance
2024	Road	CH	Connection Göschenen - connection Airolo	Works	Complete structural rehabilitation		unknown	1,685	Public, National funding for upgrading and maintenance
2025	Road	CH	Intersection Basel Hagnau - Intersection Augst	Works	Resolution of physical bottlenecks		unknown	325	Public, National funding PEB2
2026	Road	CH	Intersection Basel Wiese - Intersection Basel Hagnau	Works	Resolution of physical bottlenecks		unknown	763	Public, National funding PEB2
2027	Road	CH	Intersection Bellinzona - CH-I border Chiasso	Works	Resolution of physical bottlenecks		unknown	675	Public, National funding PEB2
2028	Road	CH	Intersection Härkingen -	Works	Resolution of physical bottlenecks		2012-2014	138	Public, National funding PEB2

No.	Trans-port mode		Location	Studies or work	Description of project	Project promoter	Timing	Costs (Mio €)	Financing sources
			Intersection Wiggertal						
2029	Road	CH	Intersection Rotsee - Intersection Lopper	Works	Resolution of physical bottlenecks		unknown	1,221	Public, National funding PEB2
2030	*Rail*	CH	*Aarau - Zürich*	Works	*Resolution of physical bottlenecks*	*Public-owned body*	*unknown-2025*	*n/a*	
2031	*Rail*	*CH*	*Bellinzona - Ranzo*	*Works*	*Resolution of physical bottlenecks, Intervention concerning train length*		*unknown-2016*	*60.00*	*Public + IM*
2032	*Rail*	*CH*	*Thalwil - Zug*	*Works*	*Resolution of physical bottlenecks*		*unknown-after 2025*	*n/a*	*Public + IM*
2033	*Rail*	*CH*	*Zug - Lucerne*	*Works*	*Resolution of physical bottlenecks*		*unknown-after 2025*	*n/a*	*Public + IM*
2034	*Rail*	*CH*	*Lausanne - Bern*	*Works*	*Resolution of physical bottlenecks*		*unknown-after 2030*	*n/a*	*Public + IM*
The following projects are proposed to solve so far unaddressed critical issues and/or fulfil the TEN-T requirements until 2030									
3000	Rail	NL	Connection Vlissingen port area	Works	Upgrade line to allow freight speed of >100 km/h		unknown - 2030	n/a	
3001	Rail	NL	Vlissingen - Bergen op Zoom	Works	Upgrade line for axle load of 22.5t		unknown - 2030	n/a	
3002	Rail	BE	Berneau - Visè - German border	Works	Upgrade line to allow freight speed of >100 km/h on the entire line		unknown - 2030	n/a	
3003	Rail	DE	Oberhausen - Köln (passenger line); Köln-Koblenz (passenger line); Köln - Frankfurt - Groß Gerau - Mannheim - Heidelberg - Karlsruhe; Hergenrath (border) - Köln	Works	ERTMS deployment		unknown - 2030	n/a	
3004	Road	BE	Belgian road network	Works	Availability of clean fuels		unknown - 2030	n/a	
3005	Road	DE	Düsseldorf	Works	Solve road capacity bottleneck and peak hour traffic congestions in and around Düsseldorf		unknown	n/a	
3006	Road	IT	Italian road network	Works	Availability of clean fuels		unknown - 2030	n/a	
3007	Road	IT	Italian road network	Works	Use of tolling system		unknown - 2030	n/a	
3008	Airport	NL	Rotterdam The Hague Airport	Works	Connect Rotterdam The Hague Airport to the rail network		unknown - 2030	n/a	
3009	IWW	FR	Strasbourg	Works	Upgrade of Bridge of Europe and Railway Bridge			n/a	
3010	Rail	BE	Belgian rail network	Works	Upgrade rail network to allow operation of 740m trains on a regular basis		unknown	n/a	
3011	Rail	DE	German rail network	Works	Upgrade rail network to allow operation of 740m trains on a regular basis	*DB Netz AG*	unknown	n/a	
3012	Rail	DE	German rail network	Works	Upgrade and modernisation as well as capacity enhancement of bridges	*DB Netz AG*	unknown	n/a	
3013	Rail	DE	German rail network	Works	Upgrade and modernisation as well as stabilisation and insuring of capacity for	*DB Netz AG*	unknown	n/a	

No.	Trans-port mode	Location	Studies or work	Description of project	Project promoter	Timing	Costs (Mio €)	Financing sources
				electronical interlockings				

8. Annex: List of critical issues

Explanation project categories:

- CB = Cross-border project
- C = Capacity/physical bottleneck
- Ml = Missing link
- I = Interoperability/TEN-T requirements
- Mm = Multimodality
- L = Last-mile
- E = Externalities/Innovation
- U = Urban area

A bold **x** for a project category means that the project mainly addresses this type of measure. If a category is marked with an "o", it means that this category is not the main focus of the project, but additionally targeted. There can be max. 1 **x** and 2 o for one project. The cross-border category was analysed seperately.

Explanation project numbering:

- 1-145: projects allocated to Member States, located on the Core Network
- 2000-2034: projects for Switzerland (projects in *italic* are on the Swiss comprehensive network)
- 3000-3011: proposed projects to address critical issues (road) and to meet the TEN-T requirements

No.	Trans-port mode		Location	CB	C	Ml	I	Mm	L	E	U	Studies or work	Critical issue
1	Rail	NL	Amsterdam		o		**x**				o	Works	Low service quality and accessibility of railway stations (passenger)
2	Rail	NL	Utrecht - Arnhem		**x**							Works	Capacity and reliability bottleneck
3	Rail	NL	Utrecht - Arnhem - German border	part	**x**							Works	Capacity and reliability bottleneck
4	Rail	NL	Meteren		**x**							Works	Overutilisation of Meteren rail freight lines (bypass needed)
5	Rail	NL	Rotterdam Port (europort) - Zwijndrecht		**x**			o	o			Study and works	Insufficient last mile connection ports
6	Rail	NL	Vlissingen - Moerdijk; Utrecht – Arnhem – Zevenaar; Utrecht - Geldermalsen	part			**x**					Works	No ERTMS deployment
7	Rail	BE	Belgian railways	part	o					**x**	o	Works	Safety, punctuality and capacity issues due to level crossings
8	Rail	BE	Belgian railways	part			**x**					Works	No ERTMS deployment
9	Rail	BE	Brussels railways		**x**						o	Works	Capacity bottlenecks at the Brussels North-South junction (used by multiple countries' trains, such as ICE for Germany and TGV for France)
10	Rail	BE	Brussels-Denderleeuw (L50A)		**x**							Works	Capacity bottlenecks in the Belgion rail network (namely: Brussels - Denderleeuw, Dudzele - Brugge, Brugge – Gent; additional tracks needed)
11	Rail	BE	Gent - Zeebrugge		**x**						o	Works	Capacity bottlenecks in the Belgion rail network (namely: Brussels - Denderleeuw, Dudzele - Brugge, Brugge – Gent; additional tracks needed)
12	Rail	DE	(Amsterdam)-Zevenaar-Emmerich-Oberhausen (1. stage)	part	**x**							Works	Capacity issues, a third track is needed, construction phase itself causes bottlenecks due to limited availability of the second track
13	Rail	DE	Zevenaar-Oberhausen (existing line)	part			**x**					Works	No ERTMS deployment
14	Rail	DE	Basel-Oberhausen	part			**x**					Works	No ERTMS deployment
15	Rail	DE	Düsseldorf-Duisburg a. nodes Rhein-Ruhr-Express		**x**	o					o	Works	Capacity bottlenecks, long travel times
16	Rail	DE	Duisburg-Moers, Düsseldorf, Haan-Leichlingen, Hürth, Köln, Mühlheim-Oberhausen							**x**	o	Works	Noise pollution
17	Rail	DE	Frankfurt/Main Stadion (2. stage)		o						**x**	Works	Upgrades of the node Mannheim and Frankfurt due to high operational and production costs
18	Rail	DE	Karlsruhe-Offenburg-Freiburg-Basel (1.stage)	part	**x**		o					Works	Capacity issues, long travel and transport times, interoperability issues along the line
19	Rail	DE	Karlsruhe-	part	**x**		o					Works	Capacity issues, long travel and transport times, interoperability issues along the line

No.	Trans-port mode		Location	CB	C	MI	I	Mm	L	E	U	Studies or work	Critical issue
			Offenburg-Freiburg-Basel (2.stage)										
20	Rail	DE	Knoten Basel Bad Bf (existing line)	x			**x**					Works	No ERTMS deployment
21	Rail	DE	Mannheim (2.stage)		o			o			**x**	Works	Upgrades of the node Mannheim and Frankfurt due to high operational and production costs
22	Rail	DE	NBS Rhein/Main - Rhein/Neckar		o	**x**						Works	Missing link in the European high speed network
23	Rail	DE	German Rail Network							**x**		Works	Noise pollution
24	Rail	IT	Genoa				**x**				o	Works	Capacity constraints affecting railway network in rail nodes
25	Rail	IT	Genoa - Tortona		o	**x**	o					Works	Capacity bottleneck around the Giovi pass (new tunnel construction)
26	Rail	IT	Milan: Rho-Gallarate		**x**							Study and works	Capacity constraints affecting railway network in rail nodes
27	Rail	IT	Chiasso - Milano	part	**x**		o					Study and works	Capacity constraints between IT and CH, freight line speeds <100km/h
28	Rail	IT	Parabiago-Gallarate		**x**		o					Study and works	Capacity bottleneck due to outdated headway technology
29	Rail	IT	Genoa-Milan; Genoa-Novara		**x**					o		Study and works	Long travel time
30	Rail	IT	Genoa-Milan; Milan-Chiasso; Genoa-Novara; Novara-Domodossola	part			**x**					Study and works	Outdated traffic management systems
31	Rail	IT	Genoa-Milan; Milan-Chiasso; Genoa-Novara; Novara-Domodossola	part			**x**					Study and works	Interoperability issues
32	Rail	IT	Tortona - Voghera		**x**							Study and works	Capacity bottleneck due to insufficient amount of tracks; upgrade needed
33	Rail	IT	Chiasso - Milano Smistamento	part			**x**					Study and works	Interoperability issues
34	Rail	IT	Novara - Oleggio	part	**x**							Study and works	Capacity bottleneck due to insufficient amount of tracks; upgrade needed
35	Rail	IT	Oleggio - Arona	part	**x**							Study and works	Capacity bottleneck due to insufficient amount of tracks; upgrade needed
36	Rail	IT	Genoa - Milan		**x**							Study and works	Capacity bottleneck due to insufficient amount of tracks; upgrade needed
37	Rail	IT	Milano-Tortona-Genova; Genova - Novara; Domodossola-Milano; Luino-Novara;	part			**x**					Study and works	Interoperability issues, no ERTMS deployment

No.	Trans-port mode		Location	CB	C	Ml	I	Mm	L	E	U	Studies or work	Critical issue
			Domodossola-Novara										
38	Rail	IT	Milan Node				o				**x**	Works	Capacity constraints affecting railway network in rail nodes
39	Rail	IT	Novara - Domodossola ; Milano - Chiasso	part			**x**					Study and works	No regular operation of 740m long trains
40	Rail	IT	Novara - Domodossola ; Milano - Chiasso	part			**x**					Study and works	No regular operation of 740m long trains
41	Rail	IT	Genova-Arquata-Novara; Genova-Tortona				**x**					Study and works	No regular operation of 740m long trains
42	Rail	IT	Chiasso - Milano	part			**x**					Study and works	Restriction in intermodal lauding gauge
43	Rail	IT	Luino - Novara/Milano				**x**					Study and works	Restriction in intermodal lauding gauge
44	Rail	IT	Genova-Arquata-Novara/Milano				**x**					Study and works	Restriction in intermodal lauding gauge
45	Rail	IT	Novara - Domodossola ; Milano - Chiasso	part						**x**		Study and works	Noise pollution
46	Rail	IT	Milano - Chiasso; Tortona - Milano; Genoa - Tortona; Domodossola-Novara	part			**x**					Works	No ERTMS deployment
47	Rail	IT	Genoa - Novara; Sesto Calende - Milano	part			**x**					Works	No ERTMS deployment
48	Rail	IT	Genoa - Milan; Genoa - Novara; Novara - Domodossola ; Milano - Chiasso	part						**x**		Works	Low service quality and accessibility of railway stations (passenger)
49	Rail	IT	Genoa Node					o	**x**		o	Study and works	Insuffient last-mile connections rail
50	Rail	IT	Genoa - Milan; Genoa - Novara; Novara - Domodossola; Milano - Chiasso	part	**x**							Study and works	Safety, punctuality and capacity issues due to level crossings
51	Rail	IT	Genoa - Milan		**x**							Study and works	Capacity bottleneck due to insufficient amount of tracks; upgrade needed
52	Rail	IT	Milano-Tortona; Novara-Alessandria				**x**					Study and works	No regular operation of 740m long trains
53	Rail	IT	Genoa - Milan;				**x**	o	o			Study and	Restriction in intermodal lauding gauge

No.	Trans-port mode		Location	CB	C	MI	I	Mm	L	E	U	Studies or work	Critical issue
			Genoa - Novara									works	
54	Rail	IT	Rho - Gallarate		**x**		o					Study and works	Capacity bottleneck due to outdated headway technology
55	Rail	IT	Novara Node		o						**x**	Study and works	Capacity constraints affecting railway network in rail nodes
56	Rail	IT	Rho - Gallarate		**x**			o	o			Study and works	Capacity bottleneck due to insufficient amount of tracks; upgrade needed
57	Rail	IT	Chiasso - Milano	part	**x**							Study and works	Capacity bottleneck due to insufficient amount of tracks; upgrade needed
58	Rail	NL, DE	Border "NL/DE" - Duisburg	part	o		**x**					Works	Zevenaar - Oberhausen: capacity issues, a third track is needed, construction phase itself causes bottlenecks due to limited availability of the second track
59	Rail	NL, BE, DE, CH, IT	Rotterdam - Genoa	part						**x**		Works	Support studies
60	Rail	IT, CH	Simplon pass	x	o		**x**					Study	Interoperability issue
61	Road	NL	Rotterdam - Duisburg	part	o	**x**						Works	Traffic congestion, peak hour traffic capacity problems, upgrade of bridge needed
62	Road	NL	Rotterdam		**x**				o		o	Works	Traffic congestion, peak hour traffic capacity problems, upgrade of bridge needed
63	Road	NL	Rotterdam - Duisburg	part		**x**						Works	Missing link in the road network
64	Road	BE	Brussels		**x**					o	o	Study and works	Upgrade of motorway infrastructure of the city of Brussels
65	Road	DE	A3 / A 4 / A44 / A5	part	**x**							Works	A3/A5/A44: insufficient capacity of truck parking positions
66	Road	DE	A1: Köln-Leverkusen (8 lanes)		**x**						o	Works	Traffic congestion, peak hour traffic capacity problems in urban nodes
67	Road	DE	A1: Köln-Leverkusen (Rhine bridge)		**x**						o	Works	Traffic congestion, peak hour traffic capacity problem: upgrade of bridges needed
68	Road	DE	A1: Leverkusen (8 lanes)		**x**						o	Works	Traffic congestion, peak hour traffic capacity problems in urban nodes
69	Road	DE	A3: Köln-Leverkusen (8 lanes)		**x**						o	Works	Traffic congestion, peak hour traffic capacity problems in urban nodes
70	Road	DE	A5/A6: Walldorf (bridge)		**x**							Works	Traffic congestion, peak hour traffic capacity problem: upgrade of bridges needed
71	Road	DE	A5: Heidelberg (bridge)		**x**							Works	Traffic congestion, peak hour traffic capacity problem: upgrade of bridges needed
72	Road	DE	A5: Weil am Rhein (bridge)	x	**x**							Works	Traffic congestion, peak hour traffic capacity problem: upgrade of bridges needed
73	Road	IT	IT-CH Border	x	**x**							Study and works	Traffic congestion to the road access to the Simplon pass
74	Road	IT	Milan Node					o	**x**		o	Study and	Traffic congestion, peak hour traffic capacity problems in urban nodes

No.	Trans-port mode		Location	CB	C	MI	I	Mm	L	E	U	Studies or work	Critical issue
												works	
75	Road	IT	Genoa		**x**						o	Study and works	Traffic congestion
76	IWW	NL	Amsterdam		**x**		o	o				Study	Insufficient maritime access
77	IWW	NL	Dordrecht - Emmerich	part	**x**							Works	Insufficient number of mooring places
78	IWW	NL	Ijmuiden - Amsterdam		**x**		o	o				Works	Insufficient lock capacity and trend of larger vessels
79	IWW	NL	Moerdijk				**x**					Study	Capacity bottleneck due to outdated traffic management systems
80	IWW	NL	Dutch IWW Core Network	part						**x**		Study	Lack of LNG supply in ports
81	IWW	NL	Dutch IWW Core Network	part				**x**				Works	Lack of alternative financial measures
82	IWW	NL	Dutch IWW Core Network	part						**x**		Works	Water pollution
83	IWW	NL	Rotterdam - Gorinchem		**x**							Works	Insufficient number of mooring places
84	IWW	NL	Volkerak		**x**							Study and works	Insufficient lock capacity
85	IWW	NL	Terneuzen		**x**							Works	Insufficient lock capacity
86	IWW	BE, NL	Westerscheldt River				**x**					Works	Insufficient RIS deployment
87	IWW	BE, NL	Westerscheldt River				**x**					Works	Insufficient RIS deployment
88	IWW	NL, DE	Rhine	part			o			**x**		Study	Insufficient RIS deployment
89	IWW	DE	Rhine (Bonn-Koblenz 2,5 m)		**x**		o					Works	Navigation reliability (fairway depth)
90	IWW	DE	Rhine (Iffezheim-Swiss border 3,5 m)	x	**x**		o					Works	Navigation reliability (fairway depth)
91	IWW	DE	Rhine (Koblenz-Iffenheim 2,1 m) (Kaub-Budenheim 1,9 m)	part	**x**		o					Works	Navigation reliability (fairway depth)
92	IWW	DE	Rhine (Krefeld-Bonn 2,8 m)		**x**		o					Works	Navigation reliability (fairway depth)
93	IWW	DE	Rhine (Lobith-Krefeld 2,8 m)		**x**		o					Works	Navigation reliability (fairway depth)
94	IWW	DE	Neckar		**x**		o					Works	Insufficient lock capacity
95	IWW	DE	Trier (Moselle)	x	**x**							Works	Insufficient lock capacity
96	IWW	DE	Plochingen (Neckar)		**x**							Works	Need for additional port areas
97	IWW	DE	Plochingen (Neckar)		o			**x**				Works	Lack of multimodal transhipment capacity
98	IWW	DE, FR,	Rhine	part	o			**x**	o			Study	Lack of multimodal transhipment capacity and cross-border cooparation

No.	Trans-port mode		Location	CB	C	Ml	I	Mm	L	E	U	Studies or work	Critical issue
99	IWW	CH FR	Upper Rhine	x			o			x		Works	Insufficient port information system
100	IWW	FR	Gambsheim (Rhine)	x	x							Works	Insufficient lock capacity
101	IWW	FR	Upper Rhine	x			x					Works	Insufficient RIS deployment
102	IWW	FR	Gambsheim (Rhine)	x			x					Works	Insufficient port information system
103	Inland Port	BE	Maas basin		o			x	o			Works	Lack of multimodal transhipment capacity, capacity bottleneck due to insufficient last-mile rail connection
104	Inland Port	DE	Düsseldorf Reisholz		o			x				Study	Lack of multimodal transhipment capacity
105	Inland Port	FR	Strasbourg	x	o		o		x			Works	Capacity bottleneck due to insuffient last-mile connections, interoperability issues
106	Inland Port	FR	Strasbourg	x	o			o	x			Works	Insufficient last-mile connection ports
107	Inland Port	FR	Strasbourg	x	o		x					Works	Insufficient lock capacity
108	Inland port	FR	Strasbourg	x				x				Works	Lack of multimodal transhipment capacity and cross-border cooparation
109	Inland Port	FR	Strasbourg	x	o			o	x			Works	Insufficient last-mile connection ports
110	Inland port	FR	Ottmarsheim	x			o	x				Study and works	Lack of multimodal transhipment capacity and cross-border cooparation
111	Inland port	FR	Mulhouse	x	x			o				Works	Need for additional port areas
112	Seaport	NL	Ijmuiden - Amsterdam		x			o				Works	Lack of multimodal transhipment capacity
113	Seaport	NL	Rotterdam Port (europort) - Zwijndrecht		x				o			Works	Lack of rail freight yard capacity, insufficient last-mile connection ports
114	Seaport	BE	Gent			o		o	x			Works	Lack of multimodal transhipment capacity, insufficient last-mile connection ports
115	Seaport	BE	Antwerp		o			o	x			Study and works	Lack of rail freight yard capacity, insufficient last-mile connection ports
116	Seaport	BE	Antwerp		x							Works	Insufficient lock capacity
117	Seaport	BE	Antwerp		x							Works	Insufficient lock capacity
118	Seaport	BE	Antwerp		x							Works	Lack of waiting capacity for barges
119	Seaport	BE	Antwerp		o			o	x			Works	Insufficient last-mile connection ports
120	Seaport	IT	Genoa							x		Works	Electric power supply of vessels in ports
121	Seaport	IT	Genoa		o			o	x			Works	Insufficient last-mile connection ports
122	Seaport	IT	Genoa		o			x	o			Works	Lack of multimodal transhipment capacity, lack of rail freight yard capacity, insufficient last-mile connection ports
123	Seaport	IT	Genoa		x		o			o		Study	Insufficient maritime access, lack of interoperability, efficiency, capacity, safety at the Port of Genoa
124	Seaport	IT	Genoa		x		o			o		Works	Insufficient maritime access
125	Seaport	IT	Genoa							x		Study and Works	Lack of LNG supply in ports
126	Seaport	IT	Genoa							x		Works	Waste pollution in ports
127	Seaport	IT	Genoa		x			o				Works	Lack of multimodal transhipment capacity

No.	Trans-port mode		Location	CB	C	MI	I	Mm	L	E	U	Studies or work	Critical issue
128	Seaport	IT	Genoa		x							Works	Insufficient maritime access for larger vessels
129	Seaport	IT	Genoa		x			o				Works	Lack of multimodal transhipment capacity
130	Seaport	IT	Genoa		x			o				Works	Lack of multimodal transhipment capacity
131	Airport	BE	Brussels			o		o	x			Works	Insufficient last-mile connection airport
132	Airport	BE	Liège-Bierset Airport			o		o	x			Works	Insufficient last-mile connection airport
133	Airport	IT	Milan		o			o	x			Study and works	Insufficient last-mile connection airport
134	Airport	IT	Milan		o			x		o		Works	Lack of multimodal transhipment capacity
135	Airport	IT	Milan (Malpensa)		o			x		o		Study and works	Lack of multimodal transhipment capacity
136	Airport	IT	Bergamo		o	x			o		o	Study and works	Insufficient last-mile connection rail
137	Airport	IT	Genoa Node		o			o	x			Study and works	Insufficient last-mile connection airport
138	IWW	NL, BE, DE	NL, BE, DE	part			x					Study	Insufficient RIS deployment
139	RRT	NL	Rotterdam				x		o	o		Works	Long waiting times to load a train
140	RRT	NL, BE, DE, CH, IT	Rotterdam - Genoa	part				o	x			Study and works	Insufficient last-mile connection rail
141	RRT	DE	Duisburg (Rhein-Ruhr terminal)		o			x				Works	Lack of multimodal transhipment capacity
142	RRT	IT	Milan Node		o			x				Study and works	Lack of multimodal transhipment capacity
143	RRT	IT	Novara Node		o			x				Study and works	Lack of multimodal transhipment capacity
144	RRT	IT	Vado Ligure (Genoa node)		o			o	x			Study and works	Insufficient last-mile connection road
145	RRT	IT	Vado Ligure (Genoa node)		x			o	o			Study and works	Lack of multimodal transhipment capacity, insufficient last-mile connection rail
2000	Rail	CH	Axen									Works	
2001	Rail	CH	Basel - Bellinzona - Chiasso	x			x					Works	Outdated traffic management systems
2002	Rail	CH	Basel - Bellinzona - Chiasso	x			x					Works	Restriction in intermodal lauding gauge
2003	Rail	CH	Basel Bad - Basel SBB	x	x							Works	Capacity bottleneck due to insufficient amount of tracks; upgrade needed
2004	Rail	CH	Basel East, Ergolztal									Works	
2005	Rail	CH	Basel-Mittelland									Works	
2006	Rail	CH	Bellinzona - Lugano, Ceneri Basetunnel	x			x					Works	

No.	Trans-port mode		Location	CB	C	MI	I	Mm	L	E	U	Studies or work	Critical issue
2007	Rail	CH	Bellinzona - Tenero									Works	
2008	Rail	CH	Bern - Thun	x			**x**					Works	
2009	Rail	CH	Corridor A/1 lines	part			**x**					Works	
2010	Rail	CH	Erstfeld - Biasca (Gotthard base tunnel)		**x**		o			o		Works	Capacity issues, long travel and transport times, interoperability issues along the line
2011	Rail	CH	Ferden - Mitholz (Lötschberg base tunnel)	x								Works	
2012	Rail	CH	Frutigen - Visp		**x**		o			o		Works	
2013	Rail	CH	Gümlingen - Münsingen	x								Works	
2014	Rail	CH	Liestal									Works	
2015	Rail	CH	Lugano	x								Works	
2016	Rail	CH	Mägenwil - Lupfig									Works	
2017	Rail	CH	Railnode Bern								**x**	Works	
2018	Rail	CH	Walchwil - Arth-Goldau									Works	
2019	Rail	CH	Pratteln-Brugg (Bözberg Tunnel)				**x**					Works	Restriction in intermodal lauding gauge
2020	Rail	CH	Olten-Aarau		**x**							Works	Capacity bottleneck due to insufficient amount of tracks; upgrade needed
2021	Rail	CH	Altdorf		**x**					o		Works	Low service quality and accessibility of railway stations (passenger)
2022	Rail	CH	Simplon Tunnel	x	**x**					o		Works	Capacity bottleneck (simplon tunnel cannot cope with satefty requirements)
2023	Road	CH	CH-D border Basel - Intersection Basel Hagnau (dir. South)	x							**x**	Works	Traffic congestion, peak hour traffic capacity problems in urban nodes
2024	Road	CH	Connection Göschenen - connection Airolo		**x**							Works	Traffic congestion, peak hour traffic capacity problems in urban nodes
2025	Road	CH	Intersection Basel Hagnau - Intersection Augst		**x**							Works	Traffic congestion, peak hour traffic capacity problems in urban nodes
2026	Road	CH	Intersection Basel Wiese - Intersection Basel Hagnau		**x**						o	Works	Traffic congestion, peak hour traffic capacity problems in urban nodes
2027	Road	CH	Intersection Bellinzona - CH-I border Chiasso	x	**x**							Works	Traffic congestion, peak hour traffic capacity problems in urban nodes
2028	Road	CH	Intersection Härkingen - Intersection Wiggertal		**x**							Works	Traffic congestion, peak hour traffic capacity problems in urban nodes
2029	Road	CH	Intersection Rotsee -		**x**							Works	Traffic congestion, peak hour traffic capacity problems in urban nodes

No.	Trans-port mode		Location	CB	C	MI	I	Mm	L	E	U	Studies or work	Critical issue
			Intersection Lopper										
2030	*Rail*	*CH*	*Aarau - Zürich*									*Works*	
2031	*Rail*	*CH*	*Bellinzona - Ranzo*				***x***					*Works*	
2032	*Rail*	*CH*	*Thalwil - Zug*									*Works*	
2033	*Rail*	*CH*	*Zug - Lucerne*									*Works*	
2034	*Rail*	*CH*	*Lausanne - Bern*									*Works*	
3000	Rail	NL	Connection Vlissingen port area		o		**x**					Works	Capacity bottleneck due to low freight line speeds (<100 km/h)
3001	Rail	NL	Vlissingen port area				**x**					Works	Low axle load
3002	Rail	BE	Berneau - Visè - German border	x	o		**x**					Works	Capacity bottleneck due to low freight line speeds (<100 km/h)
3003	Rail	DE	Oberhausen - Köln (passenger line); Köln-Koblenz (passenger line); Köln - Frankfurt - Groß Gerau - Mannheim - Heidelberg - Karlsruhe; Hergenrath (border) - Köln	part			**x**					Works	No ERTMS deployment
3004	Road	BE	Belgian road network	part			o			**x**		Works	No availability of clean fuels
3005	Road	DE	Düsseldorf		**x**						o	Works	Traffic congestion, peak hour traffic capacity problems in urban nodes
3006	Road	IT	Italian road network	part			o			**x**		Works	No availability of clean fuels
3007	Road	IT	Italian road network	part			**x**					Works	No use of tolling system
3008	Airport	NL	Rotterdam The Hague Airport				o		**x**			Works	Insufficient last-mile connection airport
3009	IWW	FR	Strasbourg	X	**x**							Works	Capacity limitations
3010	Rail	BE	Belgian rail network	part			**x**					Works	No regular operation of 740m long trains
3011	Rail	DE	German rail network	part			**x**					Works	No regular operation of 740m long trains
3012	Rail	DE	German rail network	part	**x**							Works	General capacity issues, need for modernisation of bridges
3013	Rail	DE	German rail network	part	**x**							Works	General capacity issues, need for modernisation of electronical interlockings

9. Annex: CEF compliance analysis

Specific Sectoral Objective and Priorites as set in art. 4 of Regulation 1316/2013

Objectives	Priorities
1. Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections	Projects on the corridors of the Core Network
	Projects on the other sections of the Core Network
	Rail interoperability
	European Rail Traffic Management Systems (ERTMS)
2. Ensuring sustainable and efficient transport systems in the long run, as well as enabling all modes of transport to be decarbonised	New technologies and innovation in all transport modes
	Safe and Secure infrastructure
3. Optimising the integration and interconnection of transport modes and enhancing the interoperability of transport services, while ensuring the accessibility of transport infrastructures	Single European Sky – SESAR
	River Information Services – RIS
	Intelligent Transport Services for road – ITS
	Motorways of the sea – MoS
	Actions implementing transport infrastructure in nodes of the Core Network, including urban nodes
	Connections to and development of multimodal logistics platforms

No.	Trans-port mode		Location	Costs (in Mio €)	CEF priority section	Specific Sectoral Objective (Art. 4 of Regulation 1316/2013)
1	Rail	NL	Amsterdam	431		Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
2	Rail	NL	Utrecht - Arnhem	20		Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
3	Rail	NL	Utrecht - Arnhem - German border	234		Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
4	Rail	NL	Meteren	703	x	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
5	Rail	NL	Rotterdam Port (europort) - Zwijndrecht	157 - 420	x	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
6	Rail	NL	Vlissingen - Moerdijk; Utrecht – Arnhem – Zevenaar; Utrecht - Geldermalsen	235		Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
7	Rail	BE	Belgian railways	329.4	part	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
8	Rail	BE	Belgian railways	935.5	part	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
9	Rail	BE	Brussels railways	288.9	x (NS-Med)	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
10	Rail	BE	Brussels-Denderleeuw (L50A)	68.8	part (NS-Med)	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
11	Rail	BE	Gent - Zeebrugge	462.8	x	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
12	Rail	DE	(Amsterdam)-Zevenaar-Emmerich-Oberhausen (1. stage)	2,012	x	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
13	Rail	DE	Zevenaar-Oberhausen (existing line)	n/a	x	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
14	Rail	DE	Basel-Oberhausen	284	part	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
15	Rail	DE	Düsseldorf-Duisburg a. nodes Rhein-Ruhr-Express	2,000		Optimising the integration and interconnection of transport modes and enhancing the interoperability of transport services, while ensuring the accessibility of transport infrastructures
16	Rail	DE	Duisburg-Moers, Düsseldorf, Haan-Leichlingen, Hürth, Köln, Mühlheim-Oberhausen	n/a		Ensuring sustainable and efficient transport systems in the long run, as well as enabling all modes of transport to be decarbonised
17	Rail	DE	Frankfurt/Main Stadion (2. stage)	911	x	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
18	Rail	DE	Karlsruhe-Offenburg-Freiburg-Basel (1.stage)	6,172	x	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
19	Rail	DE	Karlsruhe-Offenburg-Freiburg-Basel (2.stage)	n/a	x	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
20	Rail	DE	Knoten Basel Bad Bf (existing line)	n/a	x	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
21	Rail	DE	Mannheim (2.stage)	160	x	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
22	Rail	DE	NBS Rhein/Main - Rhein/Neckar	2,183	x	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
23	Rail	DE	German Rail Network	152	part	Ensuring sustainable and efficient transport systems in the long run, as well as enabling all modes of transport to be decarbonised

No.	Trans-port mode		Location	Costs (in Mio €)	CEF priority section	Specific Sectoral Objective (Art. 4 of Regulation 1316/2013)
24	Rail	IT	Genoa	642		Optimising the integration and interconnection of transport modes and enhancing the interoperability of transport services, while ensuring the accessibility of transport infrastructures
25	Rail	IT	Genoa - Tortona	6,197	x	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
26	Rail	IT	Milan: Rho-Gallarate	402		Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
27	Rail	IT	Chiasso - Milano	30	x	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
28	Rail	IT	Parabiago-Gallarate	70	x	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
29	Rail	IT	Genoa-Milan; Genoa-Novara	n/a	x	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
30	Rail	IT	Genoa-Milan; Milan-Chiasso; Genoa-Novara; Novara-Domodossola	n/a	x	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
31	Rail	IT	Genoa-Milan; Milan-Chiasso; Genoa-Novara; Novara-Domodossola	n/a	x	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
32	Rail	IT	Tortona - Voghera	600	x	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
33	Rail	IT	Chiasso - Milano Smistamento	21	x	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
34	Rail	IT	Novara - Oleggio	371	x	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
35	Rail	IT	Oleggio - Arona	164	x	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
36	Rail	IT	Genoa - Milan	300	x	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
37	Rail	IT	Milano-Tortona-Genova; Genova - Novara; Domodossola-Milano; Luino-Novara; Domodossola-Novara	n/a	x	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
38	Rail	IT	Milan Node	444	x	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
39	Rail	IT	Novara - Domodossola ; Milano - Chiasso	30	x	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
40	Rail	IT	Novara - Domodossola ; Milano - Chiasso	70	x	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
41	Rail	IT	Genova-Arquata-Novara; Genova-Tortona	100	x	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
42	Rail	IT	Chiasso - Milano	40	x	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
43	Rail	IT	Luino - Novara/Milano	120		Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
44	Rail	IT	Genova-Arquata-Novara/Milano	40	x	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
45	Rail	IT	Novara - Domodossola ; Milano - Chiasso	100	x	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
46	Rail	IT	Milano - Chiasso; Tortona - Milano; Genoa - Tortona; Domodossola-Novara	55	x	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections

No.	Trans-port mode		Location	Costs (in Mio €)	CEF priority section	Specific Sectoral Objective (Art. 4 of Regulation 1316/2013)
47	Rail	IT	Genoa - Novara; Sesto Calende - Milano	100	part	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
48	Rail	IT	Genoa - Milan; Genoa - Novara; Novara - Domodossola ; Milano - Chiasso	100	x	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
49	Rail	IT	Genoa Node	26	x	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
50	Rail	IT	Genoa - Milan; Genoa - Novara; Novara - Domodossola; Milano - Chiasso	160	x	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
51	Rail	IT	Genoa - Milan	600	x	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
52	Rail	IT	Milano-Tortona; Novara-Alessandria	112	x	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
53	Rail	IT	Genoa - Milan; Genoa - Novara	n/a	x	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
54	Rail	IT	Rho - Gallarate	n/a		Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
55	Rail	IT	Novara Node	493	x	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
56	Rail	IT	Rho - Gallarate	326		Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
57	Rail	IT	Chiasso - Milano	1,412	x	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
58	Rail	NL, DE	Border "NL/DE" - Duisburg	159.1	part	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
59	Rail	NL, BE, DE, CH, IT	Rotterdam - Genoa	3.2	part	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
60	Rail	IT, CH	Simplon pass	100	x	Not addressing any specific sectoral objectives
61	Road	NL	Rotterdam - Duisburg	276		Optimising the integration and interconnection of transport modes and enhancing the interoperability of transport services, while ensuring the accessibility of transport infrastructures
62	Road	NL	Rotterdam	2,031		Not addressing any specific sectoral objectives
63	Road	NL	Rotterdam - Duisburg	822		Optimising the integration and interconnection of transport modes and enhancing the interoperability of transport services, while ensuring the accessibility of transport infrastructures
64	Road	BE	Brussels	183		Ensuring sustainable and efficient transport systems in the long run, as well as enabling all modes of transport to be decarbonised
65	Road	DE	A3 / A 4 / A44 / A5	93.3		Not addressing any specific sectoral objectives
66	Road	DE	A1: Köln-Leverkusen (8 lanes)	240		Not addressing any specific sectoral objectives
67	Road	DE	A1: Köln-Leverkusen (Rhine bridge)	180		Ensuring sustainable and efficient transport systems in the long run, as well as enabling all modes of transport to be decarbonised
68	Road	DE	A1: Leverkusen (8 lanes)	250		Optimising the integration and interconnection of transport modes and enhancing the interoperability of transport services, while ensuring the accessibility of transport infrastructures
69	Road	DE	A3: Köln-Leverkusen (8 lanes)	202		Not addressing any specific sectoral objectives
70	Road	DE	A5/A6: Walldorf (bridge)	5.8		Not addressing any specific sectoral objectives
71	Road	DE	A5: Heidelberg (bridge)	2		Not addressing any specific sectoral objectives

No.	Trans-port mode		Location	Costs (in Mio €)	CEF priority section	Specific Sectoral Objective (Art. 4 of Regulation 1316/2013)
72	Road	DE	A5: Weil am Rhein (bridge)	20		Not addressing any specific sectoral objectives
73	Road	IT	IT-CH Border	35		Not addressing any specific sectoral objectives
74	Road	IT	Milan Node	11.6		Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
75	Road	IT	Genoa	3,266		Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
76	IWW	NL	Amsterdam	5.4	x	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
77	IWW	NL	Dordrecht -Emmerich	131	x	Optimising the integration and interconnection of transport modes and enhancing the interoperability of transport services, while ensuring the accessibility of transport infrastructures
78	IWW	NL	Ijmuiden - Amsterdam	891	x	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
79	IWW	NL	Moerdijk	10		Not addressing any specific sectoral objectives
80	IWW	NL	Dutch IWW Core Network	80	part	Ensuring sustainable and efficient transport systems in the long run, as well as enabling all modes of transport to be decarbonised
81	IWW	NL	Dutch IWW Core Network	162	part	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
82	IWW	NL	Dutch IWW Core Network	570	part	Ensuring sustainable and efficient transport systems in the long run, as well as enabling all modes of transport to be decarbonised
83	IWW	NL	Rotterdam - Gorinchem	29	x	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
84	IWW	NL	Volkerak	157	x	Optimising the integration and interconnection of transport modes and enhancing the interoperability of transport services, while ensuring the accessibility of transport infrastructures
85	IWW	NL	Terneuzen	930	x (NS-Med)	Optimising the integration and interconnection of transport modes and enhancing the interoperability of transport services, while ensuring the accessibility of transport infrastructures
86	IWW	BE, NL	Westerscheldt River	2.7	x (NS-Med)	Optimising the integration and interconnection of transport modes and enhancing the interoperability of transport services, while ensuring the accessibility of transport infrastructures
87	IWW	BE, NL	Westerscheldt River	4.8	x (NS-Med)	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
88	IWW	NL, DE	Rhine	7.7		Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
89	IWW	DE	Rhine (Bonn-Koblenz 2,5 m)	n/a	x	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
90	IWW	DE	Rhine (Iffezheim-Swiss border 3,5 m)	1,172	x	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
91	IWW	DE	Rhine (Koblenz-Iffenheim 2,1 m) (Kaub-Budenheim 1,9 m)	n/a	x	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
92	IWW	DE	Rhine (Krefeld-Bonn 2,8 m)	n/a	x	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
93	IWW	DE	Rhine (Lobith-Krefeld 2,8 m)	n/a	x	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
94	IWW	DE	Neckar	830		Optimising the integration and interconnection of transport modes and enhancing the interoperability of transport services, while ensuring the accessibility of transport infrastructures
95	IWW	DE	Trier (Moselle)	540		Optimising the integration and interconnection of transport modes and enhancing the interoperability of transport services, while ensuring the accessibility of transport infrastructures
96	IWW	DE	Plochingen (Neckar)	9		Optimising the integration and interconnection of transport modes and enhancing the interoperability of transport services, while ensuring the accessibility of transport infrastructures

No.	Trans-port mode		Location	Costs (in Mio €)	CEF priority section	Specific Sectoral Objective (Art. 4 of Regulation 1316/2013)
97	IWW	DE	Plochingen (Neckar)	5		Optimising the integration and interconnection of transport modes and enhancing the interoperability of transport services, while ensuring the accessibility of transport infrastructures
98	IWW	DE, FR, CH	Rhine	1.7	x	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
99	IWW	FR	Upper Rhine	1	x	Optimising the integration and interconnection of transport modes and enhancing the interoperability of transport services, while ensuring the accessibility of transport infrastructures
100	IWW	FR	Gambsheim (Rhine)	n/a	x	Ensuring sustainable and efficient transport systems in the long run, as well as enabling all modes of transport to be decarbonised
101	IWW	FR	Upper Rhine	n/a	x	Optimising the integration and interconnection of transport modes and enhancing the interoperability of transport services, while ensuring the accessibility of transport infrastructures
102	IWW	FR	Gambsheim (Rhine)	5	x	Optimising the integration and interconnection of transport modes and enhancing the interoperability of transport services, while ensuring the accessibility of transport infrastructures
103	Inland Port	BE	Maas basin	2.5		Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
104	Inland Port	DE	Düsseldorf Reisholz	0.7		Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
105	Inland Port	FR	Strasbourg	17		Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
106	Inland Port	FR	Strasbourg	10		Optimising the integration and interconnection of transport modes and enhancing the interoperability of transport services, while ensuring the accessibility of transport infrastructures
107	Inland Port	FR	Strasbourg	7		Optimising the integration and interconnection of transport modes and enhancing the interoperability of transport services, while ensuring the accessibility of transport infrastructures
108	Inland port	FR	Strasbourg	61		Optimising the integration and interconnection of transport modes and enhancing the interoperability of transport services, while ensuring the accessibility of transport infrastructures
109	Inland Port	FR	Strasbourg	n/a		Optimising the integration and interconnection of transport modes and enhancing the interoperability of transport services, while ensuring the accessibility of transport infrastructures
110	Inland port	FR	Ottmarsheim	25		Optimising the integration and interconnection of transport modes and enhancing the interoperability of transport services, while ensuring the accessibility of transport infrastructures
111	Inland port	FR	Mulhouse	7		Optimising the integration and interconnection of transport modes and enhancing the interoperability of transport services, while ensuring the accessibility of transport infrastructures
112	Seaport	NL	Ijmuiden - Amsterdam	65		Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
113	Seaport	NL	Rotterdam Port (europort) - Zwijndrecht	290		Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
114	Seaport	BE	Gent	5.5		Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
115	Seaport	BE	Antwerp	100	x (NS-Med)	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
116	Seaport	BE	Antwerp	382	x (NS-Med)	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
117	Seaport	BE	Antwerp	140	x (NS-Med)	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
118	Seaport	BE	Antwerp	16	x (NS-Med)	Ensuring sustainable and efficient transport systems in the long run, as well as enabling all modes of transport to be decarbonised
119	Seaport	BE	Antwerp	224.4	x (NS-Med)	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections

No.	Trans-port mode		Location	Costs (in Mio €)	CEF priority section	Specific Sectoral Objective (Art. 4 of Regulation 1316/2013)
120	Seaport	IT	Genoa	12	x	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
121	Seaport	IT	Genoa	50	x	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
122	Seaport	IT	Genoa	50	x	Optimising the integration and interconnection of transport modes and enhancing the interoperability of transport services, while ensuring the accessibility of transport infrastructures
123	Seaport	IT	Genoa	11.5	x	Ensuring sustainable and efficient transport systems in the long run, as well as enabling all modes of transport to be decarbonised
124	Seaport	IT	Genoa	500		Ensuring sustainable and efficient transport systems in the long run, as well as enabling all modes of transport to be decarbonised
125	Seaport	IT	Genoa	5		Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
126	Seaport	IT	Genoa	11		Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
127	Seaport	IT	Genoa	140		Optimising the integration and interconnection of transport modes and enhancing the interoperability of transport services, while ensuring the accessibility of transport infrastructures
128	Seaport	IT	Genoa	22.5		Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
129	Seaport	IT	Genoa	n/a		Optimising the integration and interconnection of transport modes and enhancing the interoperability of transport services, while ensuring the accessibility of transport infrastructures
130	Seaport	IT	Genoa	30		Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
131	Airport	BE	Brussels	64		Optimising the integration and interconnection of transport modes and enhancing the interoperability of transport services, while ensuring the accessibility of transport infrastructures
132	Airport	BE	Liège-Bierset Airport	34	x	Not addressing any specific sectoral objectives
133	Airport	IT	Milan	n/a		Not addressing any specific sectoral objectives
134	Airport	IT	Milan	114 (Resources allocated 69)		Optimising the integration and interconnection of transport modes and enhancing the interoperability of transport services, while ensuring the accessibility of transport infrastructures
135	Airport	IT	Milan (Malpensa)	225		Optimising the integration and interconnection of transport modes and enhancing the interoperability of transport services, while ensuring the accessibility of transport infrastructures
136	Airport	IT	Bergamo	170 (incl. study and works)		Optimising the integration and interconnection of transport modes and enhancing the interoperability of transport services, while ensuring the accessibility of transport infrastructures
137	Airport	IT	Genoa Node	37		Optimising the integration and interconnection of transport modes and enhancing the interoperability of transport services, while ensuring the accessibility of transport infrastructures
138	IWW	NL, BE, DE	NL, BE, DE	2.8		Optimising the integration and interconnection of transport modes and enhancing the interoperability of transport services, while ensuring the accessibility of transport infrastructures
139	RRT	NL	Rotterdam	125		Optimising the integration and interconnection of transport modes and enhancing the interoperability of transport services, while ensuring the accessibility of transport infrastructures
140	RRT	NL, BE, DE, CH, IT	Rotterdam - Genoa	1.2 - 2		Optimising the integration and interconnection of transport modes and enhancing the interoperability of transport services, while ensuring the accessibility of transport infrastructures
141	RRT	DE	Duisburg (Rhein-Ruhr terminal)	43.5		Optimising the integration and interconnection of transport modes and enhancing the

No.	Trans-port mode		Location	Costs (in Mio €)	CEF priority section	Specific Sectoral Objective (Art. 4 of Regulation 1316/2013)
						interoperability of transport services, while ensuring the accessibility of transport infrastructures
142	RRT	IT	Milan Node	50		Optimising the integration and interconnection of transport modes and enhancing the interoperability of transport services, while ensuring the accessibility of transport infrastructures
143	RRT	IT	Novara Node	90		Optimising the integration and interconnection of transport modes and enhancing the interoperability of transport services, while ensuring the accessibility of transport infrastructures
144	RRT	IT	Vado Ligure (Genoa node)	38		Not addressing any specific sectoral objectives
145	RRT	IT	Vado Ligure (Genoa node)	25		Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
2000	Rail	CH	Axen	n/a	no	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
2001	Rail	CH	Basel - Bellinzona - Chiasso	230	no	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
2002	Rail	CH	Basel - Bellinzona - Chiasso	700	no	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
2003	Rail	CH	Basel Bad - Basel SBB	40	no	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
2004	Rail	CH	Basel East, Ergolztal	747	no	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
2005	Rail	CH	Basel-Mittelland	n/a	no	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
2006	Rail	CH	Bellinzona - Lugano, Ceneri Basetunnel	2,048	no	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
2007	Rail	CH	Bellinzona - Tenero	124.5	no	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
2008	Rail	CH	Bern - Thun	18	no	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
2009	Rail	CH	Corridor A/1 lines	115	no	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
2010	Rail	CH	Erstfeld - Biasca (Gotthard base tunnel)	8,235	no	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
2011	Rail	CH	Ferden - Mitholz (Lötschberg base tunnel)	n/a	no	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
2012	Rail	CH	Frutigen - Visp	640	no	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
2013	Rail	CH	Gümlingen - Münsingen	522	no	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
2014	Rail	CH	Liestal	124.5	no	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
2015	Rail	CH	Lugano	83	no	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
2016	Rail	CH	Mägenwil - Lupfig	83	no	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
2017	Rail	CH	Railnode Bern	515	no	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
2018	Rail	CH	Walchwil - Arth-Goldau	74.7	no	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
2019	Rail	CH	Pratteln-Brugg (Bözberg Tunnel)	70.6	no	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular,

No.	Trans-port mode		Location	Costs (in Mio €)	CEF priority section	Specific Sectoral Objective (Art. 4 of Regulation 1316/2013)
						improving cross-border sections
2020	Rail	CH	Olten-Aarau	664	no	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
2021	Rail	CH	Altdorf	37.4	no	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
2022	Rail	CH	Simplon Tunnel	141.1	no	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
2023	Road	CH	CH-D border Basel - Intersection Basel Hagnau (dir. South)	47	no	Optimising the integration and interconnection of transport modes and enhancing the interoperability of transport services, while ensuring the accessibility of transport infrastructures
2024	Road	CH	Connection Göschenen - connection Airolo	1,685	no	Projects which cannot be related to one of the objectives set in the Multi-Annual Work Programme 2014
2025	Road	CH	Intersection Basel Hagnau - Intersection Augst	325	no	Projects which cannot be related to one of the objectives set in the Multi-Annual Work Programme 2014
2026	Road	CH	Intersection Basel Wiese - Intersection Basel Hagnau	763	no	Projects which cannot be related to one of the objectives set in the Multi-Annual Work Programme 2014
2027	Road	CH	Intersection Bellinzona - CH-I border Chiasso	675	no	Projects which cannot be related to one of the objectives set in the Multi-Annual Work Programme 2014
2028	Road	CH	Intersection Härkingen - Intersection Wiggertal	138	no	Projects which cannot be related to one of the objectives set in the Multi-Annual Work Programme 2014
2029	Road	CH	Intersection Rotsee - Intersection Lopper	1,221	no	Projects which cannot be related to one of the objectives set in the Multi-Annual Work Programme 2014
2030	*Rail*	*CH*	*Aarau - Zürich*	*n/a*	*no*	*Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections*
2031	*Rail*	*CH*	*Bellinzona - Ranzo*	*60.00*	*no*	*Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections*
2032	*Rail*	*CH*	*Thalwil - Zug*	*n/a*	*no*	*Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections*
2033	*Rail*	*CH*	*Zug - Lucerne*	*n/a*	*no*	*Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections*
2034	*Rail*	*CH*	*Lausanne - Bern*	*n/a*	*no*	*Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections*
3000	Rail	NL	Connection Vlissingen port area	n/a	no	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
3001	Rail	NL	Vlissingen port area	n/a	no	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
3002	Rail	BE	Berneau - Visè - German border	n/a	no	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
3003	Rail	DE	Oberhausen - Köln (passenger line); Köln-Koblenz (passenger line); Köln - Frankfurt - Groß Gerau - Mannheim - Heidelberg - Karlsruhe; Hergenrath (border) - Köln	n/a	no	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
3004	Road	BE	Belgian road network	n/a	no	Projects which cannot be related to one of the objectives set in the Multi-Annual Work Programme 2014
3005	Road	DE	Düsseldorf	n/a	no	Projects which cannot be related to one of the objectives set in the Multi-Annual Work Programme 2014
3006	Road	IT	Italian road network	n/a	no	Projects which cannot be related to one of the objectives set in the Multi-Annual Work Programme 2014

No.	Trans-port mode		Location	Costs (in Mio €)	CEF priority section	Specific Sectoral Objective (Art. 4 of Regulation 1316/2013)
3007	Road	IT	Italian road network	n/a	no	Optimising the integration and interconnection of transport modes and enhancing the interoperability of transport services, while ensuring the accessibility of transport infrastructures
3008	Airport	NL	Rotterdam The Hague Airport	n/a	no	Projects which cannot be related to one of the objectives set in the Multi-Annual Work Programme 2014
3009	IWW	FR	Strasbourg	n/a	no	*Projects which cannot be related to one of the objectives set in the Multi-Annual Work Programme 2014*
3010	Rail	BE	Belgian rail network	n/a	part	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
3011	Rail	DE	German rail network	n/a	part	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
3012	Rail	DE	German rail network	n/a	part	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections
3013	Rail	DE	German rail network	n/a	part	Bridging missing links, removing bottlenecks, enhancing rail interoperability, and, in particular, improving cross-border sections

10. Annex: List of terminals (RFC 1 implementation plan)

The Netherlands:

Terminal	Handover station
APMT	Maasvlakte West
ECT	Maasvlakte West
Euromax	Maasvlakte West
RTW	Maasvlakte West
EMO	Maasvlakte Oost
RSC	Waalhaven Zuid
OBA	Amsterdam Westhaven
Tata-Steel	Beverwijk
ECT Venlo	Blerick
Vopak Vlissingen	Vlissingen Sloehaven
RWG (Rotterdam World Gateway)	Maasvlakte West
EECV (Europort CV)	Europoort
PCTBV (Pernis Combi Terminal BV)	Pernis

Source: Rail Freight Corridor Rhine-Alpine Implementation Plan

Belgium:

Terminal	Handover station
Ant. Gateway DP World Terminal	Antwerpen Kallo
Deurganck PSA	Antwerpen Kallo
Shipit (under construction)	Antwerpen Kallo
Main Hub	Antwerpen Main Hub
Hupac Terminal Ant.	Antwerpen Noord
Ant. ATO	Antwerpen Noord
Ant. Cirkeldyck	Antwerpen Noord
Ant. Zomerweg	Antwerpen Noord
Combinant	Antwerpen Noord
Delwaidedock Terminal	Antwerpen Noord
Europa Terminal PSA	Antwerpen Noord
Mexico Natie N.V.	Antwerpen Noord
Noordzee Terminal PSA	Antwerpen Noord
Euroterminal Genk Exploitatie	Genk Zuid / Genk Goederen
Haven Genk	Genk Zuid / Genk Goederen
Ghent container terminal	Ghent Zeehaven
IPG Intermodal Platform Ghent	Ghent Zeehaven
Dry Port Muizen	Muizen
Liège Logistique Intermodal	Renory /Kinkempois
Renory /Kinkempois	Renory /Kinkempois
Trilogiport (under construction)	Renory /Kinkempois
APM Terminal	Zeebrugge Vorming
Container Handling Zeebrugge (CHZ)	Zeebrugge Vorming
P&O ferrymasters	Zeebrugge Vorming
2XL	Zeebrugge Vorming
Zeebrugge International Port	Zeebrugge Vorming

Source: Rail Freight Corridor Rhine-Alpine Implementation Plan

Germany:

Terminal	Handover station
DeCeTe	Duisburg-Ruhrort Hafen
Megahub Duisburg	Duisburg-Ruhrort Hafen
PKV	Duisburg-Ruhrort Hafen
Rhein Ruhr Terminal	Gbf Duisburg Hafen
Logport II Gateway West Terminal	Duisburg Hochfeld Süd
Contargo DIT Duisburg Intermodal Terminal	Duisburg-Rheinhausen Logport I
D3T Terminal	Duisburg-Rheinhausen Logport I
Duisburg Kombiterminal	Duisburg-Rheinhausen Logport I
Neuss Intermodal Terminal	Neuss Hessentor
Neuss Trimodal	Neuss Hessentor
Umschlag Container Terminal GmbH	Neuss Hessentor
Köln Eifeltor Ubf (DUSS)	Köln-Eifeltor Gbf
Köln Niehl Hafen CTS	Köln-Niehl Hafen (HGK)
Frankenbach Terminal	Mainz-Bischofsheim Gbf
Contargo Mannheim	Mannheim Rbf
Mannheim Handelshafen (DUSS)	Mannheim Rbf
Mannheim MCT	Mannheim Rbf
Ludwigshafen KTL (BASF)	Ludwigshafen BASF
Contargo Ludwigshafen	Ludwigshafen Gbf
DP World Germersheim	Germersheim Bf
Karlsruhe Ubf (DUSS)	Karlsruhe Gbf
Karlsruhe Contargo	Karlsruhe Hafen
SA/SVG Südbaden RAlpin (RoLa)	Freiburg Gbf
Basel/Weil am Rhein Ubf (DUSS)	Basel Bad Rbf

Source: Rail Freight Corridor Rhine-Alpine Implementation Plan

Switzerland:

Terminal	Handover station
Swissterminal Basel AG	Kleinhüningen
Satram-Huiles SA	Kleinhüningen
Rhenus Port Logistics AG	Kleinhüningen
Contargo AG	Kleinhüningen
Ultra-Brag AG	Kleinhüningen
Rhytank AG	Birsfelden Hafen
Varo Energy Tankstorage AG	Birsfelden Hafen
Ultra Brag AG	Birsfelden Hafen
Birs Terminal AG	Birsfelden Hafen
Swissterminal Birsfelden AG	Birsfelden Hafen
Landor AG	Birsfelden Hafen
TAU Tanklager Auhafen AG	Birsfelden Hafen
Basel CT	Basel SBB RB
Swissterminal AG Frenkendorf	Frenkendorf-Füllingsdorf
Hupac Terminal Aarau	Aarau
Swissterminal AG Rekingen	Reckingen
Hupac Terminal Chiasso	Chiasso Smistamento

Source: Rail Freight Corridor Rhine-Alpine Implementation Plan

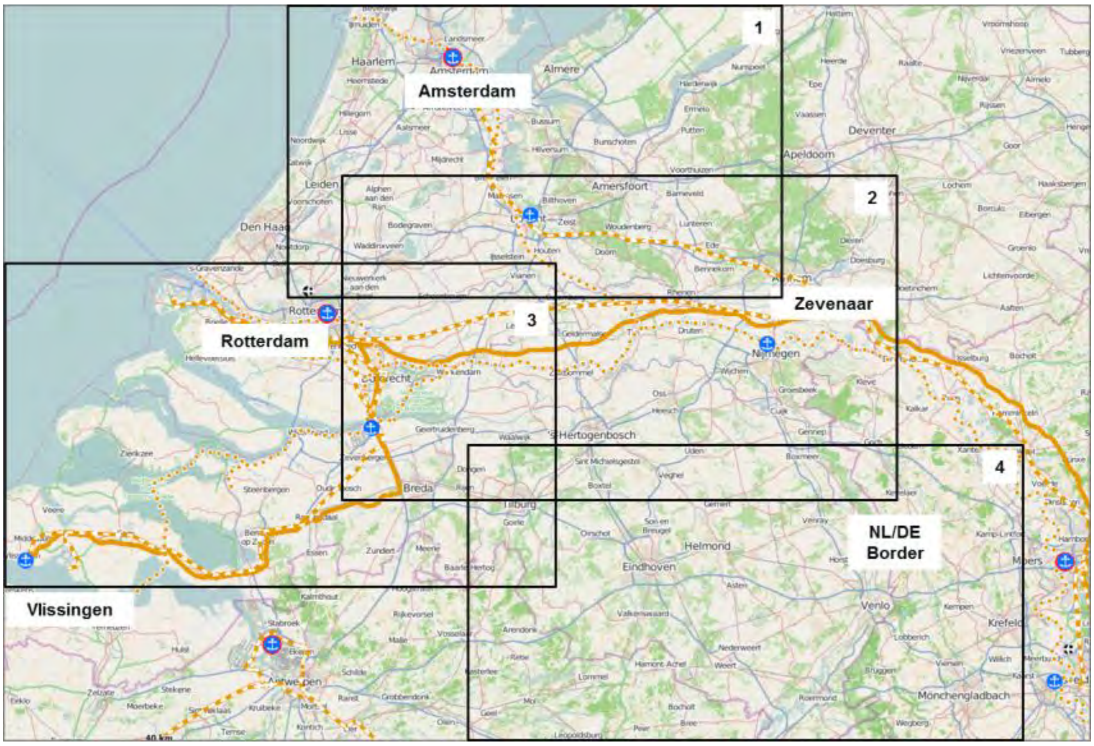
Italy:

Terminal	Handover station
Crossrail DOMO (Terminal)	Domodossola II
DBS Hangartner	Domodossola II
HUPAC	Busto Arsizio
Ambrogio Intermodal	Gallarate
CIM Interporto di Novara	Novara Boschetto
Hupac (Ro-La)	Novara Boschetto
Eurogateway	Novara Boschetto
Terminal Intermodale di Mortara (TIMO)	Mortara
Terminalitalia Intermodal Milano Certosa	Milano Certosa
Terminalitalia Intermodal Milano-Smistamento	Milano Smistamento
Sogemar	Melzo
Terminal Intermodal Milano Segrate	Milano Smistamento
Piacenza Intermodale	Piacenza
Voltri Terminal EU	Genova Voltri Mare
Terminal Ignazio Messina	Messina Genova Marittima Bacino
Terminal SECH	San Benigno - Bettolo
ILVA Steel Factory	Genova Sestri Ponente

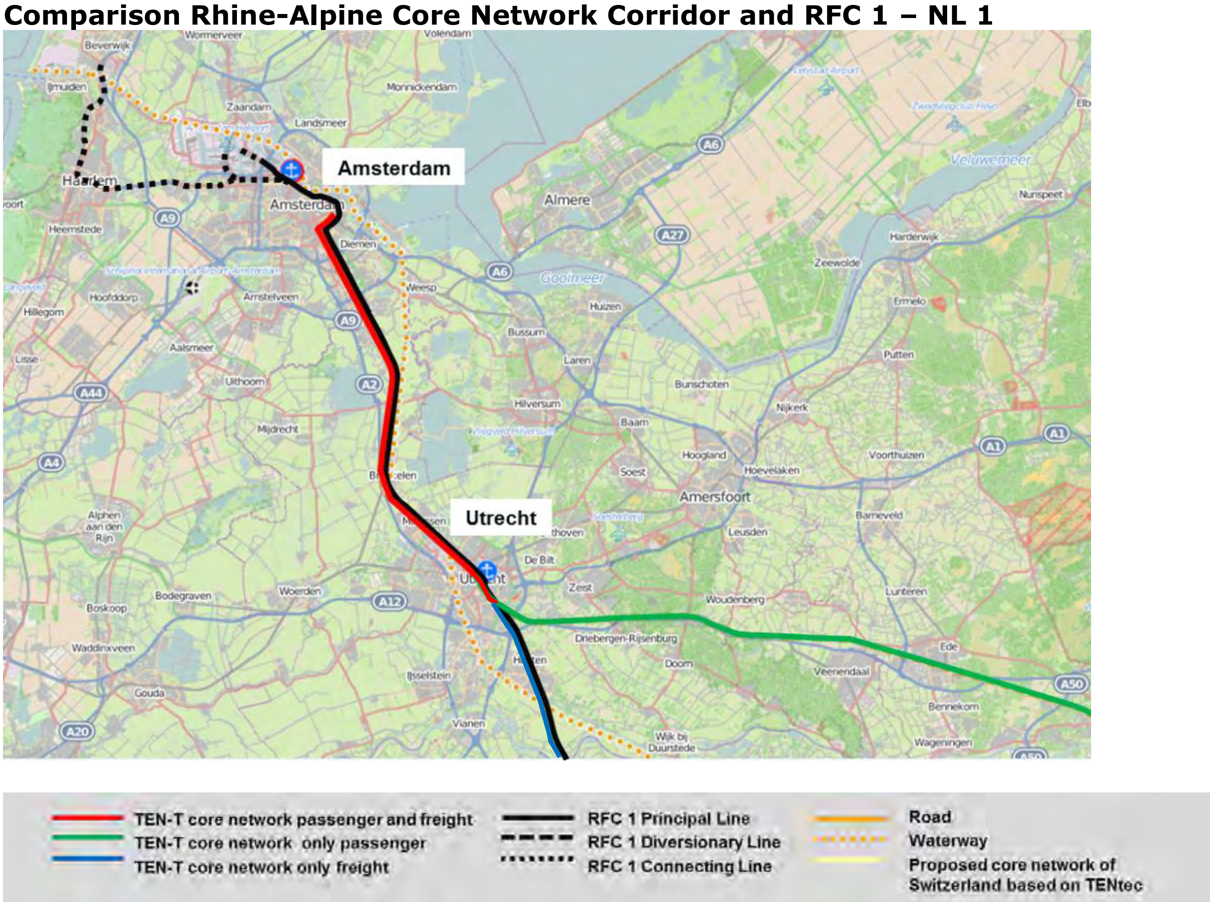
Source: Rail Freight Corridor Rhine-Alpine Implementation Plan

11. Annex: Rail Freight Corridor Rhine-Alpine alignment comparison

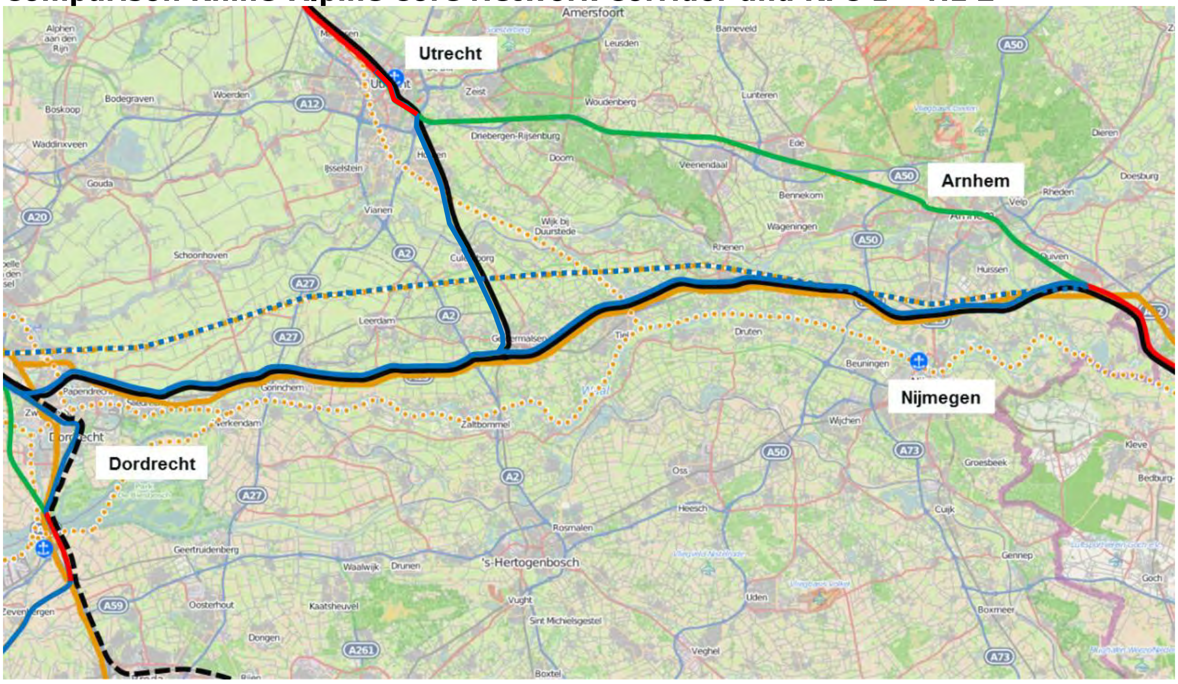
General view –The Netherlands



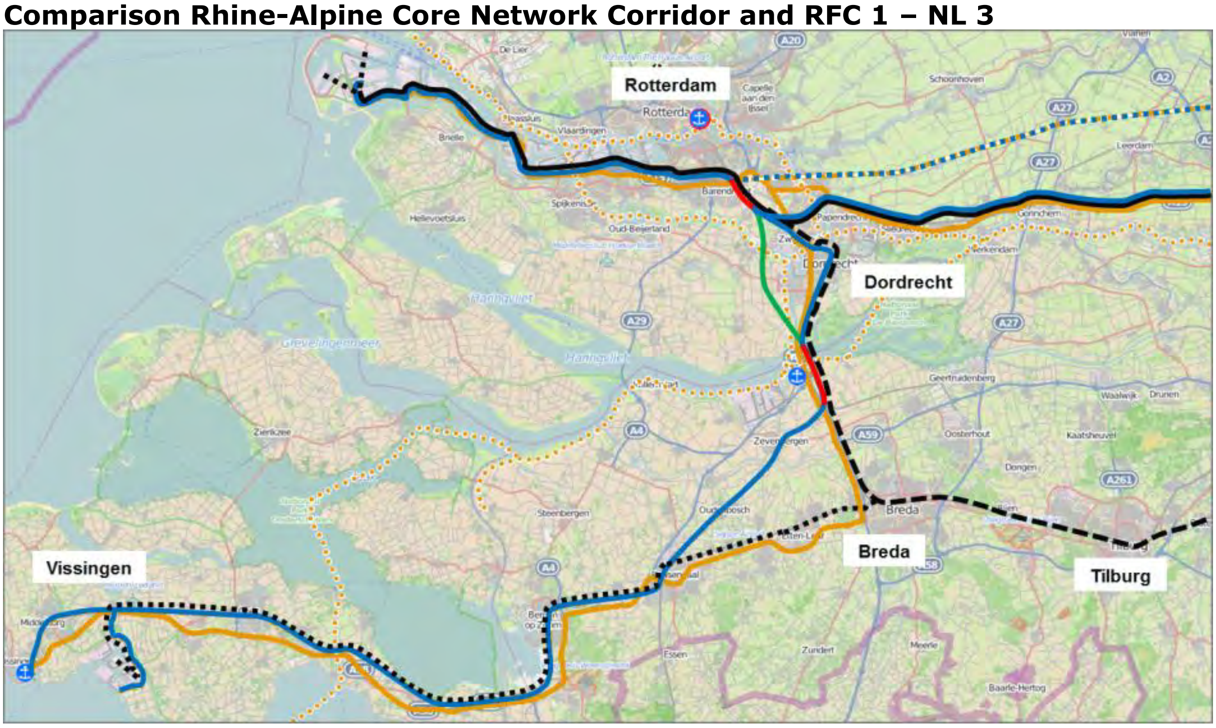
Comparison Rhine-Alpine Core Network Corridor and RFC 1 – NL 1



Comparison Rhine-Alpine Core Network Corridor and RFC 1 – NL 2

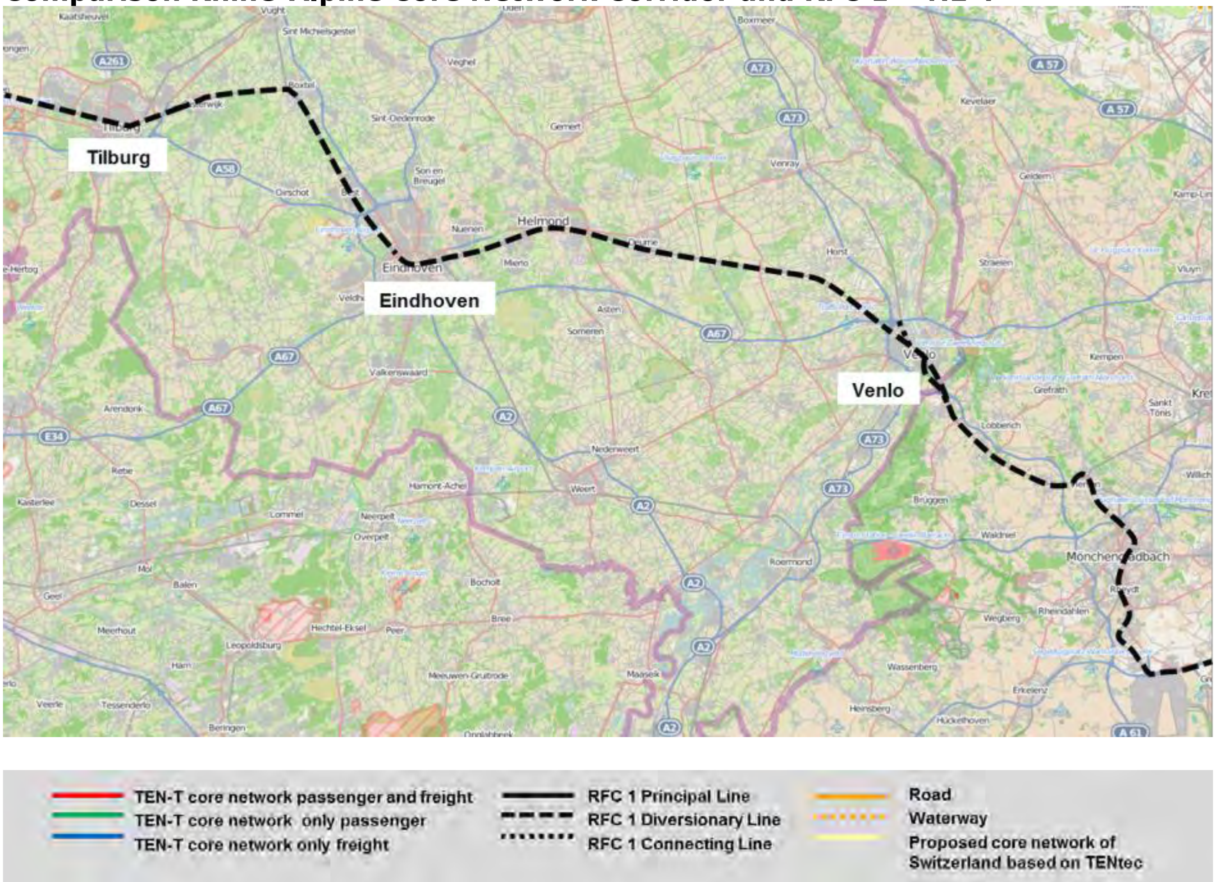


Comparison Rhine-Alpine Core Network Corridor and RFC 1 – NL 3



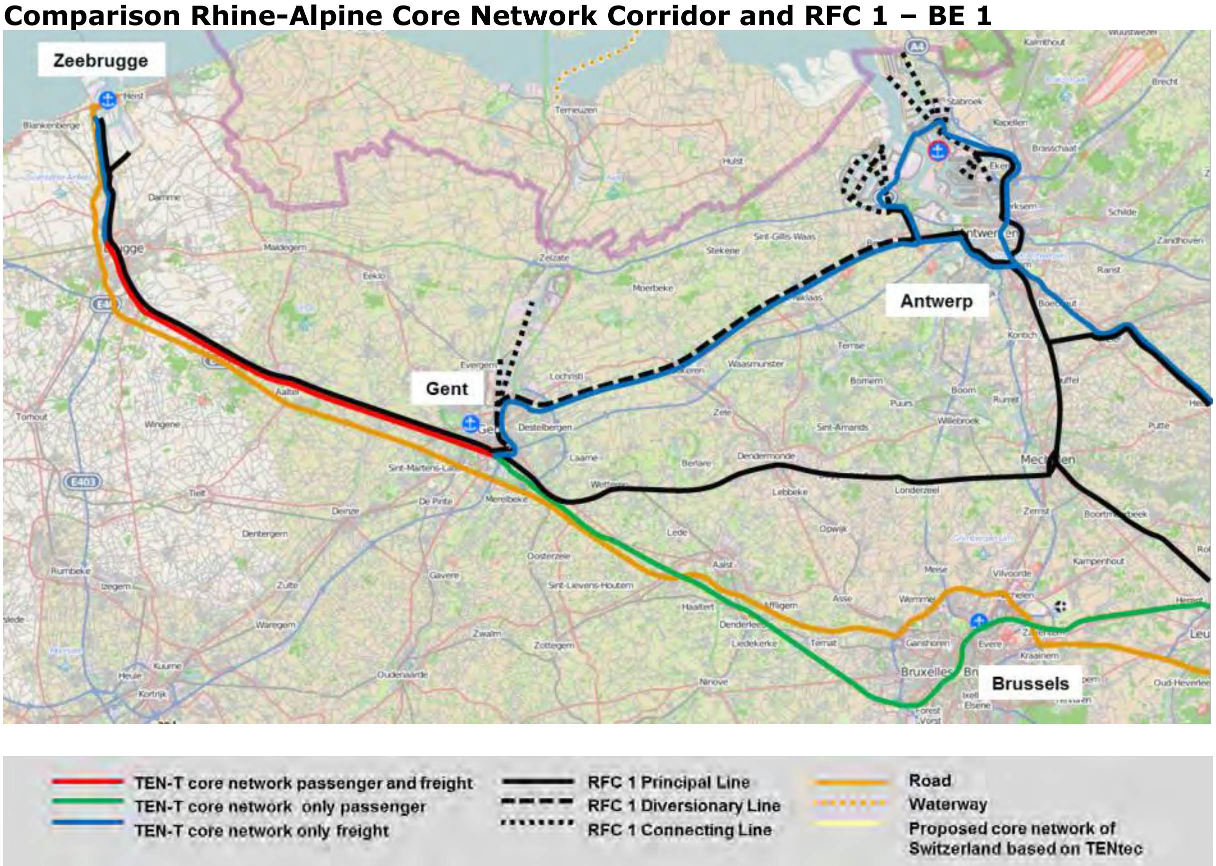
- TEN-T core network passenger and freight
- TEN-T core network only passenger
- TEN-T core network only freight
- Wrong visualisation of TEN-T alignment
- RFC 1 Principal Line
- RFC 1 Diversionary Line
- RFC 1 Connecting Line
- Road
- Waterway
- Proposed core network of Switzerland based on TENtec

Comparison Rhine-Alpine Core Network Corridor and RFC 1 – NL 4

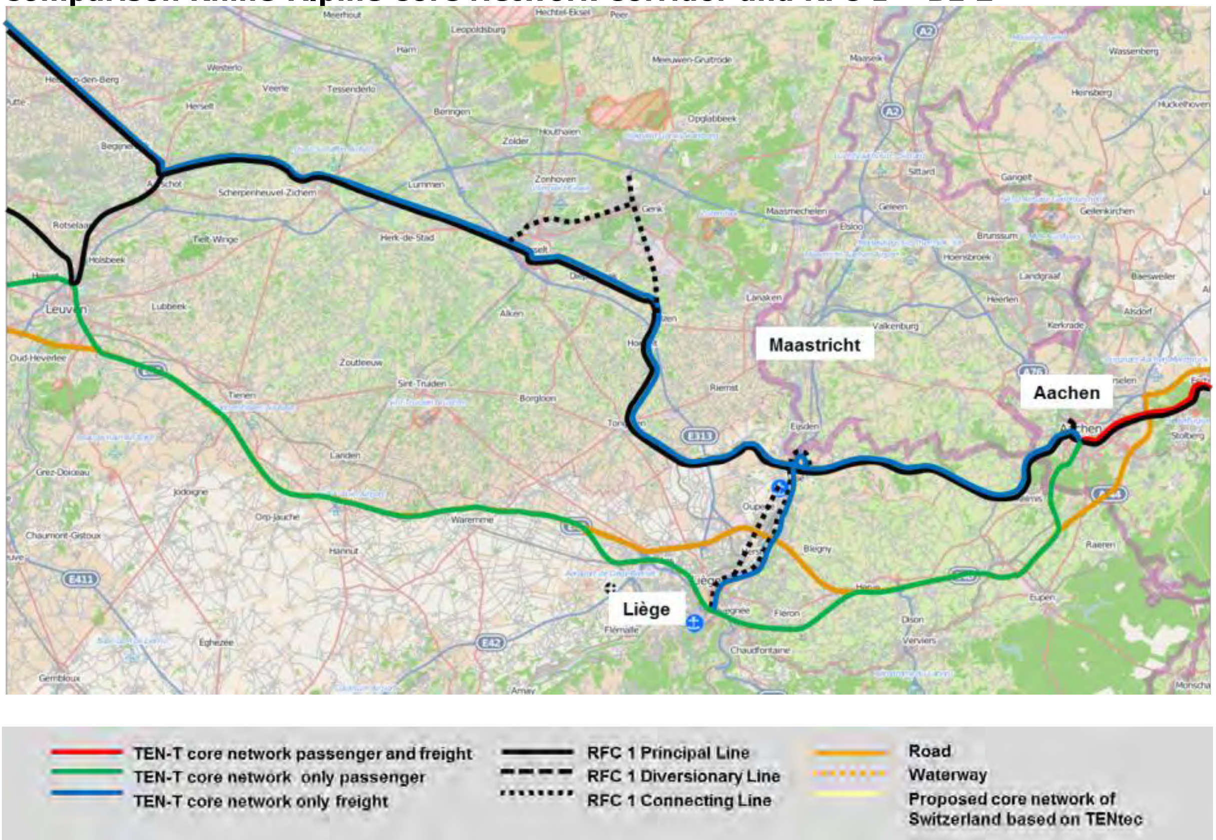


General view Belgium

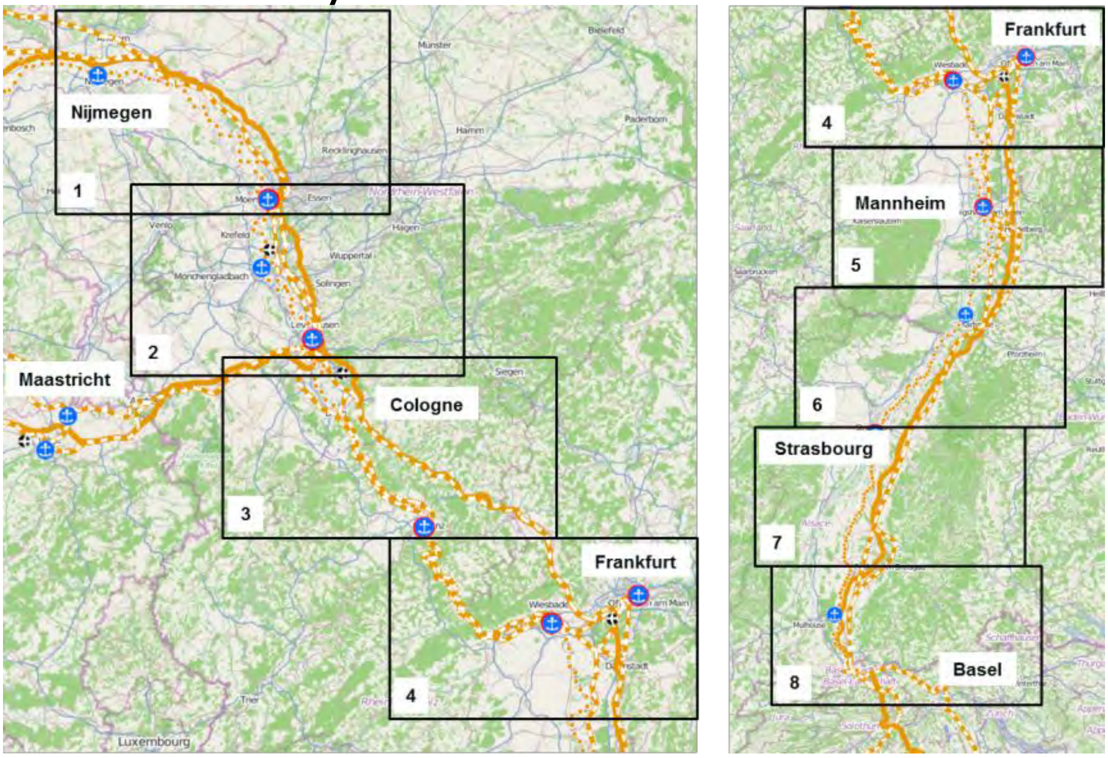
Comparison Rhine-Alpine Core Network Corridor and RFC 1 – BE 1



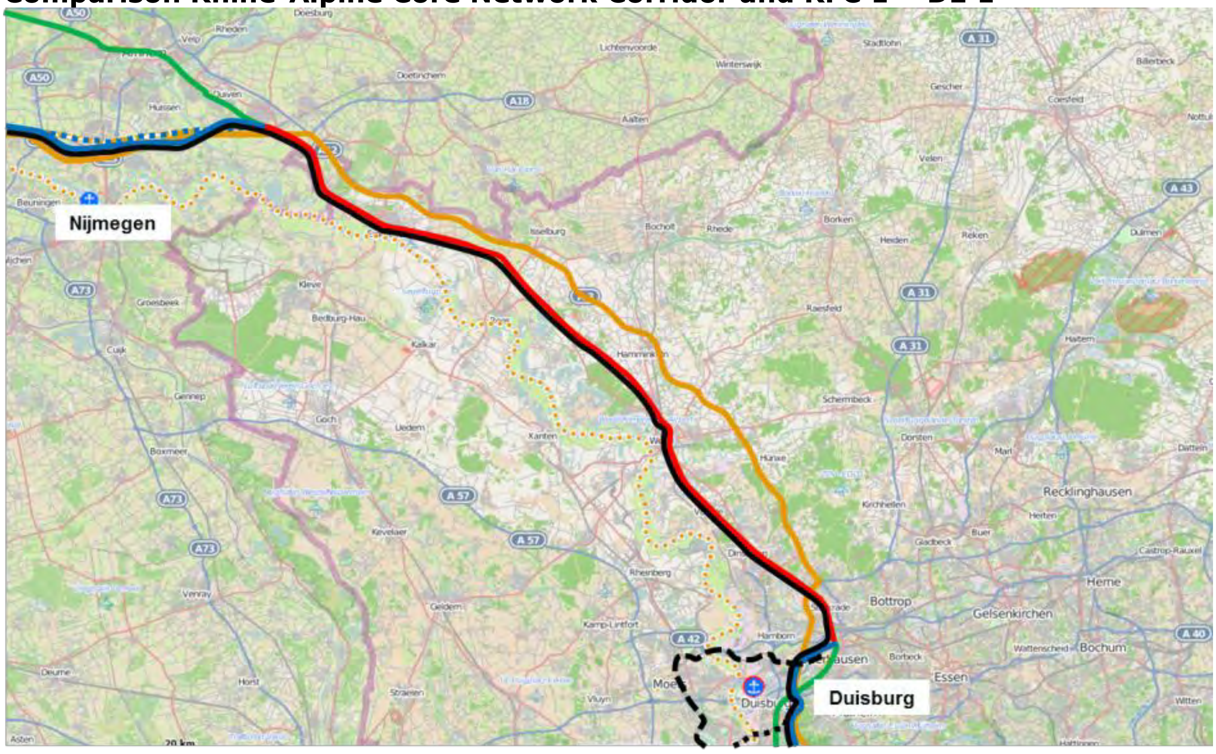
Comparison Rhine-Alpine Core Network Corridor and RFC 1 – BE 2



General view Germany

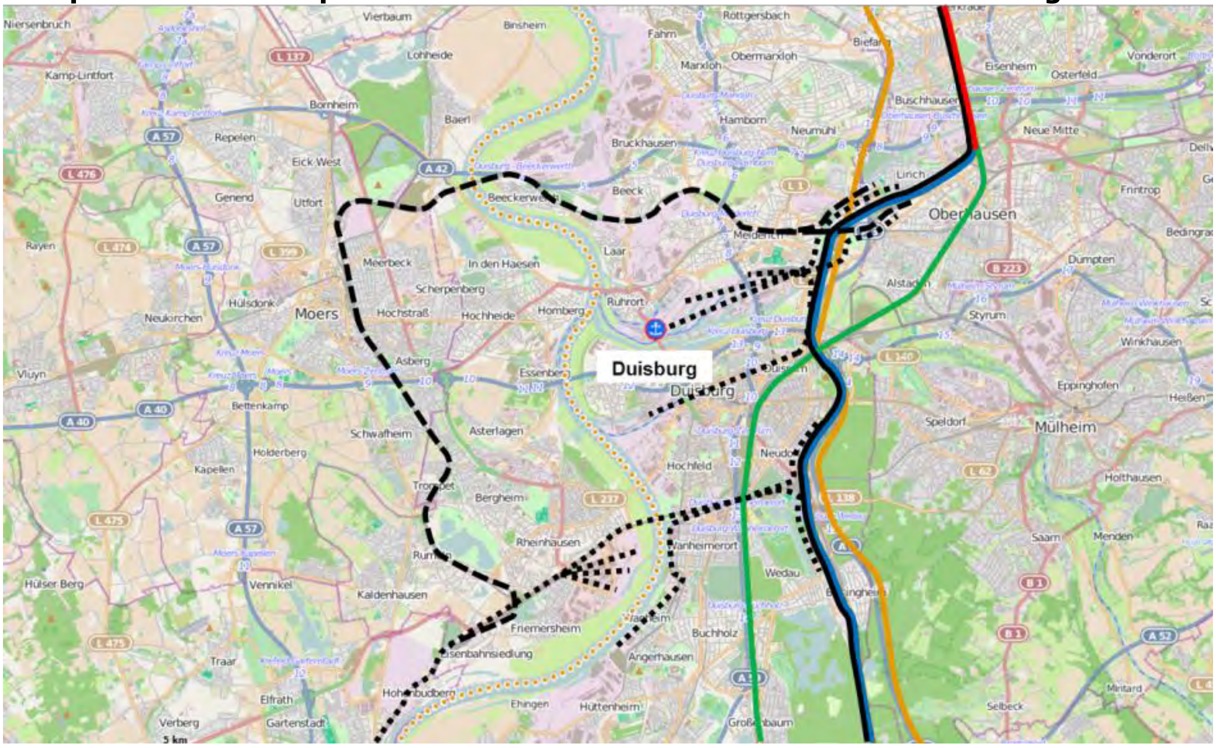


Comparison Rhine-Alpine Core Network Corridor and RFC 1 – DE 1

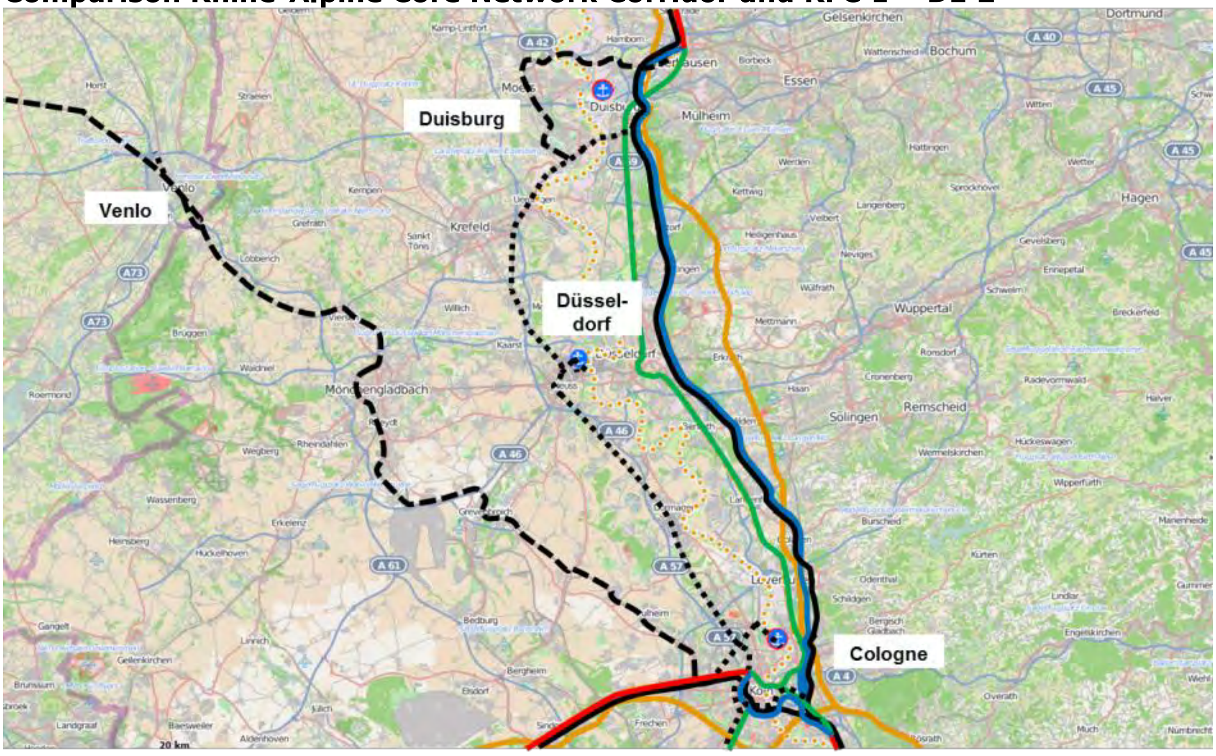


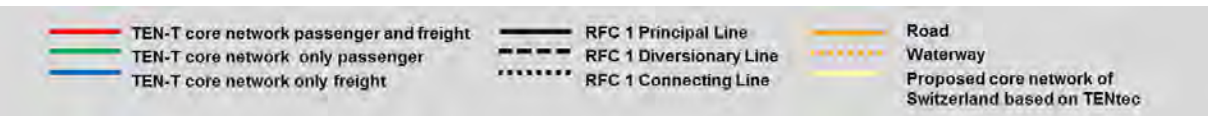
TEN-T core network passenger and freight	RFC 1 Principal Line	Road
TEN-T core network only passenger	RFC 1 Diversionary Line	Waterway
TEN-T core network only freight	RFC 1 Connecting Line	Proposed core network of Switzerland based on TENtec
Wrong visualisation of TEN-T alignment		

Comparison Rhine-Alpine Core Network Corridor and RFC 1 – Duisburg

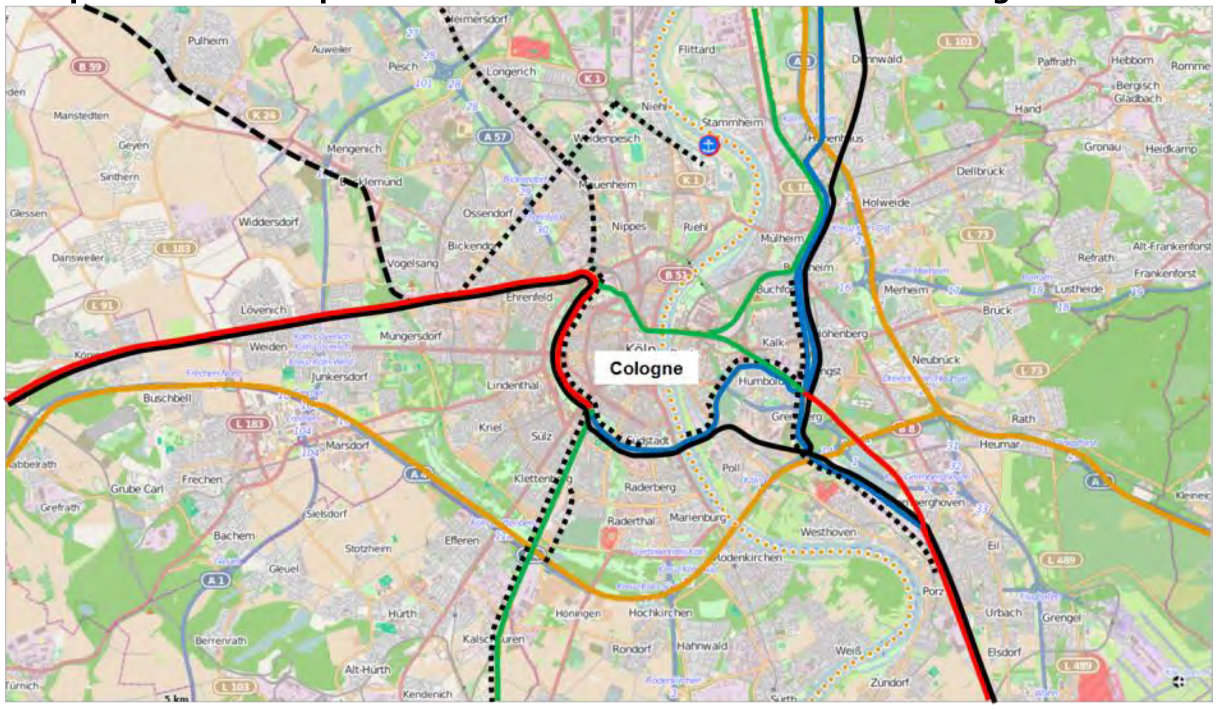


Comparison Rhine-Alpine Core Network Corridor and RFC 1 – DE 2

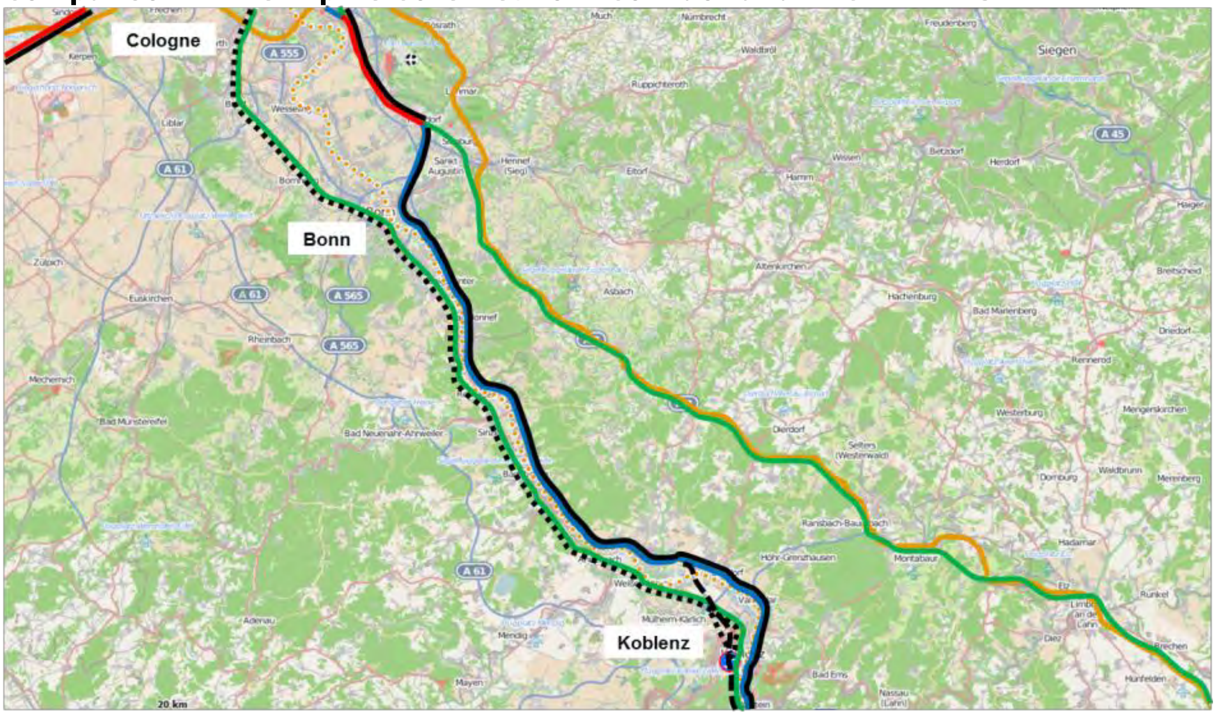


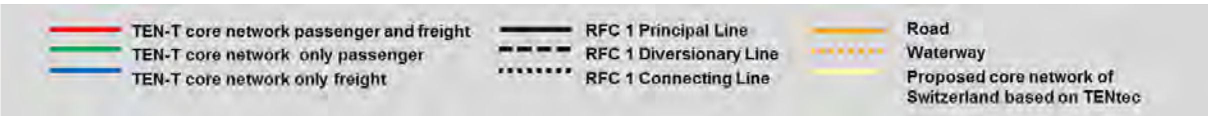


Comparison Rhine-Alpine Core Network Corridor and RFC 1 – Cologne

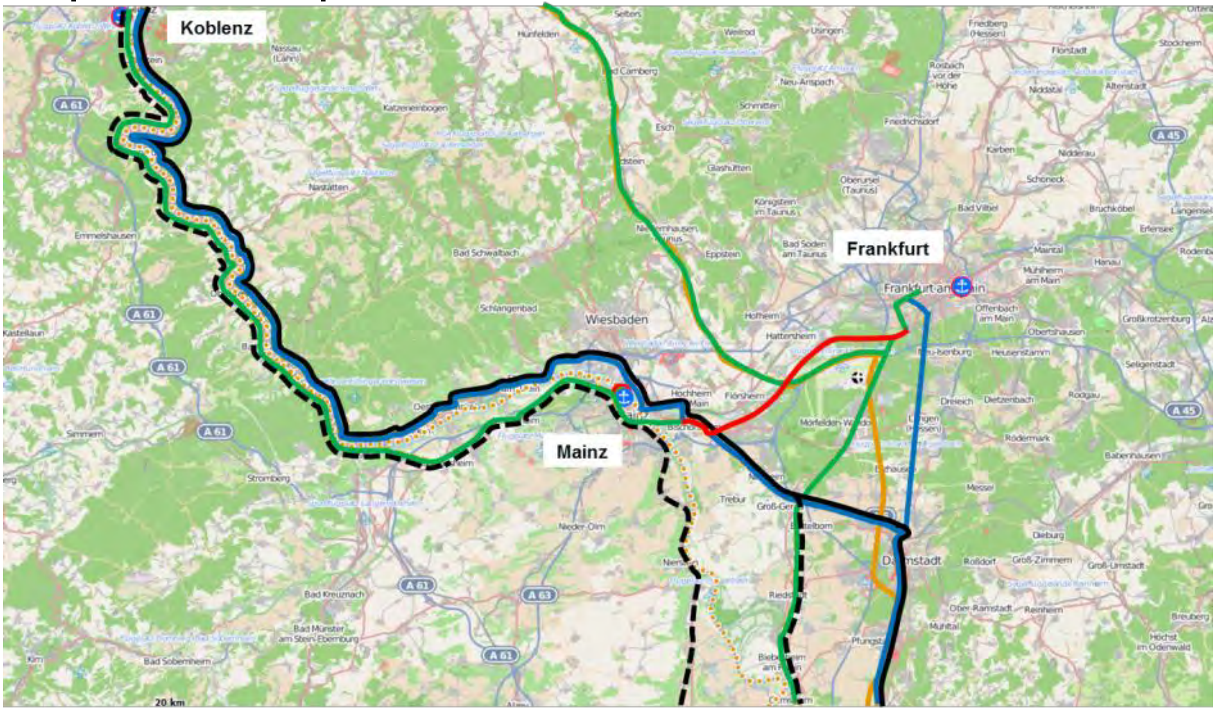


Comparison Rhine-Alpine Core Network Corridor and RFC 1 – DE 3





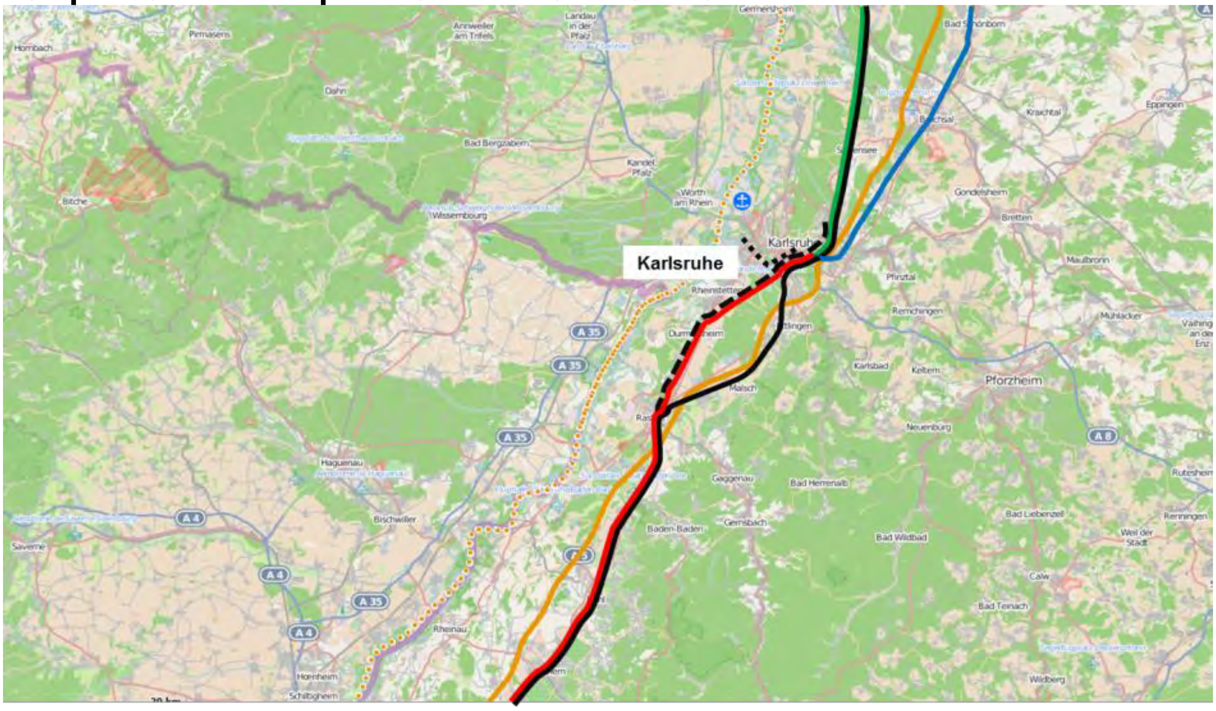
Comparison Rhine-Alpine Core Network Corridor and RFC 1 – DE 4



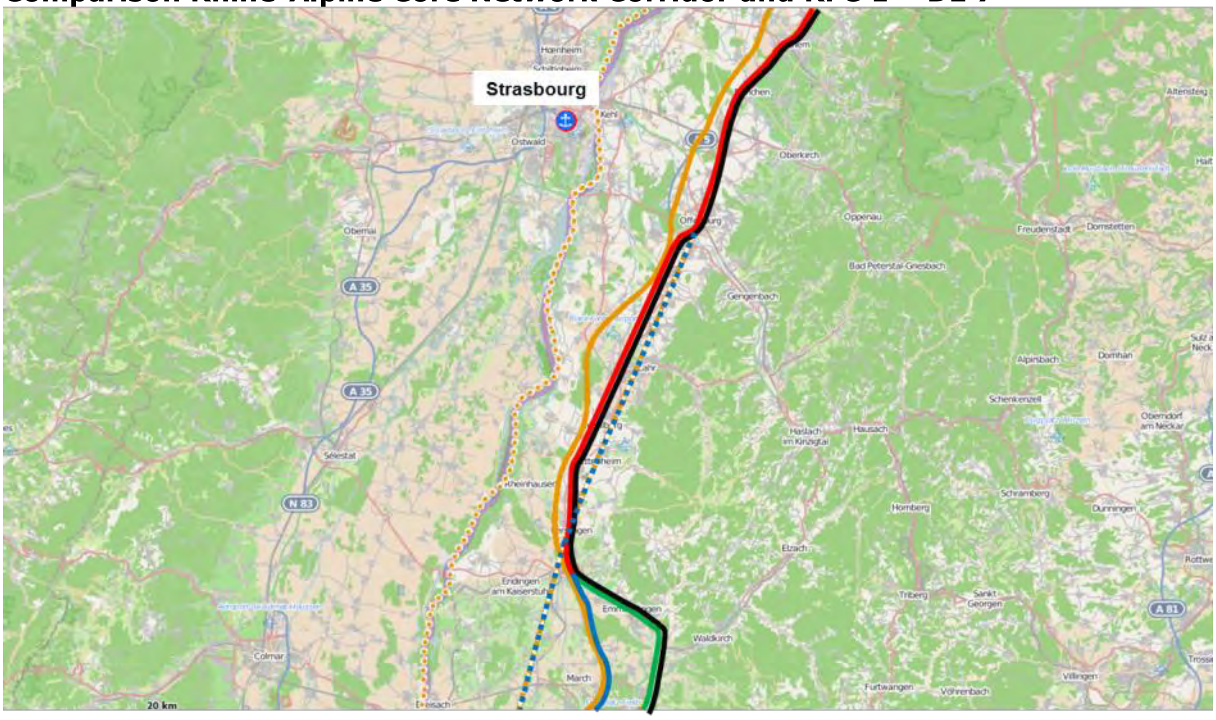
Comparison Rhine-Alpine Core Network Corridor and RFC 1 – DE 5

TEN-T core network passenger and freight
TEN-T core network only passenger
TEN-T core network only freight
Wrong visualisation of TEN-T alignment
RFC 1 Principal Line
RFC 1 Diversionary Line
RFC 1 Connecting Line
Road
Waterway
Proposed core network of Switzerland based on TENtec

Comparison Rhine-Alpine Core Network Corridor and RFC 1 – DE 6

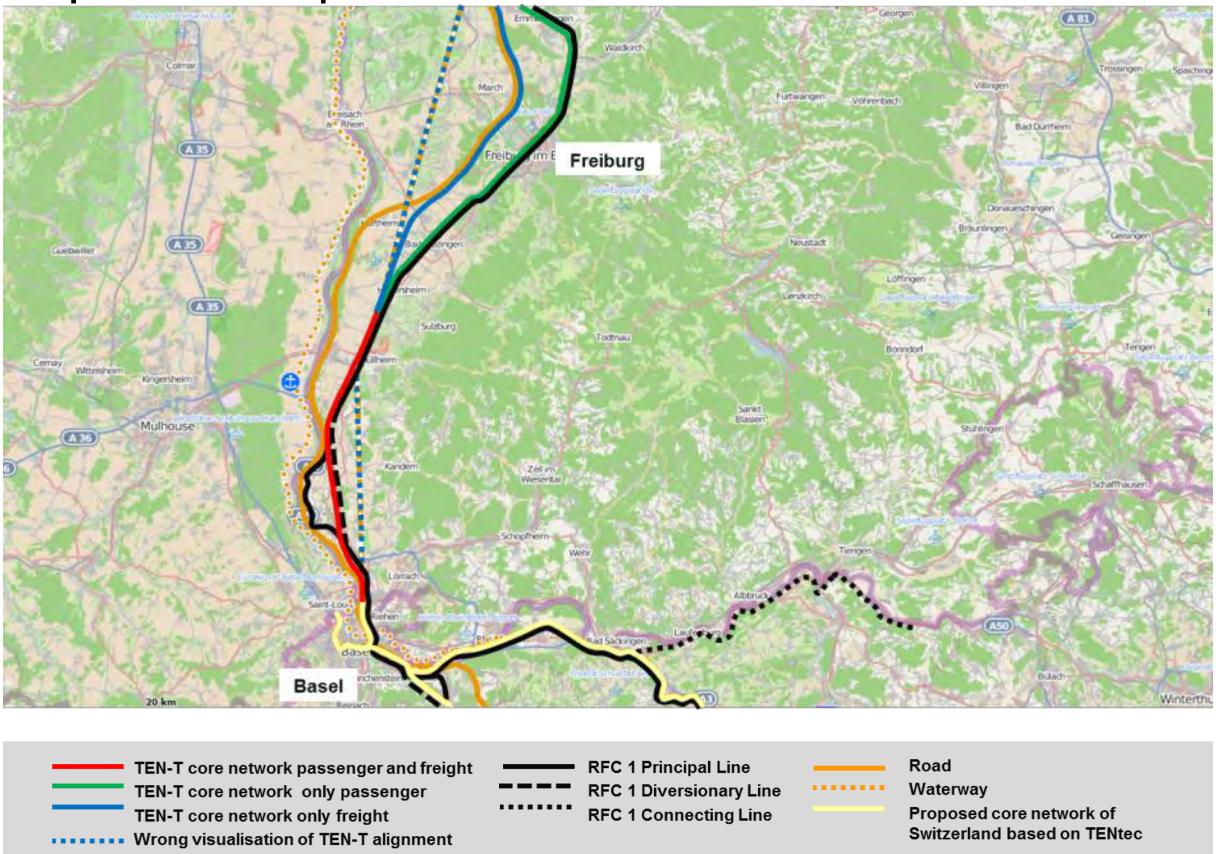


Comparison Rhine-Alpine Core Network Corridor and RFC 1 – DE 7

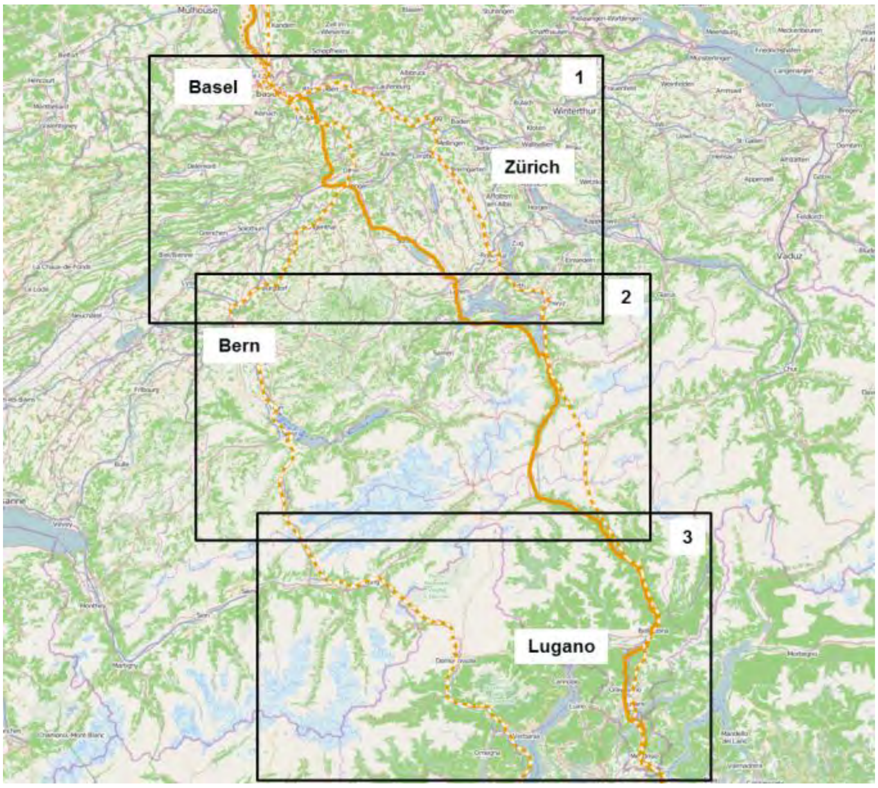


- TEN-T core network passenger and freight
- TEN-T core network only passenger
- TEN-T core network only freight
- Wrong visualisation of TEN-T alignment
- RFC 1 Principal Line
- RFC 1 Diversionary Line
- RFC 1 Connecting Line
- Road
- Waterway
- Proposed core network of Switzerland based on TENtec

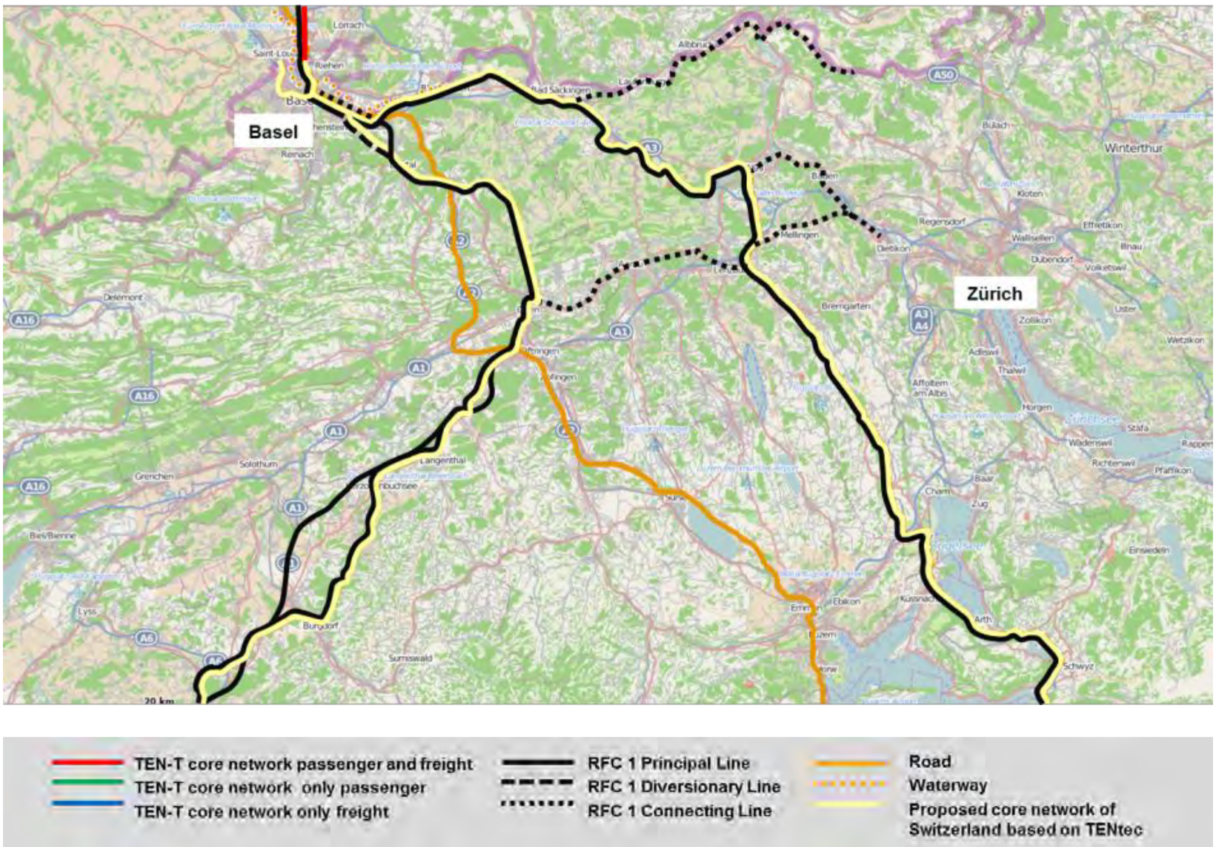
Comparison Rhine-Alpine Core Network Corridor and RFC 1 – DE 8



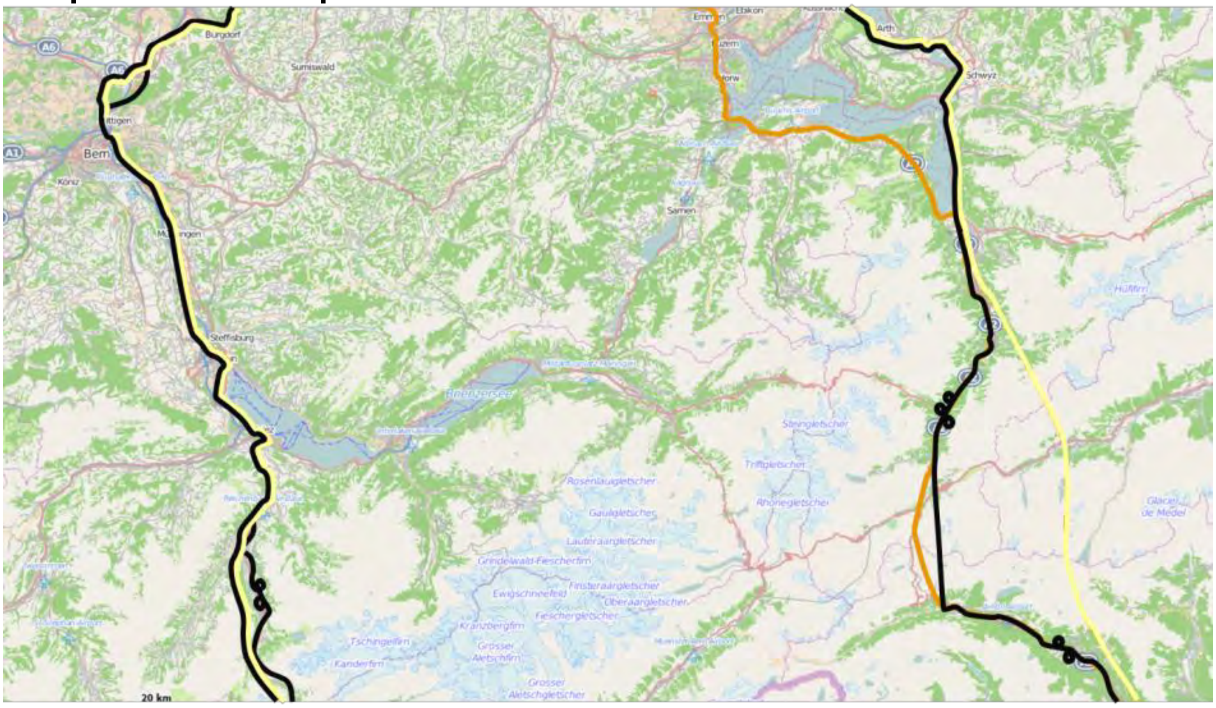
General view Switzerland



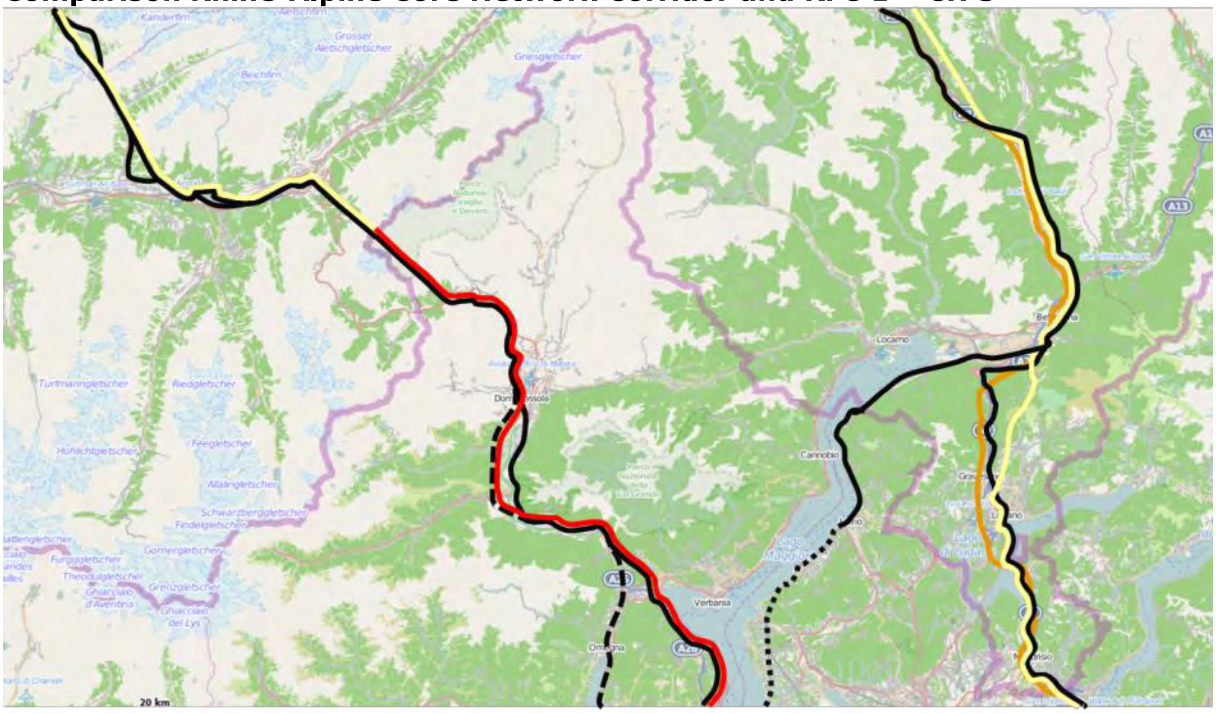
Comparison Rhine-Alpine Core Network Corridor and RFC 1 – CH 1



Comparison Rhine-Alpine Core Network Corridor and RFC 1 – CH 2

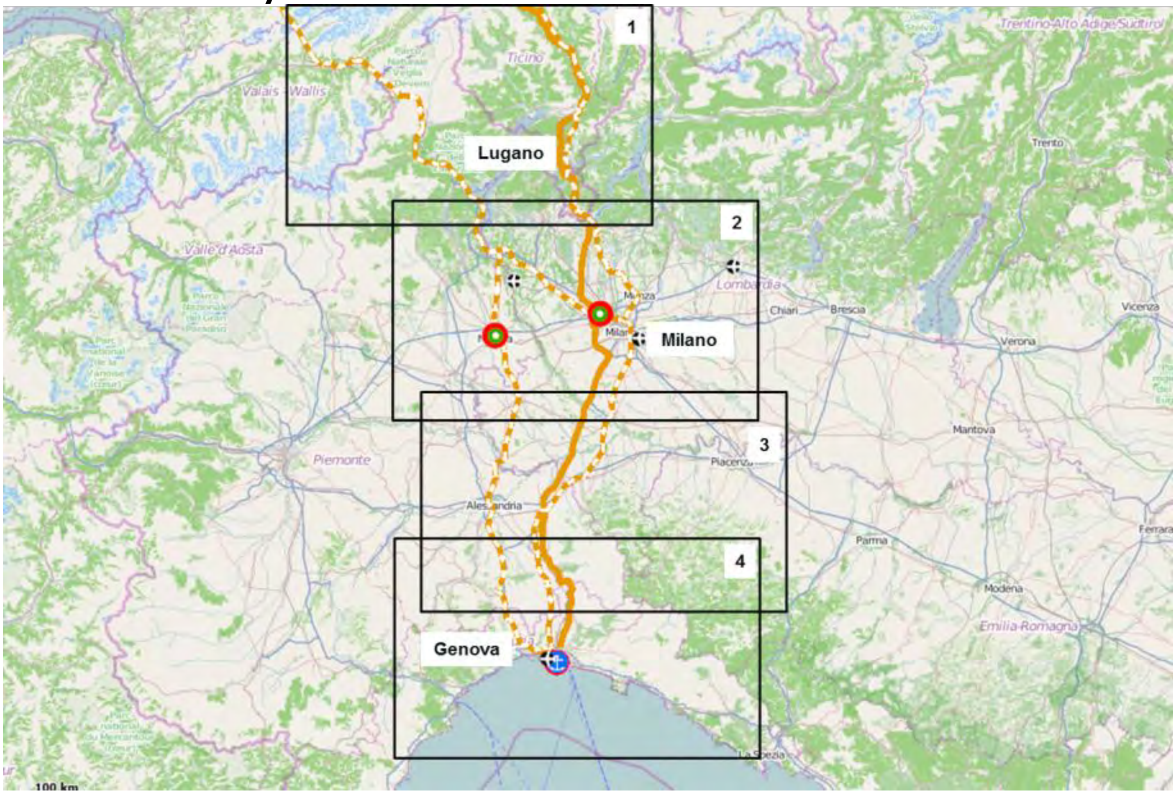


Comparison Rhine-Alpine Core Network Corridor and RFC 1 – CH 3

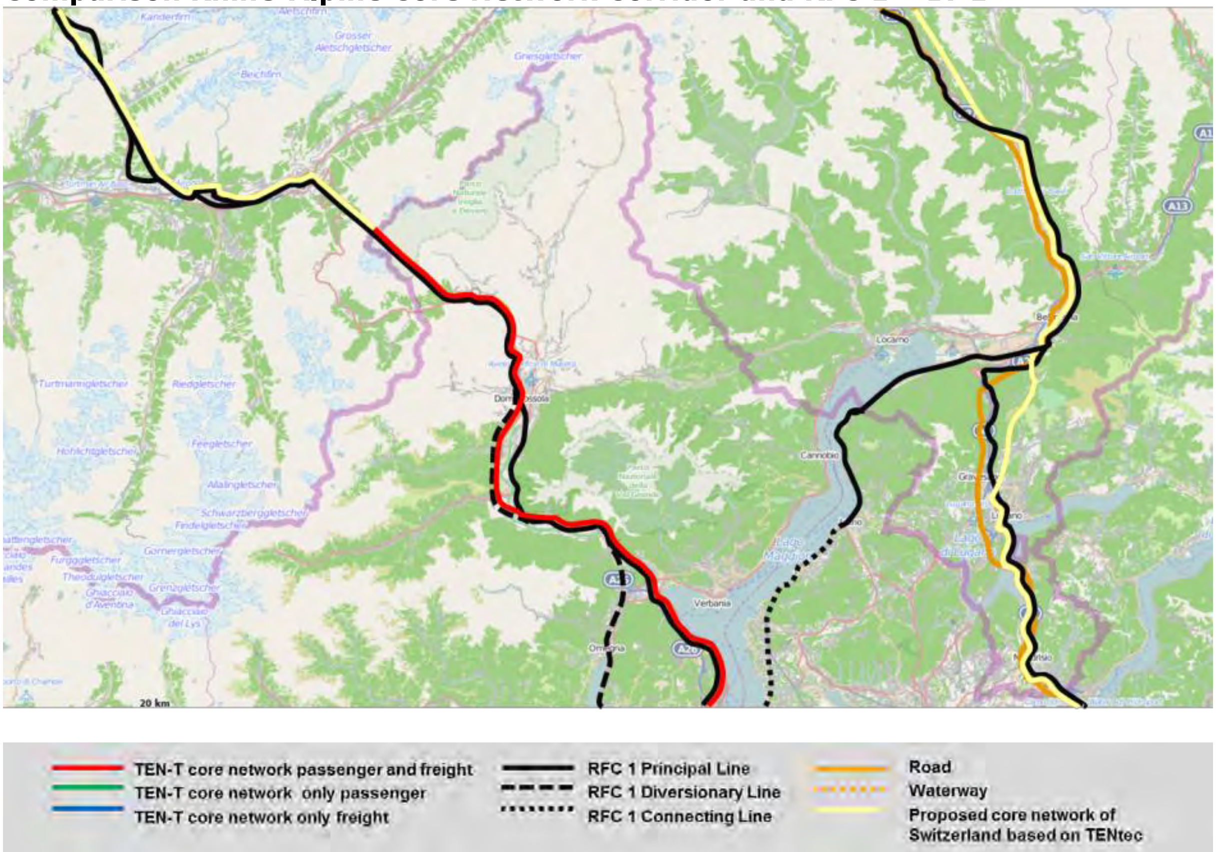


TEN-T core network passenger and freight
TEN-T core network only passenger
TEN-T core network only freight
RFC 1 Principal Line
RFC 1 Diversionary Line
RFC 1 Connecting Line
Road
Waterway
Proposed core network of Switzerland based on TENtec

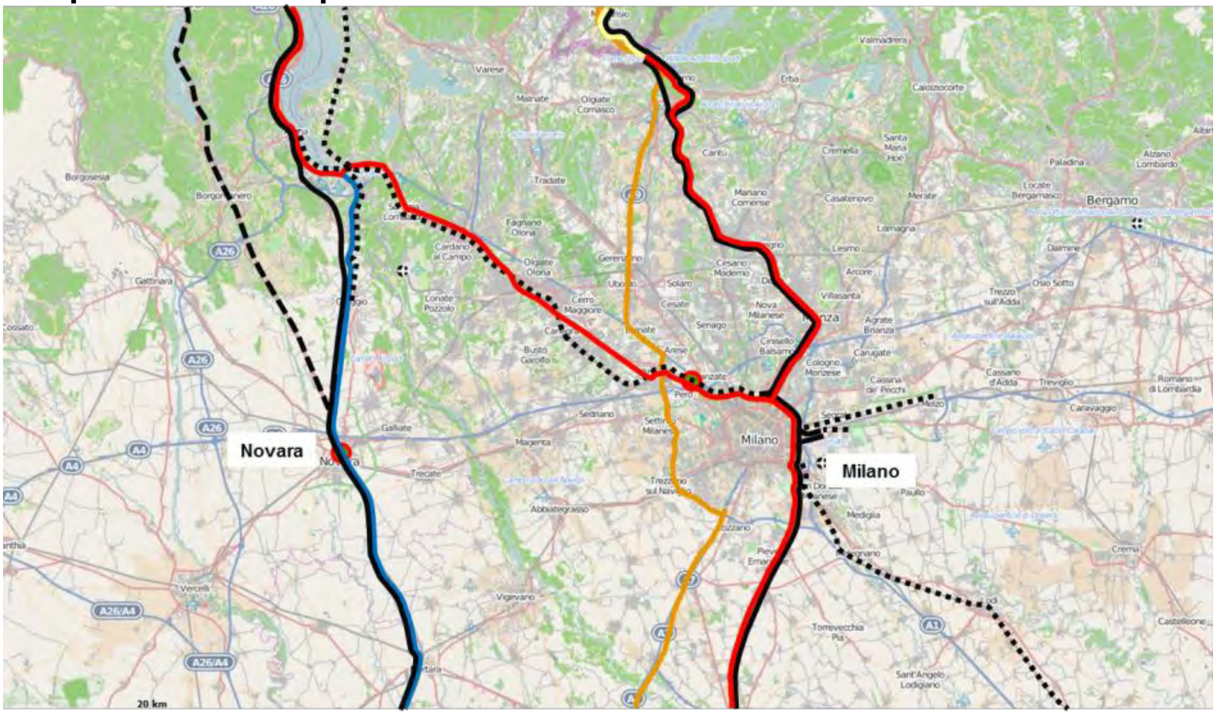
General view Italy



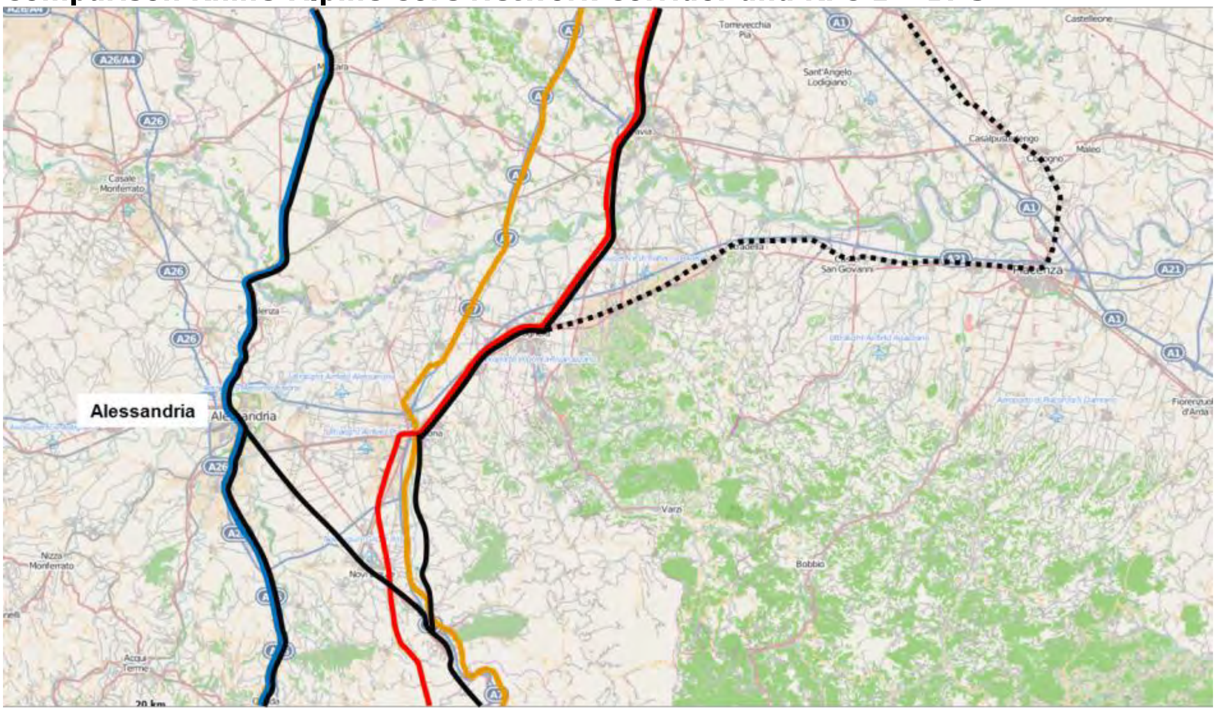
Comparison Rhine-Alpine Core Network Corridor and RFC 1 – IT 1

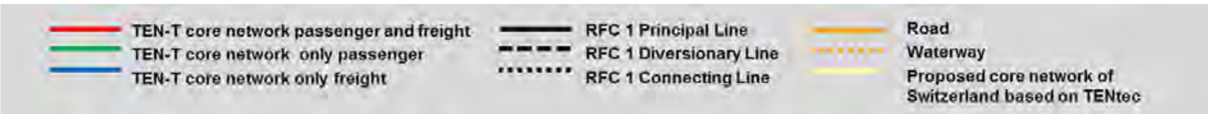


Comparison Rhine-Alpine Core Network Corridor and RFC 1 – IT 2



Comparison Rhine-Alpine Core Network Corridor and RFC 1 – IT 3



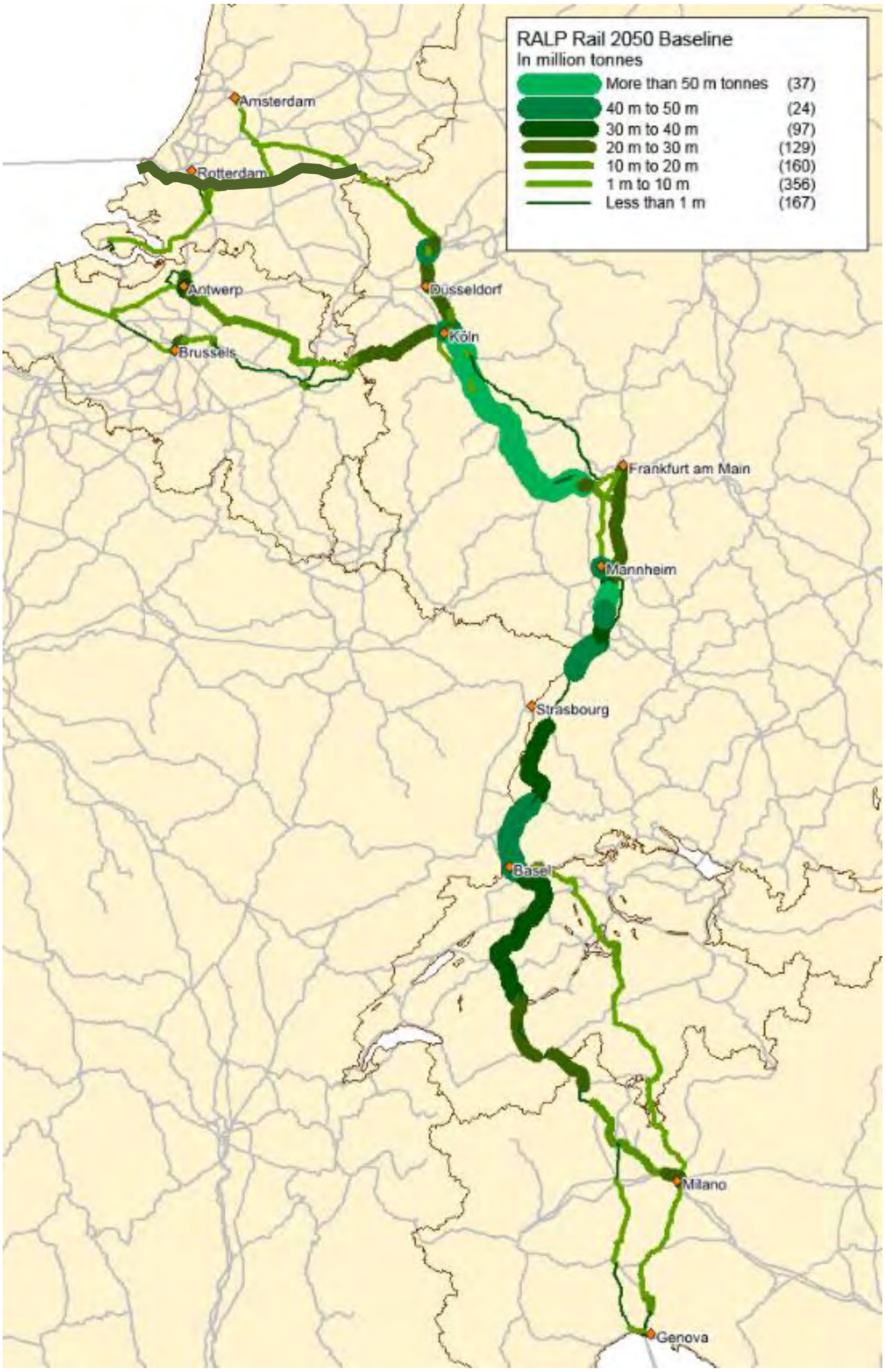


Comparison Rhine-Alpine Core Network Corridor and RFC 1 – IT 4

TEN-T core network passenger and freight
TEN-T core network only passenger
TEN-T core network only freight
Wrong visualisation of TEN-T alignment
RFC 1 Principal Line
RFC 1 Diversionary Line
RFC 1 Connecting Line
Road
Waterway
Proposed core network of Switzerland based on TENtec

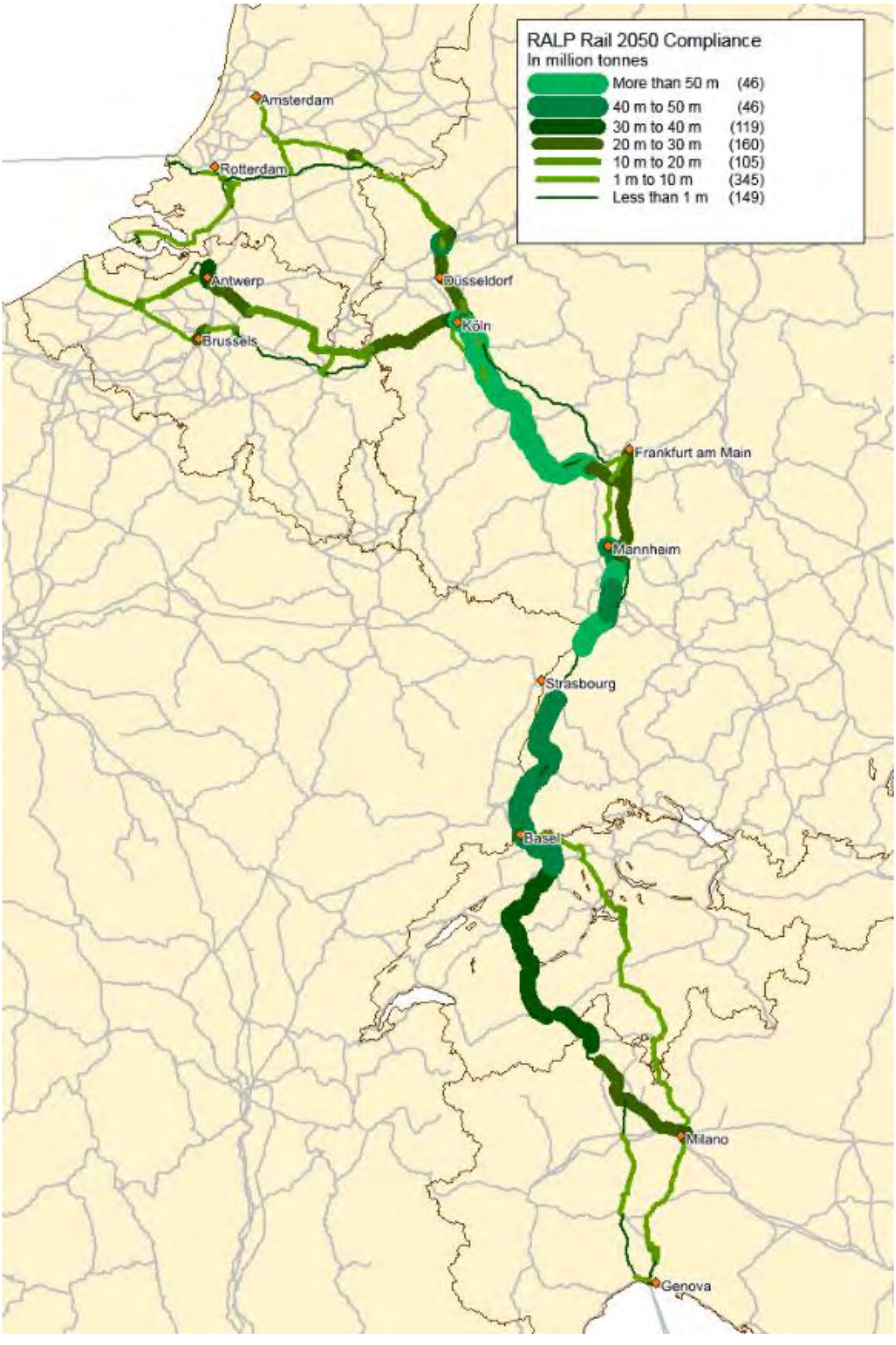
12. Annex: Maps for 2050 Scenarios (Transport Market Study)

Baseline Rail scenario outcomes for 2050 (in tonnes)



Source: Panteia, ETISplus

Compliance Rail scenario outcomes for 2050 (in tonnes)



Source: Panteia, ETISplus

Baseline Road scenario outcomes for 2050 (in tonnes)

Source: Panteia

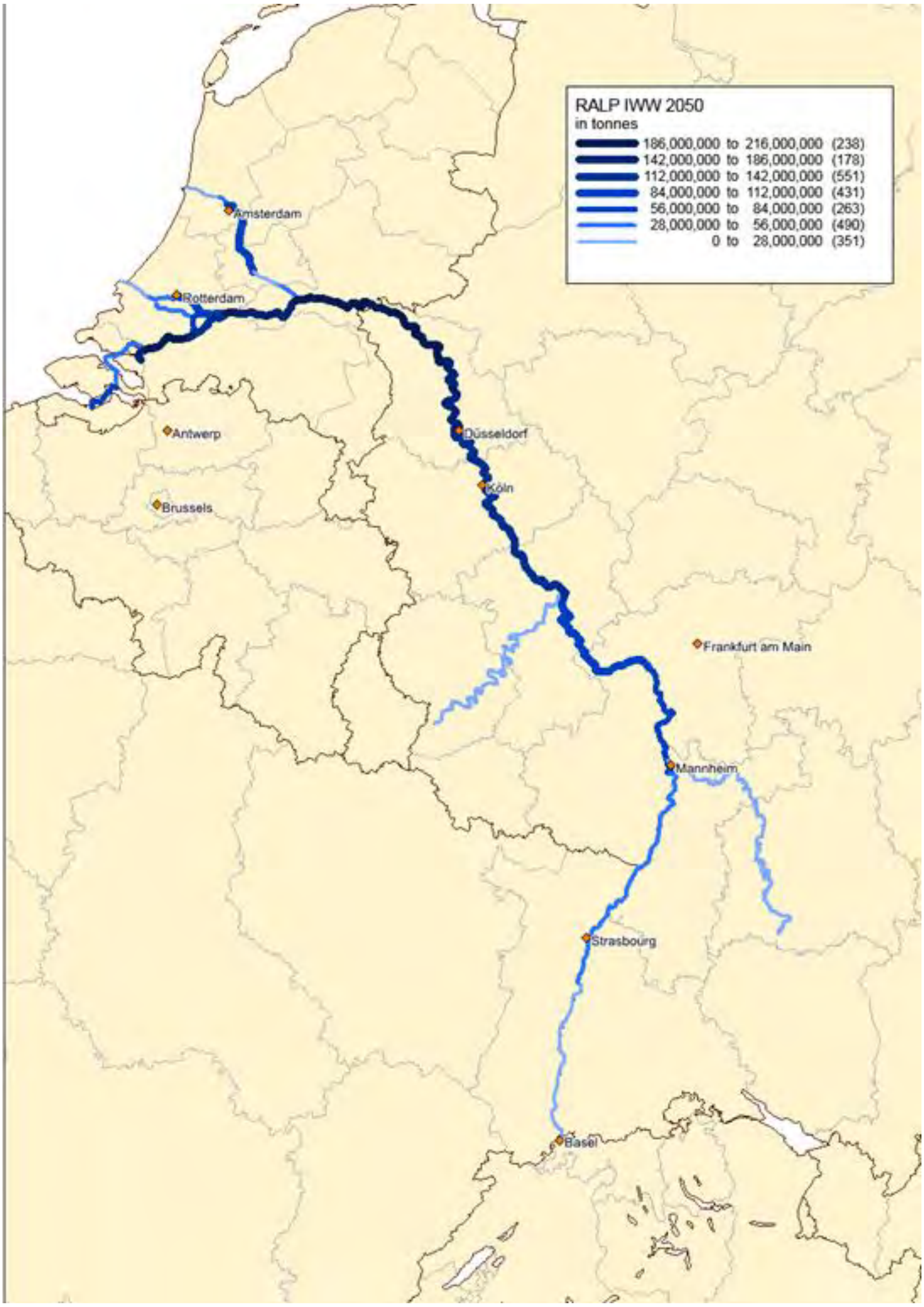
Compliance Road scenario outcomes for 2050 (in tonnes)

Source: Panteia

Difference between Baseline and Compliance scenarios for road 2050 (in tonnes)

Source: Panteia

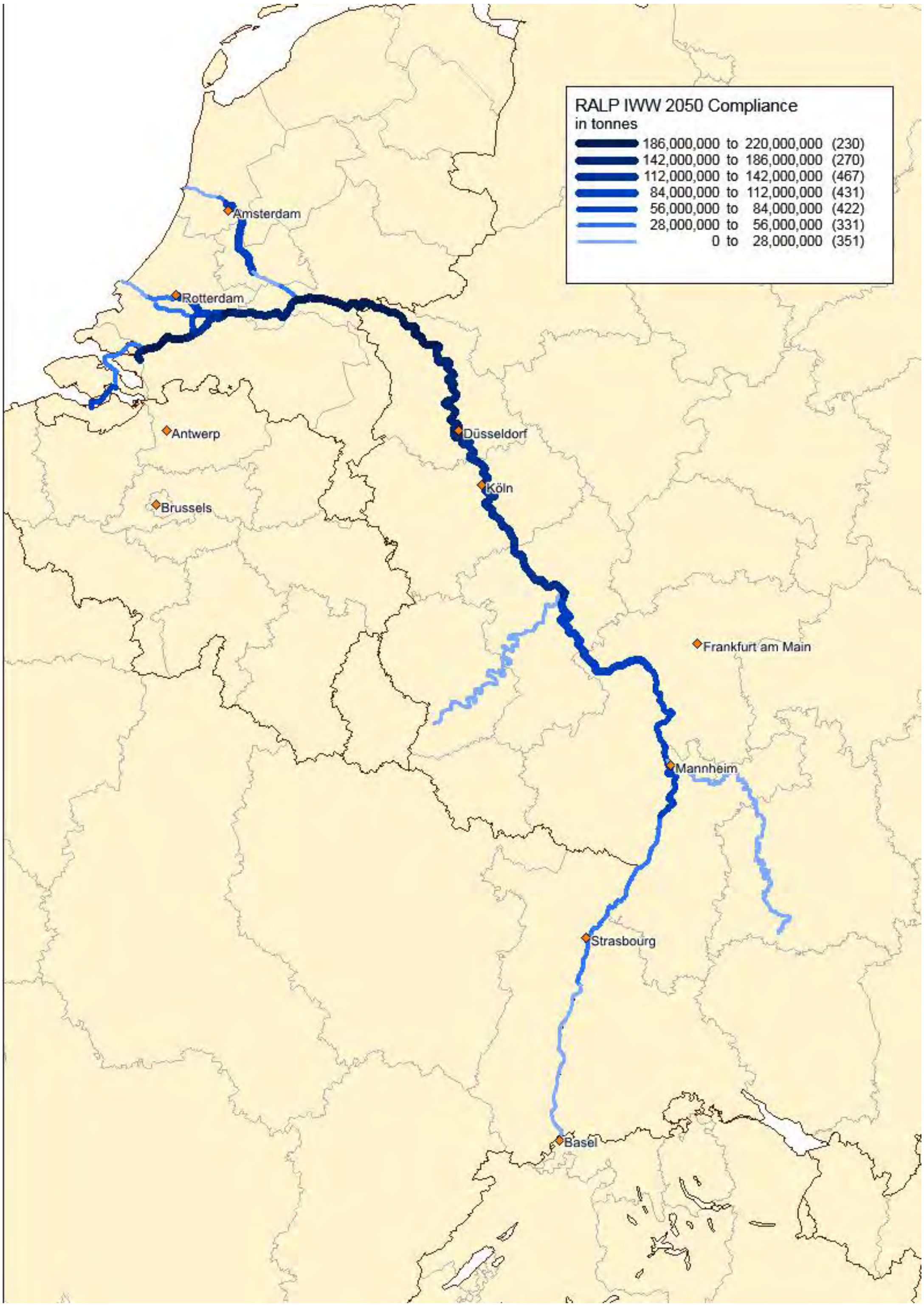
Baseline IWW scenario outcomes for 2050 (in tonnes)[67]



Source: Panteia

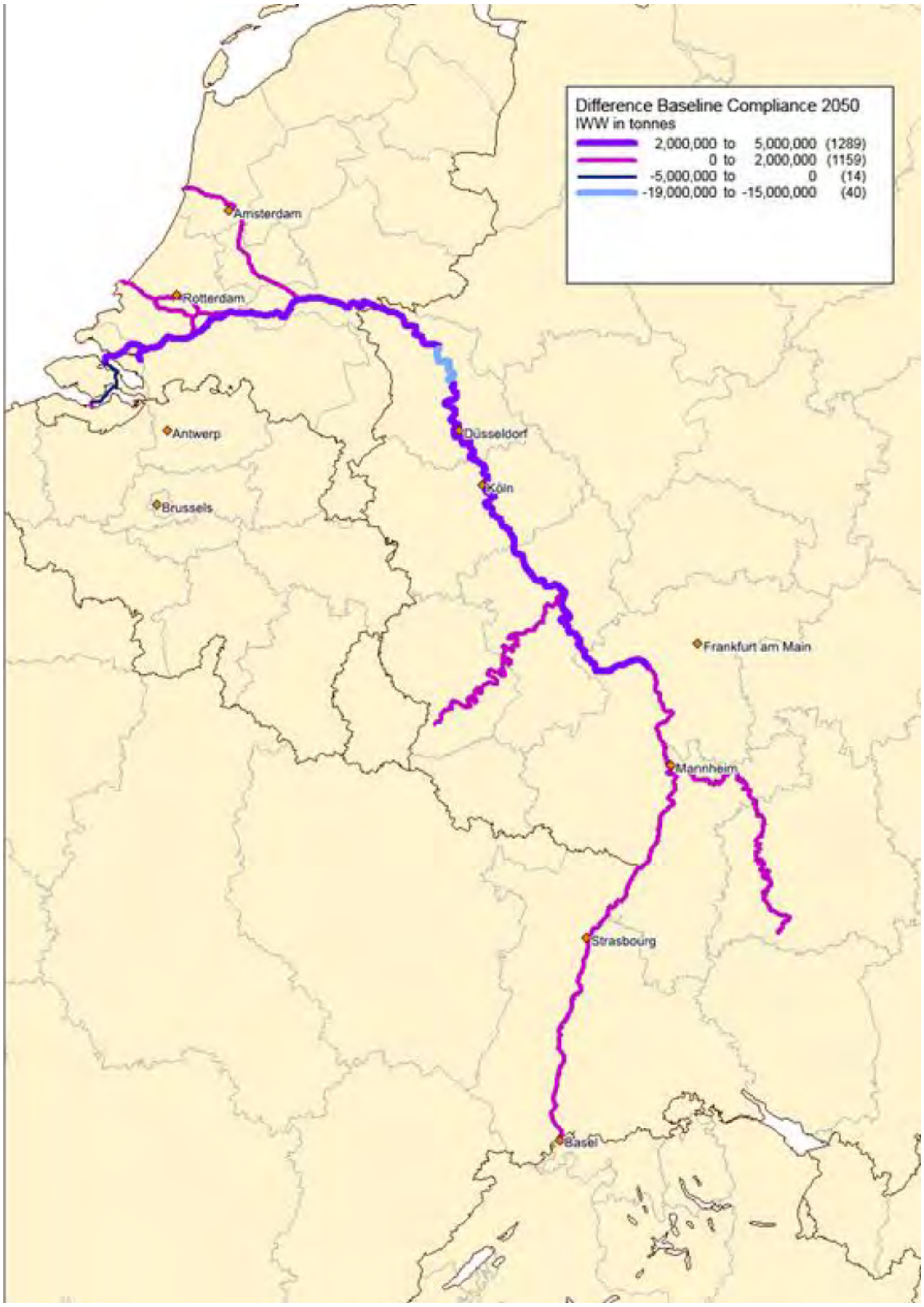
[67] BE IWW traffic flows are not presented on this map as strictly the BE IWW network does not belong to the alignment of the R-Alp corridor

Compliance IWW scenario outcomes for 2050 (in tonnes)



Source: Panteia

Difference between Baseline and Compliance scenarios for IWW (in tonnes)



Source: Panteia

13. Annex: Management Summaries

Management Summary (Dutch)

De Verordeningen (EU) № 1315/2013[68] en 1316/2013[69] definieren de juridische basis voor het trans-Europese vervoernetwerkbeleid tot 2030/50. Ze omvatten de "EU richtlijnen" die het beleidskader uitzetten en bevatten zowel een multimodaal Kernnetwerk met negen Kernnetwerk corridors die in 2030 zullen worden afgerond, als de "Connecting Europe Facility", die de EU-financiering beheert voor de periode 2014-2020.

Kernnetwerk corridors zijn een nieuw instrument op EU-niveau, met als doel het vergemakkelijken van een samenhangende ontwikkeling van infrastructuur door alle relevante partijen hierbij te betrekken: de lidstaten en een breed scala aan belanghebbenden (bijvoorbeeld infrastructuurbeheerders, regionale overheden etc.). De Europese Commissie steunt deze corridor ontwikkeling, zowel door middel van coördinerende activiteiten als door de bundeling van financiële instrumenten.

Volgens de TEN-T Richtlijnen moet er voor de ontwikkeling van elke Kernnetwerk corridor tot 2030 een werkplan worden uitgewerkt, waarin het kader wordt bepaald voor de ontwikkeling van efficiënte vervoersinfrastructuur, die de soepele werking van alle vervoerswijzen en van naadloze multimodale ketens mogelijk maakt voor zowel personen- als goederenvervoer.

De studie van de Rijn-Alpine Kernnetwerk corridor bevat alle noodzakelijke analyses en stappen die ondernomen moeten worden voor de uitwerking van het werkplan. Het identificeert de noodzakelijke projecten om de corridor tot 2030 te verbeteren, om zo de verdere versterking van de interne markt en de mondiale concurrentiepositie van Europa te ondersteunen, en om de economische, sociale en territoriale samenhang, alsmede een betere toegankelijkheid in de gehele EU, te waarborgen.

De Rijn-Alpine Corridor is een belangrijk onderdeel geweest van de vorige TEN-T en vervoersbeleid (met name prioriteitsprojecten 5 en 24, ERTMS Corridor A en de Rijn-Alpine Spoorgoederenvervoer Corridor) en bouwt voort op belangrijke, reeds afgeronde investeringen in infrastructuur. De Rijn-Alpine Corridor lijkt daarom voorbestemd om de koploper te zijn van de negen TEN-T Kernnetwerk Corridors, naar een "nieuwe generatie van infrastructuur ontwikkeling", met onder meer de versterking van multi-modaliteit, het optimaliseren van het gebruik van infrastructuur of het bevorderen van innovatieve benaderingen.

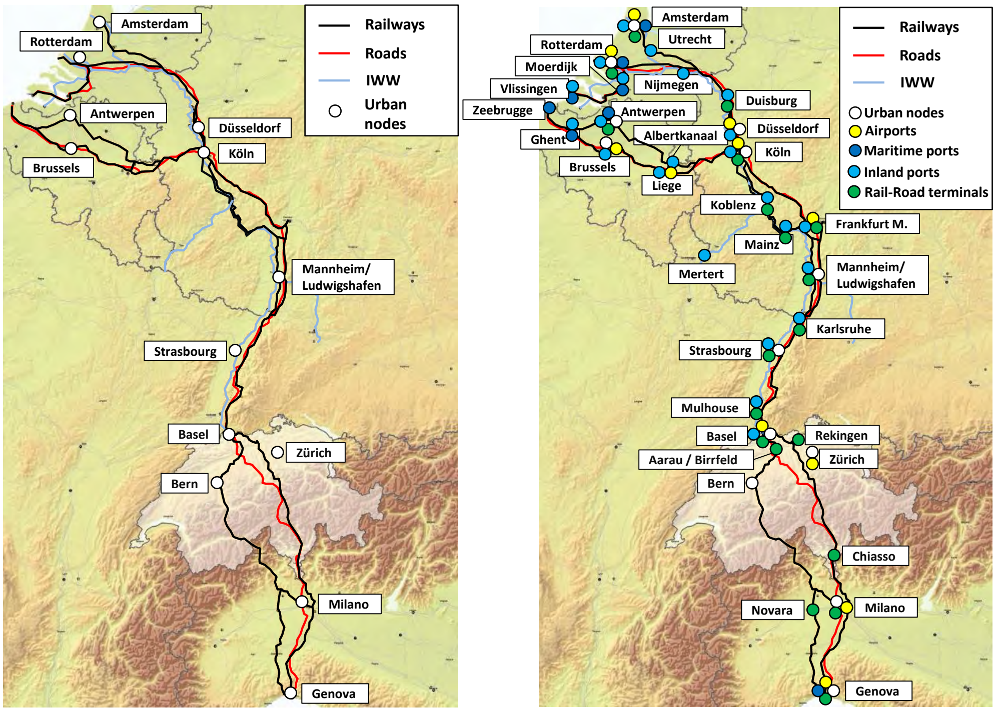
De Rijn-Alpine Corridor is een van de drukste goederenvervoerroutes in Europa, en sluit de belangrijkste economische en dichtbevolkte regio's op elkaar aan (meer dan 70 miljoen inwoners). Het kan als een van de meest ontwikkelde corridors worden beschouwd voor wat betreft de eisen die gesteld worden in de TENT-T verordening. Niettemin zijn investeringen in vervoersinfrastructuur nog steeds noodzakelijk, aangezien dit de economische groei en werkgelegenheid zal ondersteunen en zal leiden tot een milieuvriendelijker en duurzamer multimodaal transportsysteem. Het is dus van groot belang om het publieke bewustzijn en de aanvaarding van deze investeringen te vergroten. De Rijn-Alpine Corridor "verbindt de Noordzee havens van Rotterdam en Antwerpen met het Middellandse-Zeegebied in Genua via Zwitserland en een aantal van de belangrijkste economische centra van west EU. Deze multimodale corridor (waaronder het Rijnbekken) voorziet in verbindingen tussen meerdere oost-west assen". Betrokken landen zijn Nederland, België, Duitsland, Zwitserland, Noord-

[68] Verordening (EU) N° 1315/2013 van het Europese Parlement en van de Raad van 11 december 2013 inzake Unie Richtlijnen voor de ontwikkeling van het trans-Europese transport netwerk

[69] Verordening (EU) N° 1316/2013 van het Europese Parlement en van de Raad van 11 december 2013 oprichting van the Connecting Europe Facility

Italië en het oostelijk deel van Frankrijk, namelijk de regio Straatsburg, en Luxemburg (Moezel).

De Rijn-Alpine Corridor



Bron: Verordening 1316/2013 Annex 1, Deel 1

Er is een doorlopend kern infrastructuur netwerk voor het spoor en over de weg, oftewel er is een (ten minste één) eind-tot-eind-verbinding is tussen Rotterdam/ Zeebrugge en Genua. Voor de binnenvaartwegen is de situatie meer complex. Zwitserland heeft slechts een klein deel van de binnenvaartwegen, Italië heeft helemaal geen uitgelijnd binnenvaartnet en de Belgische waterwegen zijn toegewezen aan een ander corridor (namelijk Noordzee-Middellandse Zee). Niettemin zijn ze van belang voor de Rijn-Alpine Corridor, vanwege de belangrijke grensoverschrijdende stromen van België richting Nederland en Duitsland. Gegevens van deze vervoersstromen worden gebruikt voor analyse van de vervoer marktstudie, maar de Belgische binnenvaart projecten zullen niet in dit rapport worden besproken. In het wegvervoer zijn de relevante wegen bijna uitsluitend snelwegen, maar het grootste deel van de infrastructuur is niet altijd aangepast aan de huidige vraag. Spoorvervoer opereert grensoverschrijdend met verschillende secties die uitsluitend gericht zijn op hogesnelheidslijnen. Alternatieve routes zijn beschikbaar in het geval van storingen. De luchthavens langs de corridor zijn van groot belang voor het personenvervoer, waaronder de centrale luchthavens in Frankfurt, Amsterdam, Zürich, Brussel en Milaan.

Betrokkenheid van relevante belanghebbenden

De belanghebbenden worden stap voor stap betrokken door middel van vier Corridor Fora. Een Corridor Forum is een adviesorgaan dat een basis voor gesprekken en coördinatie biedt. Aldus zal het werkplan het resultaat zijn van een uitgebreid overlegproces, om er voor te zorgen dat alle deelnemers begrip en acceptatie delen van de noodzaak om bepaalde maatregelen in te voeren. Er zijn ruim 400 stakeholders geïdentificeerd. In aanvulling op de Corridor Fora werden ook twee "werkgroepen" gehouden in 2014.

Integratie van bestaande studies

De analyse van bestaande onderzoeken heeft een uitgebreide database opgeleverd met belangrijke corridor rapporten op EU-breed, corridor-breed en op nationaal niveau. De relevante studies zijn geclusterd in de volgende hoofdcategorieën:

- Macro-regio documenten voor het plannen en ontwikkelen van transport;
- Studie- en planning documenten van infrastructurele projecten;
- Studies over transport ontwikkeling, met lange termijn voorspellingen en lange termijn marktontwikkelingen;
- Beheerstudies en strategiedocumenten.

De analyse was een belangrijke pijler voor het verkrijgen van een uitgebreid overzicht op de corridor als hoofdbestanddeel voor het werkplan.

Corridor kenmerken

Het werk aan de corridor kenmerken is in twee stappen verdeeld: in eerste instantie is de infrastructuur van het kernnetwerk gecontroleerd aan de hand van de eisen gedefinieerd in de TEN-T 1315/2013 verordening. Binnen deze stap zijn de technische parameters per vervoerwijze geïdentificeerd en de secties of faciliteiten die niet voldeden aan deze normen, zijn gemarkeerd als "kritieke punten", samen met verder geïdentificeerde knelpunten, zoals capaciteitsproblemen etc. Om de gemarkeerde kritieke punten en knelpunten op te lossen zijn er verschillende projecten langs de corridor gedefinieerd (cp. Implementatieplan). De resultaten van deze oefening zijn bekrachtigd door de lidstaten en de belanghebbenden tijdens de Corridor Fora.

Bij de analyse van de TEN-T "compliance" bleek voor spoor dat elektrificatie en de vereiste minimale spoorbreedte volledig worden toegepast op de gehele corridor. Goederentrein snelheden van meer dan 100 km/h en een aslast van 22.5t zijn mogelijk op meer dan 92% van alle spoorsecties. Vandaag de dag is de werking van treinen met een lengte van 740m haalbaar op 87% van de corridor uitlijning, terwijl de invoering van ERTMS zich nog in een vroeg stadium bevindt met slechts 12.3% van de secties die hiermee zijn uitgerust op de corridor. Verdere plannen die nog uitgerold kunnen worden worden overwogen in het ERTMS implementatieplan. Terwijl de infrastructuur op grote schaal overeen komt per ontwerp, zal in de toekomst meer rekening moeten worden gehouden met andere operationele factoren zoals veiligheid en het voorkomen van geluidshinder. Spoorweglawaai is herhaaldelijk geïdentificeerd als een kritiek punt voor secties die door dichtbevolkte gebieden lopen, zoals op de Rijn-Alpine Corridor. Op de gehele corridor zijn verschillende secties geïdentificeerd waar de vraag groter is dan de beschikbare capaciteit. Ook zouden reistijden verkort kunnen worden en hoofdrail knooppunten zouden kunnen worden geoptimaliseerd voor een betere toegankelijkheid en kwaliteit van de dienstverlening.

De weginfrastructuur voldoet bijna volledig aan de TEN-T eisen. Tweederde van de betreffende wegen zijn voorzien van tolsystemen. Desondanks zijn door de benutting van infrastructuur congestie 'hot-spots' geïdentificeerd bij meerdere stedelijke gebieden langs de snelwegen, en ook beperkte truck parkeercapaciteit. Grensoverschrijdende problemen zijn geidentificeerd van en naar Zwitserland. Aangezien wegtransport een van de belangrijkste bronnen voor de uitstoot van broeikasgassen is, is het stimuleren van het gebruik van schone brandstof alternatieven een prioriteit.

De ontwikkeling van de binnenvaartwegen laat slechts gedeeltelijke beperkingen zien van de technische eisen. De Duitse secties langs de Rijn, Neckar en Moezel vereisen vergroting van de diepgang, het opheffen van de hoogte beperking onder bruggen en een verbetering van de sluis capaciteit. Het gidsen via River Information Services

(RIS) wordt als cruciaal gezien voor grensoverschrijdend vervoer waar verder coordinatie noodzakelijk is voor een consistente implementatie.

De acht zeehavens worden geconfronteerd met knelpunten in hun bereikbaarheid. De capaciteitskwestie zal een belangrijk onderwerp worden in de toekomst, wanneer ontwikkelingen en hogere vraag ook sterkere achterlandverbindingen en een betere maritieme toegang vereisen.

De voornaamste centrale passagiers luchthavens zijn allemaal aangesloten op het spoorwegnet. Verbeteringen zijn nodig op zes vrachtvervoer knooppunten en op luchthavens met minder capaciteit, waar treinverbindingen gerealiseerd zouden moeten worden in 2050.

Voor spoor-weg terminals en het waarborgen van multimodaal vervoer over de corridor zijn knelpunten geidentificeerd met betrekking tot de verwerkingscapaciteit van de terminals en binnenhavens. Projecten om deze kritieke punten te verminderen zijn gerelateerd aan meerdere regio's om de capaciteit binnen de terminals en de aansluitende infrastructuur te verbeteren.

Op basis van de geïdentificeerde kritieke punten is een categorisering gedaan om de volgende punten te clusteren: 1. Capaciteit/Knelpunt; 2. Ontbrekende Schakel; 3. Interoperabiliteit / Naleving van de TEN-T standaarden; 4. Multimodaliteit; 5. Laatste-mijl verbinding; 6. Externe factoren / Duurzaamheid / Innovatie; 7. Stedelijke gebieden. Grensoverschrijdende naleving is apart geanalyseerd.

Deze clusters leveren een gemeenschappelijke structuur op voor de volgende werkstappen en de uiteindelijke categorisering van projecten.

Transport marktstudie

Het doel van de Transport Marktstudie (TMS) voor de Rijn-Alpine Corridor was om de huidige en toekomstige marktomstandigheden, in combinatie met de huidige en toekomstige bezettingsgraad van de verschillende vervoerswijzen, te analyseren. Er is een model gebruikt gebaseerd op drie punten: 2010 (basis), 2030 (referentie) en 2030 (naleving). De referentieprognose is alleen gebaseerd op de sociaal economische veronderstellingen en de prognose van de naleving verwacht een volledige naleving van de TEN-T standaarden in 2030. Deze scenario's zijn strikt gedefinieerd voor de uitlijning van de corridor en hebben op basis van de relevante aannames de potentiële groei laten zien op het corridor netwerk. Tenslotte levert de TMS een aantal suggesties op voor de uitvoering van een goed functionerende multimodale corridor.

De huidige markt-kenmerken[70] laten zien dat voor grensoverschrijdend verkeer binnen de Rijn-Alpine Corridor het spoor een aandeel heeft van 12%, de weg een aandeel van 34% en binnenvaart een aandeel van 54%. Het volume wordt geschat op 371.9 miljoen ton in 2010, dat is 37% van de totaal geschatte vraag in het gedefinieerde netwerk gebied, met inbegrip van alle verkeersstromen (internationaal en binnenlands).

Wat betreft het basispunt wordt een gematigde groei verwacht tot 2030 in de vraag naar vrachtvervoer, met een stijging van 1.7% per jaar voor weg, spoor en binnenvaart. Dit betekent een totale groei van ongeveer 40% voor elk vervoerswijze.

Het toepassen van de beleidsinterventies op het nalevingsscenario, doen deze 2010-2030 groeicijfers respectievelijk wijzigen naar 36%, 55% en 41%. De aanzienlijke groei van het spoorvervoer is te verklaren door kortere reistijden en aannames van lagere kosten. Aan de andere kant wordt de weg steeds duurder en tijdrovender en veroorzaakt daardoor een verschuiving naar het spoor. De binnenvaart zal min of meer op hetzelfde niveau blijven vanwege de lage vervoerkosten en de volwassenheid

[70] Gebaseerd op ETIS data, 2010

van deze vervoerwijze in de corridor. Uit de analyse is gebleken dat op marktgebied de in- en uitvoer (gecombineerd) het hoogste aandeel heeft (~ 53%), gevolgd door doorvoer (~ 26%, met name hoog in Zwitserland). De analyse op vertrek/bestemming niveau laat een hogere groei trend zien voor het centrale deel van de corridor, met name voor spoorvervoer in de gebieden dicht bij Keulen, Frankfurt en Mannheim, gevolgd door een sterke aanwezigheid door Zwitserland en Italië. Voor de binnenvaart zijn de links van Rotterdam, de Rijn volgend naar Duisburg en daarna naar Frankfurt, de drukste op het netwerk. Voor de weg is het voornaamste groeipotentieel aangetoond rond stedelijke gebieden. Deze behoefte aan capaciteit in 2030 is ook bevestigd in de analyse van het aanbod van de corridor, zowel voor wat betreft het netwerk als de capaciteit van de terminals.

De analyse van het aanbod gaf ook de mogelijkheden aan voor een goed functionerende multimodale Rijn-Alpine Corridor. De ontwikkeling van multimodale locaties, langere treinen, nieuwe diensten en een betere samenwerking tussen de belanghebbenden zijn genoemd als mogelijke servicegerichte verbeteringen.

Corridor doelstellingen

Algemene Europese doelstellingen zijn geïdentificeerd, waaruit een aantal specifieke doelstellingen voor de Rijn-Alpine Corridor zijn verzameld. De corridor doelstellingen kunnen worden geclusterd tot de volgende onderverdeling:

De algemene doelstelling – *"Het trans-Europese vervoersnetwerk zal de sociale, economische en territoriale samenhang van de Unie versterken en een bijdrage leveren aan de totstandkoming van een interne Europese vervoersruimte"*[2] – kan worden onderverdeeld in vier hoofdthema's:

- Territoriale en structurele samenhang: Het kernnetwerk moet zorgdragen voor toegankelijkheid en verbinding van alle regio's van de Europese Unie;
- Efficiëntie tussen de verschillende netwerken: het wegnemen van knelpunten, de verhoging van de capaciteit van overbenutte secties en het overbruggen van ontbrekende schakels tussen de grondgebieden van lidstaten, en tussen hen onderling moet een prioriteit zijn voor het Europese netwerk;
- Duurzaamheid in transport: de ontwikkeling van alle vervoermodaliteiten moet gericht zijn op duurzaamheid en economische efficiëntie;
- Verhoging van de voordelen voor gebruikers: het Europese transportnetwerk moet beantwoorden aan de mobiliteit- en transport behoeften van haar gebruikers.

"Kernnetwerkcorridors moeten ook bredere doelstellingen van het vervoersbeleid aanpakken en interoperabiliteit, modale integratie en multimodale opties bevorderen"[71]. De corridors moeten zorgdragen voor consistent nationaal en internationaal vervoer door het gebruik van alle vormen van vervoer, het minimaliseren van milieu-effecten en het verbeteren van de concurrentiepositie.

Modale doelstellingen zijn gedefinieerd, met betrekking tot:

- Multimodaliteit en intermodaliteit in de corridor: de verbinding van vervoerwijzen op de knooppunten, real-time informatie in de transportketen, communicatie naar de gebruikers op de stations, vracht overslag, enz.;
- Spoorvervoer: infrastructuur uitgerust met ERTMS, interoperabiliteit van nationale netwerken, volledige elektrificatie, veiligheid, de aansluiting van multimodale knooppunten op het spoor, enz.;

[71] EU-Verordening 1315/2013, Artikel 4

- Wegvervoer: vermindering van de congestie, de interoperabiliteit op het netwerk, veiligheid, beschikbaarheid van schone brandstoffen, vermindering van uitstoot, etc.;
- Zeehavens, binnenhavens en binnenvaart transport: een minimum van CEMT klasse IV, voldoende capaciteit van transport, doorlopende doorvaarhoogte, goede bevaarbaarheid, RIS, verbinding van havens en spoorlijnen, wegen, enz.;
- Luchtvaart: ten minste één terminal toegankelijk voor alle exploitanten, de uitvoering van het gemeenschappelijk Europees luchtruim (Single European Sky), de beschikbaarheid van schone brandstoffen.

Specifieke doelstellingen voor de Rijn-Alpine Corridor gaan over het verbeteren van grensoverschrijdende trajecten, het verbeteren van de capaciteit en het wegnemen van knelpunten, het elimineren van ontbrekende schakels, interoperabiliteit/naleving van de TEN-T standaarden bij het ontwikkelen van multimodaliteit, het verbeteren van de laatste-mijl verbinding, het aanpakken van externaliteiten/duurzaamheid/innovatie en rekening houden met de gevolgen op stedelijke gebieden

Programma van maatregelen

Het programma van maatregelen definieert het kader voor het corridor werkplan. De kernresultaten van de voorgaande werkstappen zijn verkort samengevat en samengevoegd. Noodzakelijke maatregelen voor de verbetering van de transportinfrastructuur worden afgeleid uit het afstemmen van de resultaten van de transport marktstudie, het vastleggen van kwantitatieve vereisten en de corridor doelstellingen, die de kwalitatieve vereisten definieren uit het oogpunt van het TEN-T beleid en de belanghebbenden binnen de transport markt, vergeleken met de huidige corridor kenmerken.

Implementatieplan

Het implementatieplan is zowel gebaseerd op de identificatie van projecten, de inbreng van belanghebbenden, als op bilaterale samenwerking met de lidstaten.

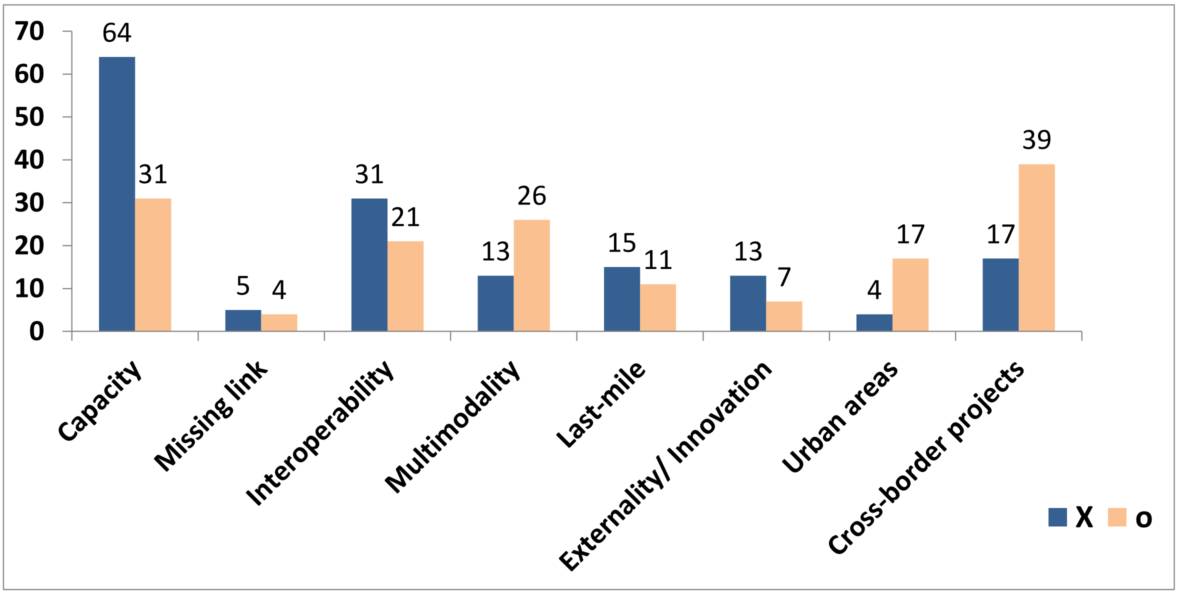
Om alle kritieke punten en knelpunten aan te pakken die beschreven staan in de corridor kenmerken, voorziet het implementatieplan in de realisatie van 175 projecten op het Kernnetwerk van het Rijn-Alpine Corridor. Hiervan zijn 30 projecten toegewezen aan Zwitserland en daarom afzonderlijk beschouwd.

Van de resterende 145 projecten is de meerderheid (60) toegekend aan het spoor, gevolgd door binnenvaart (28), zeehavens (19) en wegvervoer (15). Binnenhavens (9), luchthavens (7) en spoor-weg terminals (7) hebben slechts een klein aandeel. Voor wat betreft de toekenning van projecten aan de betreffende lidstaat wordt duidelijk dat de meeste projecten plaatsvinden in Italië (57). Duitsland heeft 31 toegewezen projecten, Nederland 22, België 15 en Frankrijk 11. Daarnaast zijn er 9 projecten waar meer dan één land bij betrokken is.

Over het algemeen is het de bedoeling om de meeste projecten (74) uiterlijk in 2020 af te ronden (volgens hun interne implementatie schema). Dit betreft vooral binnenhavens, zeehavens en binnenvaart, waar 37 van de in totaal 56 projecten naar verwachting vóór het einde van 2020 zullen eindigen. Voor 30 projecten is er geen informatie over het jaar van uitvoering; ze zijn beschouwd als "later beëindigd dan 2030". Van vijf projecten wordt verwacht dat ze tegen het einde van 2014 zijn afgerond. Aan alle technische TEN-T infrastructuur parameters (zoals aangegeven in de corridor karakteristieken) moet uiterlijk in 2030 zijn voldaan in de Kernnetwerk Corridor.

Daarnaast moesten alle grensoverschrijdende secties worden geïdentificeerd. Dit is per vervoerwijze gedaan met input van de Europese Commissie. Het leidde tot 56 relevante grensoverschrijdende projecten.

Alle projecten zijn geclusterd volgens de gedefinieerde categorieën van kritieke punten (X = hoofddoelstelling van het project / o = extra doel).



Bron: HaCon analyse

Investering

Op basis van de beschikbare informatie heeft de investeringsanalyse aangetoond dat de totale kosten van de 145 geïdentificeerde projecten circa €47.615 M bedragen, waarvan voor 19 projecten de specifieke informatie over de kosten van de projecten niet beschikbaar was. Verdere analyse heeft aangetoond dat 70 van de 145 projecten ten minste gedeeltelijk gedefinieerd worden als "vooraf geïdentificeerde secties" en dus vallen onder de CEF financieringsprioriteiten. De verwachte totale kosten van de 7o projecten bedragen €29.854 M. Daarnaast bevinden zich 10 projecten op de lijn van zowel de Rijn-Alpine Corridor als de Noordzee-Med Corridor met ongeveer €2.158 M. aan extra kosten. Bovenop de 80 (70 + 10) "vooraf geïdentificeerde projecten" die hierboven vermeld worden, zijn er 52 projecten die kunnen worden gekoppeld aan ten minste één van de financieringsprioriteiten die zijn vastgesteld in Verordening 1316/2013. De geschatte totale kosten van de 52 extra projecten bedraagt €10.245 M.

In totaal vallen ongeveer 132 projecten, en daarmee 90% van de 145 projecten, onder de prioriteiten van de CEF-financiering, met geschatte totale kosten van €42.256 M. Het grootste aantal projecten bevindt zich in Italië (52), Duitsland (26) en Nederland (19), terwijl de hoogste kosten in Duitsland (€17.020 M) worden gedragen, gevolgd door Italië (€14.367 M).

De doelstelling "Het overbruggen van ontbrekende schakels, het wegnemen van knelpunten, het verbeteren van spoor interoperabiliteit, en vooral de verbetering van grensoverschrijdende secties" heeft het grootste aandeel met 86 projecten en €34.3 miljard aan totale kosten.

De doelstelling "Optimalisering van de integratie en verbinding van vervoerwijzen en verbetering van de interoperabiliteit van vervoerdiensten, terwijl de toegankelijkheid van de vervoersinfrastructuur gewaarborgd wordt", vertegenwoordigt een lager aantal projecten (36) en totale kosten van €6.7 miljard. Tot slot wordt de doelstelling "Waarborging van duurzame en efficiënte vervoerssystemen op de lange termijn, alsmede de mogelijkheid voor alle vervoersmodaliteiten om te ontkolen", door slechts 10 projecten nagestreefd voor €1.26 miljard aan totale kosten.

Opgemerkt moet worden dat deze analyse een eerste oefening is, gebaseerd op gedeeltelijke informatie. Het in aanmerking komen van een project voor CEF financiering valt onder de verantwoordelijkheid van de Europese Commissie (met name INEA), die haar beslissing zal baseren op evaluatie van de ingediende aanvragen ingediend in de calls for proposal.

Management Summary (French)

Les règlements de l'Union Européenne 1315/2013[72] et 1316/2013[73] définissent la base juridique de la politique des résaux transeuropéens de transport aux horizons 2030 et 2050. Ils comprennent les "Orientations de l'Union" qui déterminent le cadre de la politique et définissent un réseau multimodal de neuf Corridors proritaires devant être parachevé pour 2030, ainsi que "le mécanisme pour l'inter-connexion en Europe" qui régit le financement de l'UE pendant la période 2014 - 2020.

Ces corridors prioritaires constituent un instrument de politique européenne visant à faciliter le développement cohérent de l'infrastructure en impliquant tous les acteurs concernés: les États membres ainsi qu'un large éventail de parties prenantes telles que les gestionnaires des infrastructures de transport, les autorités régionales, etc. La Commission européenne soutient le développement des corridors, à la fois grâce à des activités de coordination et grâce à la concentration des instruments financiers de l'UE.

A l'horizon 2030, ces neuf corridors devront être développés suivant un Plan de travail définissant le cadre de développement d'une infrastructure de transport efficace permettant le bon fonctionnement de tous les modes de transport ainsi que des chaînes multimodales de transport de passagers et de marchandises.

L'étude sur le corridor prioritaire Rhin-Alpes comprend toutes les analyses et les étapes de travail nécessaires à l'élaboration de ce Plan de travail. Elle fournit les fondements qui ont permis d'identifier les projets pour améliorer le corridor d'ici 2030 afin de renforcer le marché intérieur et la compétitivité globale de l'Europe, de veiller à la cohésion économique, sociale et territoriale et d'assurer une meilleure accessibilité à travers l'UE.

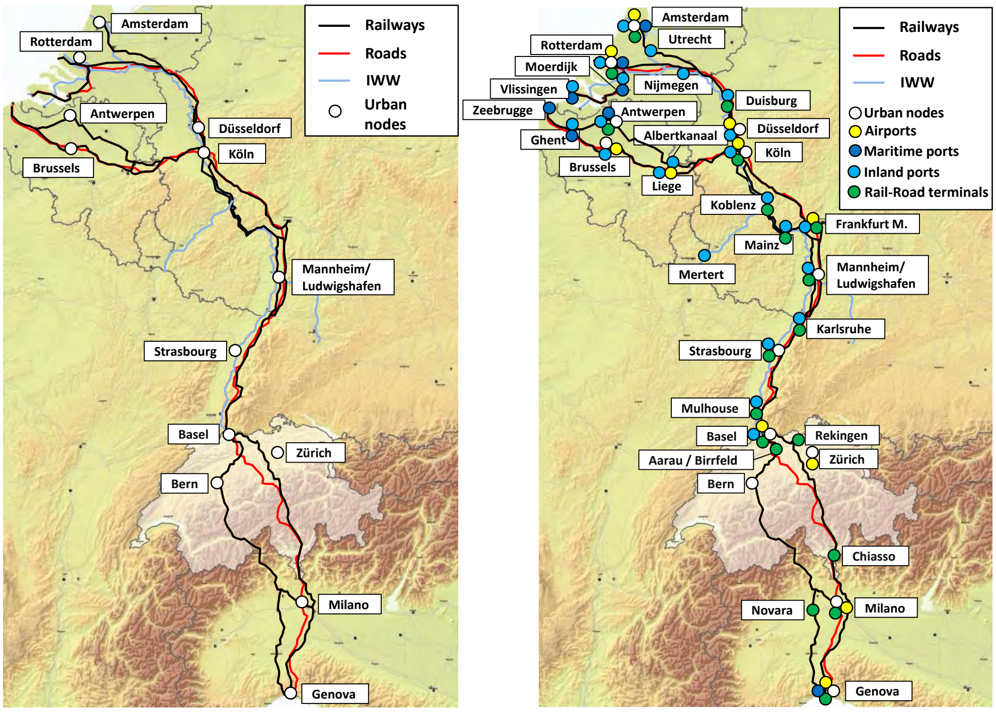
Le développement du corridor Rhin-Alpes peut compter sur des éléments acquis des précédentes politiques de transport européennes (notamment les projets prioritaires 5 et 24, le corridor ERTMS A et le Corridor de Fret Ferroviaire Rhin-Alpes) et sur des investissements déjà réalisés sur son infrastructure. Le corridor Rhin-Alpes apparaît donc prédestiné à ouvrir la voie à l'ensemble des neuf corridors RTE-T vers une nouvelle génération du développement de l'infrastructure : renforcement de la multimodalité, optimisation de l'utilisation de l'infrastrcuture, promotion des approches innovantes.

En effet, ce corridor est l'un des axes de transport les plus fréquentés en Europe, reliant les régions économiques les plus importantes et les plus densément peuplées (plus de 70 millions d'habitants). Même si des investissements dans les infrastructures de transport sont encore nécessaires, il peut être considéré comme l'un des corridors les plus développés en termes d'exigences fixées par le règlement RTE-T. Ces investissements permettront de stimuler et soutenir la croissance économique et l'emploi, et de conduire à un système de transport multimodal plus écologique et durable. Il est donc capital de prendre en compte la sensibilisation du public ainsi que l'acceptabilité de ces investissements. Le corridor Rhin-Alpes possède une caractéristique d'importance géographique : il relie les ports de la Mer du Nord à ceux du bassin méditerranéen via la Suisse et quelques principaux centres économiques de l'Ouest de l'UE. Ce corridor multimodal (y compris le bassin du Rhin) est en quelque sorte l'épine dorsale sur laquelle viennent se greffer de nombreux corridors Est-Ouest. Les régions ou pays faisant partie de ce corridor prioritaire sont : les Pays-Bas, la Belgique, l'Allemagne rhénane, la Suisse, l'Italie du Nord, l'Est français et le Luxembourg (Moselle).

[72] Règlement (UE) n° 1315/2013 du Parlement européen et du Conseil du 11 décembre 2013 sur les orientations de l'Union pour le développement du réseau transeuropéen de transport

[73] Règlement (UE) n° 1316/2013 du Parlement européen et du Conseil du 11 décembre 2013 établissant le mécanisme pour l'interconnexion en Europe

Le Corridor Rhin-Alpes



Source: Regulation 1316/2013 Annex 1, Part 1

Au sein du corridor, il existe un réseau continu d'infrastructures ferroviaires et routières entre les ports maritimes belges, hollandais et le port de Gênes. En revanche, la situation est plus compliquée en ce qui concerne le réseau des voies navigables. En effet, en Suisse, ce dernier ne couvre qu'une petite partie du territoire national, tandis que le réseau des voies navigables en Italie ne fait partie d'aucun réseau prioritaire européen et que les voies navigables belges sont affectées au corridor prioritaire Mer du Nord-Méditerranée. Ces dernières ont néanmoins une fonction stratégique pour le corridor Rhin-Alpes, car les flux transfrontaliers de la Belgique vers les Pays-Bas et l'Allemagne sont conséquents. C'est pour cette raison que les données relatives à ces flux de transport sont reprises dans l'étude de marché du présent rapport, les projets belges n'étant toutefois pas abordés. Pour le transport routier, les routes concernées sont presque exclusivement des autoroutes dont la capacité est rarement adaptée à la demande actuelle. Le réseau ferroviaire possède de nombreuses sections transfrontalières avec des lignes dédiées à la grande vitesse avec des itinéraires alternatifs disponibles en cas de perturbations. Enfin, les aéroports le long du corridor (Francfort, Amsterdam, Zurich, Bruxelles et Milan) sont également importants, notamment pour le service des passagers.

Prise en considération des acteurs clés

L'ensemble des acteurs clés présents sur le corridor Rhin-Alpes ont été impliqués progressivement grâce à la tenue de quatre « forums ». Un forum est un organe consultatif qui fournit un cadre pour les discussions et la coordination au sein du corridor. Ce vaste processus de consultation a permis de garantir la compréhension et l'acceptation commune du Plan de travail. Plus de 400 intervenants furent identifiés. En plus des forums, deux réunions de groupe de travail furent programmées en 2014.

Prise en compte des études existantes

L'identification des études disponibles a mis en évidence des rapports analysant le corridor aux niveaux nationaux et européen. Une base de données complète a été réalisée afin de mettre en évidence les études pertinentes. Les catégories principales sont :

- Les documents macro-régionaux pour la planification et le développement des transports;
- Les études et documents de planification des projets d'infrastructure;
- Les études de développement des transports, couvrant prévisions et évolution du marché à long terme;
- Les études de gouvernance et les documents de politique stratégique.

Cette analyse fut une étape importante de l'étude, car elle a permis de dresser une représentation complète du corridor.

Caractéristiques du Corridor

L'analyse des caractéristiques du corridor a été réalisée en deux étapes distinctes. Dans un premier temps, l'infrastructure du réseau prioritaire a été inventoriée et comparée aux exigences définies dans le règlement RTE-T n°1315/2013. Les paramètres techniques, par mode de transport, ont été déterminés et les sections ou aménagements qui ne répondaient pas à ces normes ont été identifiés comme «problèmes critiques». Dans un deuxième temps, des projets ('*implementation plan*') ont été mis en avant pour répondre à ces «problèmes critiques» et aux goulets d'étranglement. Les résultats de cet exercice ont été validés par les États membres et les différentes parties prenantes.

Les résultats de cette analyse ont révélé que l'électrification et l'écartement minimum des voies sont pleinement mis en œuvre sur le réseau ferroviaire. Les trains de marchandises peuvent circuler à plus de 100 km/h avec une charge à l'essieu de 22,5 tonnes sur plus de 92% du réseau ferroviaire. Les trains de marchandises de 740 mètres de long peuvent circuler sur 87% du réseau ferrovaire du corridor tandis que le déploiement de l'ERTMS n'est encore qu'à ses débuts avec seulement 12,3% des sections équipées sur le corridor. Bien que l'infrastructure soit largement en conformité avec les critères fixés par l'Europe, il semble déterminant que d'autres facteurs opérationnels, tels que la sécurité et la prévention des émissions de bruit, soient d'avantage pris en compte dans les projets futurs. Le bruit ferroviaire a été identifié, en particulier sur ce corridor, comme un problème critique pour les sections qui traversent des zones densément peuplées. De cette analyse, il ressort également que la demande dépasse la capacité disponible sur plusieurs sections du corridor, que le temps de transport pourrait être amélioré et que les terminaux ferroviaires pourraient être optimisés quant à leur accessibilité et leur niveau de service.

L'infrastructure <u>routière</u> rencontre presqu'entièrement les prescriptions RTE-T. Les problématiques viennent principalement du taux de saturation relativemlent élevé sur les autoroutes autour des grandes villes, de la capacité de stationnement limitée pour les poids lourds le long des autoroutes et des passages frontières depuis et vers la Suisse. Deux tiers du réseau routier est équipé de systèmes de péage. L'attention est aussi attirée sur le fait qu'il faille mettre en avant les carburants propres parce que le transport routier est l'une des principales sources d'émissions de gaz à effet de serre.

Le <u>réseau fluvial</u> connait quelques limitations partielles : en Allemagne, certaines sections du Rhin, du Neckar et de la Moselle possèdent des restrictions en matière de tirant d'eau, de tirant d'air et de capacité aux écluses. Le service d'information fluviale

(SIF ou '*RIS*' en anglais), capital pour le trafic transfrontalier, nécessite une coordination plus poussée pour sa mise en œuvre.

Les huit ports maritimes du corridor rencontrent des problèmes d'accessibilité. Dans le futur, les problèmes de capacité devront être traités de manière spécifique étant donné le développement des zones d'activités et l'évolution croissante de la demande, nécessitant une bonne connexion entre la façade maritime et son hinterland.

Les principaux aéroports pour le transport de personnes sont reliés au réseau ferroviaire. Des connexions ferroviaires devraient être établies d'ici 2050 pour six hubs de fret, ainsi que sur les aéroports de plus faible capacité.

En ce qui concerne les terminaux rail-route et les opérations intermodales le long du corridor, des goulets d'étranglement ont été identifiés en termes de capacité de manutention des terminaux et des ports intérieurs. Des projets d'augmentation de capacité des terminaux et des infrastructures de raccordement des modes routiers et ferroviaires sont prévus dans différentes régions du corridor.

Une catégorisation a été effectuée dans le but de regrouper les principaux problèmes du corridor : 1. Capacité / goulet d'étranglement ; 2. Section manquante ; 3. Interopérabilité / conformité aux normes RTE-T ; 4. Multimodalité ; 5. « Dernier kilomètre » ; 6. Externalités / développement durable / innovation ; 7. Zones urbaines. La problématqiue transfrontalière a été analysée séparément.

Ces catégories assurent une structure commune à l'analyse effectuée dans cette étude et *in fine* aux projets identifiés.

Etude de marché du transport

Le but de l'étude de marché du transport sur le corridor Rhin-Alpes fut d'analyser les caractéristiques du marché actuelles et futures combinées avec les niveaux d'utilisation actuels et futurs des modes de transport. Un modèle a été employé pour trois horizons de temps: 2010 (référence), 2030 ('*baseline*') et 2030 ('*compliance*'). Le scénario « baseline » est basé uniquement sur des hypothèses socio-économiques, et le scénario « compliance » prévoit la conformité de l'infrastructure aux normes RTE-T d'ici 2030. Ces scénarios ont été étudiés pour le corridor et montrent le potentiel de croissance sur les résaux du corridor selon les hypothèses retenues. L'étude de marché fournit enfin un certain nombre de suggestions pour la mise en œuvre d'un corridor multimodal opimal.

Les caractéristiques actuelles[74] du marché affichent pour le trafic transfrontalier une part modale du trafic transfrontalier de 12% pour le ferroviaire, 34% pour la route et 54% pour les voies navigables intérieures. Le volume transfrontalier est estimé à 371,9 millions de tonnes en 2010, couvrant 37% de la demande totale estimée, y compris les flux de trafic nationaux et internationaux.

En ce qui concerne le scénario « baseline », les perspectives de croissance de la demande de fret sont modérées avec une augmentation de 1,7% par an pour les trois modes, soit une croissance d'environ 40% pour les trois modes à l'horizon 2030. En tenant compte des politiques à mettre en place dans le scénario « Compliance », ces taux de croissance passent à 55%, 36% et 41% respectivement pour la route, le rail et la voie d'eau. La croissance soutenue dans le secteur ferroviaire s'explique par des temps de transport et des hypothèses de coûts réduits. Alors que le temps et le coût de transport par la route augmentent, ce qui provoque un report modal vers le rail. Le mode fluvial reste stable en raison de son faible coût de transport et de la maturité de ce mode sur le corridor. En termes de marché, l'analyse montre que les importations et les exportations occupent la plus grande part (~53%), suivie par le transit (~26%,

[74] font référence avec données ETIS de 2010

particulièrement élevé en Suisse). L'analyse par orgine / destination montre une tendance à une croissance plus élevée pour la partie centrale du corridor, en particulier pour le transport ferroviaire dans les zones à proximité de Cologne, Francfort et Mannheim, suivies de la Suisse et l'Italie. Les segments des voies navigables les plus fréquentés du réseau sont ceux du Rhin qui relient Rotterdam à Duisbourg, puis à Francfort. Pour la route, le principal potentiel de croissance se situe autour des zones urbaines. Ce besoin en capacité d'ici 2030 a été confirmé dans l'analyse de l'offre sur le corridor, tant sur le réseau que sur les terminaux.

L'analyse de l'offre en infrastructure a également mis en évidence les opportunités pour la création d'un réseau multimodal fonctionnel au sein du Corridor Rhin-Alpes. Parmi celles-ci, on peut mentionner le développement des sites multimodaux, des trains plus longs, de nouveaux services ou une meilleure collaboration entre les parties prenantes.

Ojectifs du Corridor

Les objectifs généraux européens, mais aussi des objectifs spécifiques pour le corridor Rhin-Alpes ont été définis dans la présente étude. L'objectif global - «Le réseau de transport transeuropéen doit renforcer la cohésion sociale, économique et territoriale de l'Union et contribuer à la création d'un système de transport unique européen » - peut être décliné en quatre thèmes principaux:

- Cohésion territoriale et structurelle: le réseau prioritaire doit assurer l'accessibilité et la connectivité de toutes les régions de l'Union européenne;
- Efficacité entre les différents réseaux: la suppression des goulets d'étranglement, l'augmentation de la capacité des sections sur-utilisées et le comblement des liaisons manquantes au sein du territoire des États membres et entre ceux-ci sont des priorités pour le réseau européen;
- Durabilité de transport: tous les modes de transport doivent être établis en vue de répondre aux préoccupations en matière de durabilité et d'efficacité économique;
- Augmenter les avantages pour les utilisateurs: le réseau de transport européen doit répondre aux besoins de mobilité et de transport de ses utilisateurs.

« Les corridors prioritaires doivent également répondre à des objectifs plus larges de la politique des transports et faciliter l'interopérabilité, l'intégration modale et les options multimodales »[75]. Les corridors doivent assurer un transport national et international homogène pour tous les modes de transport, minimiser les impacts environnementaux et accroître leur compétitivité.

Des objectifs ont été définis pour chaque mode :

- La multimodalité et l'intermodalité: interconnexion des modes de transport au niveau des noeuds, informations en temps réel dans la chaîne de transport, communication aux utilisateurs, transbordement de fret, etc.;
- Transport ferroviaire: équipement des infrastructures en ERTMS, interopérabilité des réseaux nationaux, électrification complète, sécurité, raccordement des noeuds multimodaux au rail, etc.;
- Transport routier: réduction de la congestion, interopérabilité sur le réseau, sécurité, disponibilité de carburants propres, réduction des émissions, etc.;
- Ports maritimes, ports intérieurs et transport fluvial: gabarit minimum de classe IV CEMT, capacité de transport adéquate, hauteur libre sous pont

[75] EU-Regulation 1315/2013, article 4

continue, bonne navigabilité, système d'information (RIS), interconnexion des ports avec les réseaux ferroviaires et routiers, etc.;

- Le transport aérien: au moins un terminal accessible à tous les opérateurs, mise en œuvre du ciel unique européen, disponibilité de carburants propres.

Les objectifs spécifiques du corridor Rhin-Alpes visent à améliorer les tronçons transfrontaliers, améliorer la capacité, supprimer les goulets d'étranglement, combler les liaisons manquantes, garantir l'interopérabilité et le respect des normes européennes, développer la multimodalité, améliorer la connectivité du dernier kilomètre, prendre en compte contre les externalités, la durabilité, l'innovation et prendre en considération les impacts sur les zones urbaines.

Programme de mesures

Le programme de mesures définit le cadre du Plan de travail du corridor. D'abord, les résultats de base des étapes précédentes sont synthétisés et consolidés. Ensuite, les mesures nécessaires à l'amélioration de l'infrastructure de transport sont mises en exergue en les faisant correspondre avec les résultats de l'étude de marché des transports définissant des exigences quantitatives en rapport avec les objectifs de corridor qui, quant à eux, traduisent les exigences qualitatives du point de vue de la politique des RTE-T et des parties prenantes du marché des transports.

Plan de mise en oeuvre

Le plan de mise en œuvre est basé sur l'identification des projets, sur les renseignements fournis par les parties prenantes et sur la coordination bilatérale avec les États membres.

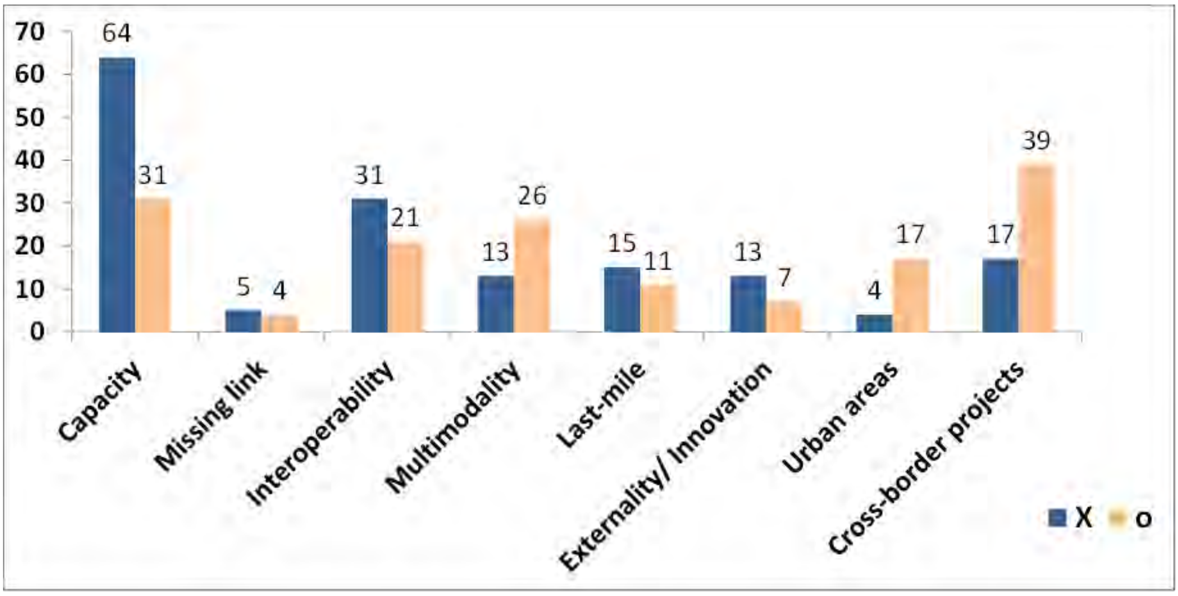
Pour répondre à l'ensemble des problèmes critiques et goulets d'étranglement décrits dans la partie traitant des caractéristiques du corridor, le plan de mise en œuvre prévoit la réalisation d'un total de 175 projets sur le réseau prioritaire du corridor Rhin-Alpes dont 30 projets assignés à la Suisse.

Sur les 145 projets restants, la majorité (60) est affectée au rail, suivie par les voies navigables (28), les ports maritimes (19) et la route (15). Les projets dédiés aux ports intérieurs (9), aux aéroports (7) et aux terminaux rail-route (7) sont peu représentés. L'analyse des attributions par État membre montre que c'est l'Italie (57) qui concentre le plus grand nombre de projets. L'Italie est suivie par l'Allemagne (31), les Pays-Bas (22), la Belgique (15) et la France (11). Il existe en outre neuf (9) projets « internationaux », c'est-à-dire impliquant au moins deux pays différents.

En général, la plupart des projets (74) devrait être finalisée d'ici 2020 au plus tard (selon leur calendrier de mise en œuvre interne). Cela concerne en particulier les ports intérieurs, les ports maritimes et le réseau fluvial, pour lesquels 37 des 56 projets devraient être achevés avant la fin de 2020. Cinq projets devraient être réalisés avant 2015, alors que, pour 30 projets, l'année (potentielle) de mise en œuvre n'a pas pu être déterminée. Tous les paramètres techniques RTE-T de l'infrastructure (comme cela a été souligné dans la partie relative aux caractéristiques du corridor) doivent être atteints pour l'ensemble du réseau prioritaire du corridor pour 2030.

De plus, tous les tronçons transfrontaliers ont été identifiés avec l'aide de la Commission Européenne faisant émerger un total de 56 projets transfrontaliers.

Tous les projets ont été répartis dans les huit catégories de classement des « problèmes critiques » identifiés sur le corridor.



Source: HaCon analysis

Investissements

Sur base des informations disponibles, on estime à environ € 47,615 M le montant total des investissements nécessaires à la réalisation des 145 projets. Pour 19 d'entre eux, aucune donnée spécifique de coût d'investissement n'a été fournie. Une analyse plus poussée montre que 70 des 145 projets sont au moins partiellement définis comme « pré-identifiés » et relèvent donc des priorités de financement CEF. Le coût total des 70 projets est de € 29,854 M. En outre, 10 autres projets sont situés à la fois sur l'alignement du corridor Rhin-Alpes et sur le Corridor Mer du Nord-Méditerrannée pour un coût d'environ € 2,158 M. En plus des 80 (70 + 10) « projets pré-identifiés » mentionnés ci-dessus, 52 autres projets peuvent être associés à au moins l'une des priorités de financement établies par le règlement n°1316/2013. Les coûts globaux estimés de 52 projets supplémentaires s'élèvent à € 10,245 M.

Au total, environ 132 projets, soit 90% des 145 projets s'inscrivent dans les priorités de financement CEF dont le coût estimatif global s'élève à € 42,256 M. Le plus grand nombre de projets se trouve en Italie (52), en Allemagne (26), et aux Pays-Bas (19), tandis que les coûts d'investissement les plus importants concernent l'Allemagne (€ 17,020 M) et l'Italie (€ 14,367 M).

L'objectif de « combler les liaisons manquantes, en supprimant les goulets d'étranglement, en améliorant l'interopérabilité ferroviaire, et, en particulier, en améliorant les tronçons transfrontaliers » couvre le plus grand nombre de projets avec 86 d'entre eux, pour un coût total de € 34,3 milliards. L'objectif consistant à« optimiser l'intégration et l'interconnexion des modes de transport et l'amélioration de l'interopérabilité des services de transport, tout en assurant l'accessibilité des infrastructures de transport » représente 36 projets et un coût total de € 6,7 milliards. Enfin, l'objectif visant à « assurer des systèmes de transport durables et efficaces dans le long terme et faciliter la décarbonisation de tous les modes de transport » est poursuivi par seulement une dizaine de projets pour un coût total de € 1,26 milliards.

Il convient de mentionner que cette analyse est un exercice préliminaire basé sur des informations partielles. L'admissibilité des projets au financement CEF est sous la responsabilité de la Commission européenne (en particulier INEA), qui fonde sa décision sur l'évaluation des demandes présentées dans le cadre d'appels à proposition.

Management Summary (German)

Die Verordnungen (EU) Nr. 1315/2013[76] und 1316/2013[77] definieren die rechtlichen Grundlagen für die transeuropäische Verkehrsnetzpolitik bis 2030/2050. Sie umfassen die "Union Guidelines", die Richtlinien der Europäischen Union, welche den politischen Rahmen definieren. Sie beinhalten außerdem ein multimodales Kernnetzwerk, bestehend aus neun Kernnetzwerkkorridoren, welche bis 2030 fertiggestellt werden sollen, sowie die Fazilität "Connecting Europe" (CEF), die die Förderung seitens der EU für den Zeitrahmen 2014 - 2020 reguliert.

Kernnetzkorridore sind ein neues Instrument auf EU-Ebene, das auf eine kohärente Infrastrukturentwicklung unter Einbeziehung aller relevanten Akteure abzielt: Mitgliedstaaten und eine breite Auswahl an Interessensvertretern (z.B. Infrastrukturbetreiber, regionale Behörden etc.). Die EU-Kommission unterstützt diese Korridorentwicklung sowohl durch Koordinierungsmaßnahmen als auch durch eine Verdichtung der EU-Finanzierungsinstrumente.

Gemäß den TEN-T Richtlinien für die Entwicklung jedes Kernnetzwerkkorridors bis 2030 soll ein Arbeitsplan ausgearbeitet werden. Dieser bildet den Rahmen zur Bildung einer effizienten Transportinfrastruktur, die eine reibungslose Funktionsfähigkeit aller Verkehrsträger und nahtlose multimodale Transportketten für den Güter- und Personenverkehr ermöglicht.

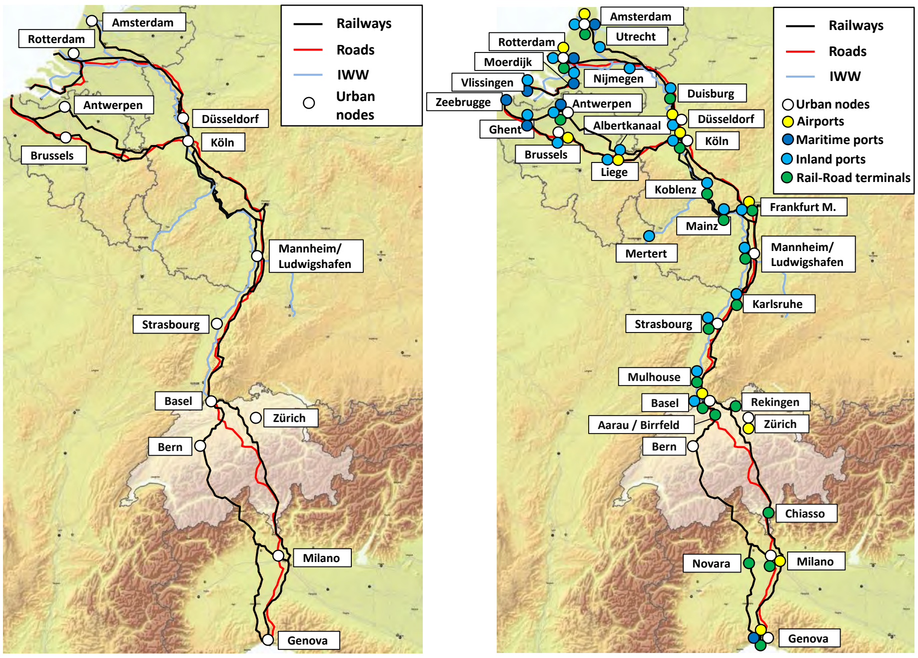
Die Studie für den Rhein-Alpen Kernnetzkorridor enthält die notwendigen Analysen und Arbeitsschritte für die Ausarbeitung des Arbeitsplans. Die Studie identifiziert die notwendigen Projekte, um den Korridor bis 2030 zu verbessern. Dadurch wird sowohl die Stärkung des Binnenmarktes als auch Europas globale Wettbewerbsfähigkeit unterstützt. Darüber hinaus gewährleistet der Arbeitsplan eine soziale und territoriale Kohäsion sowie eine verbesserte Erreichbarkeit innerhalb der EU.

Der Rhein-Alpen Korridor integriert die wesentlichen Ergebnisse aus den vorangegangenen TEN-T und verkehrspolitischen Arbeiten (insbesondere Prioritätsprojekte 5 und 24, ERTMS Korridor A und Schienengüterverkehrskorridor Rhein-Alpen) und baut auf wichtigen, bereits umgesetzten Infrastrukturinvestitionen auf. Daher kann er als Vorbild für die neun TEN-T Korridore dienen, zu einem „neuen Zeitalter der Infrastrukturentwicklung", u.a. durch Stärkung der Multimodalität, durch Optimierung der Infrastrukturnutzung oder durch Förderung von innovativen Ansätzen.

Der Korridor ist einer der aufkommensstärksten Frachtrouten in Europa und verbindet die wichtigsten Wirtschaftszentren und Ballungsräume (mit zusammen mehr als 70 Millionen Einwohnern) und kann bezogen auf die in der TEN-T Verordnung definierten Parameter als einer der fortschrittlichsten Kernnetzkorridore bezeichnet werden. Nichtsdestotrotz werden immer noch Investitionen in die Transportinfrastruktur benötigt, um Wirtschaftswachstum und Beschäftigungszahlen zu steigern und die Entwicklung zu einem umweltfreundlicherem und nachhaltigen multimodalem Verkehrsnetzwerk zu fördern. Daher ist es insbesondere wichtig, die öffentliche Wahrnehmung und Akzeptanz für diese Investitionen stetig zu erhöhen. Der Rhein-Alpen Korridor verbindet die Nordseehäfen Rotterdam und Antwerpen mit dem Mittelmeerbecken in Genua, durch die Schweiz und einige der großen wirtschaftlichen Zentren der westlichen EU. Dieser multimodale Korridor (inklusive des Rheinbeckens) wird Verbindungen zu mehreren Ost-West Achsen bieten. Involvierte Länder sind die Niederlande, Belgien, Deutschland, Norditalien, Luxemburg (Mosel) sowie der östliche Teil Frankreichs (genauer gesagt der Großraum Strasbourg).

[76] Verordnung (EU) Nr. 1315/2013 des Europäischen Parlaments und des Europäischen Rates vom 11. Dezember 2013 über Leitlinien der Union für die Entwicklung eines transeuropäischen Verkehrsnetzes
[77] Verordnung (EU) Nr. 1316/2013 des Europäischen Parlaments und des Europäischen Rates vom 11. Dezember 2013 zur Einführung der Fazilität „Connecting Europe" (CEF)

Der Rhein-Alpen Korridor



Source: Regulation 1316/2013 Annex 1, Part 1

Es existiert ein durchgehendes Kerninfrastrukturnetz für Schiene und Straße, d.h. mindestens eine durchgehende Verbindung zwischen Rotterdam/Seebrügge und Genua. Für die Binnenschifffahrt ist die Situation komplizierter. Die Schweiz hat nur einen kleinen Anteil an Binnenschifffahrt, Italien verfügt über gar kein Binnenschiffnetzwerk auf dem Korridor und die belgischen Wasserstraßen sind Bestandteil eines anderen Korridors (des Nordsee-Mittelmeer Korridors). Aufgrund der starken grenzüberschreitenden Verkehrsströme zwischen Belgien und der Niederlande bzw. Deutschland ist sind die belgischen Wasserstraßen trotzdem von Wichtigkeit für den Rhein-Alpen Korridor. Die Daten über diese Verkehrsströme wurden zwar in der Transportmarktstudie des Rhein-Alpen Korridors analysiert, belgische Wasserstraßenprojekte werden in diesem Bericht aber nicht betrachtet. Hinsichtlich des Straßentransports sind fast alle korridorrelevanten Straßen Autobahnen. Der Großteil der Straßeninfrastruktur ist jedoch nicht immer dem aktuellen Nachfragebedarf gerecht. Der Verkehrsträger Schiene operiert grenzübergreifend; viele dieser grenzüberschreitenden Abschnitte sind Hochgeschwindigkeitstrassen. Im Falle von Störungen oder Unterbrechungen sind Ausweichrouten verfügbar. Die Flughäfen entlang des Korridors sind substanziell für den Passagierdienst, inklusive der Flughäfen in Frankfurt, Amsterdam, Zürich, Brüssel und Mailand.

Einbindung relevanter Interessenvertreter

Die Interessenvertreter werden stufenweise durch vier Korridorfora involviert. Das Korridorforum ist ein beratendes Gremium, das eine Basis für Diskussionen und Koordinierungen bietet. Daher ist der Arbeitsplan das Ergebnis eines breit angelegten Konsultationsprozesses, der das gemeinsame Verständnis und die Akzeptanz aller Beteiligten in Bezug auf die Umsetzung erforderlicher Maßnahmen sicherstellt. Mehr als 400 Interessensvertreter wurden identifiziert. Zusätzlich zu den Korridorforen wurden zwei Arbeitsgruppensitzungen durchgeführt.

Einbindung bereits existierender Studien

Die Analyse verfügbarer Studien führte zu einer umfassenden Datengrundlage, welche korridorfokussierte Berichte und Analysen auf EU-, Korridor- und nationaler Ebene hervorhebt. Die relevanten Studien wurden in verschiedene Kategorien eingeordnet:

- Makro-regionale Dokumente zur Planung und Entwicklung des Transports;
- Studien und Planungsunterlagen von Infrastrukturvorhaben;
- Transportentwicklungsstudien, die sich auf Langzeitprognosen und die langfristige Entwicklung des Marktes beziehen;
- Regierungsstudien und Strategiepapiere.

Diese Analyse war eine wichtige Säule für den Aufbau einer umfassenden Übersicht des Korridors und ein Kernelement für den Arbeitsplan.

Korridorcharakteristika

Die Erarbeitung der Korridorcharakteristika wurde in zwei Schritte unterteilt. Zunächst wurde die relevante Kerninfrastruktur mit den Anforderungen aus der TEN-T Verordnung 1315/2013 abgeglichen. In diesem Rahmen wurden die technischen Parameter per Verkehrsträger identifiziert. Abschnitte oder Infrastruktureinrichtungen (z.B. Schleusen) welche diese Anforderungen nicht erfüllen, wurden, zusammen mit zusätzlich erkannten Engpässen, als "kritische Probleme" hervorgehoben. In einem Folgeschritt wurden all diese kritischen Probleme zusammengefasst und in die Korridorcharakteristika des Rhein-Alpen Korridors übernommen. Zur Behebung der kritischen Probleme und Engpässe wurden verschiedene Projekte entlang des ganzen Korridors identifiziert (vgl. Durchführungsplan). Die Ergebnisse dieser Arbeit wurden durch die Mitgliedstaaten und Interessenvertreter im Rahmen der Korridorfora bestätigt.

Die Analyse über die Erfüllung der TEN-T Parameter zeigt für die Schiene eine Elektrifizierung der Strecken auf dem gesamten Korridor sowie die ganzheitliche Erfüllung der erforderlichen Spurweite. Eine Mindestgeschwindigkeit für Güterzüge von 100 km/h und eine zulässige Achslast von 22,5t sind auf mehr als 92% der Schienenabschnitte gewährleistet. Heutzutage ist ein Betrieb von 740m langen Zügen auf 87% des Korridors möglich, wohingegen die Implementierung von ERTMS (Europäisches Schienenverkehrsmanagementsystem) mit einem Anteil von 12,3% noch in einer frühen Phase ist. Weitere Ausbaupläne sind im ERTMS Entwicklungsplan ersichtlich. Während die Schieneninfrastruktur also größtenteils die technischen Parameter erfüllt, müssen andere betriebliche Faktoren, wie Sicherheit und Lärmreduzierung in zukünftigen Projekten stärker berücksichtigt werden. Für Abschnitte, welche durch Ballungsräume führen (welche es insbesondere im Rhein-Alpen Korridor gibt), wurde Schienenlärm wiederholt als kritisches Problem identifiziert. Auch könnten Reisezeiten verkürzt und die Hauptknotenpunkte für Schiene optimiert werden; dies hätte eine bessere Erreichbarkeit und Dienstleistungsqualität zur Folge.

Die Straßeninfrastruktur erfüllt die TEN-T Anforderungen in fast vollem Umfang. Zweidrittel der relevanten Straßen weisen Systeme zur Mauterhebung auf. Nichtsdestotrotz gibt es eine häufige Überlastung der korridorrelevanten Straßen, insbesondere in Nähe der Ballungsräume. Zusätzlich wurden Kapazitätsprobleme bei den Lkw Parkplätzen identifiziert. In den Grenzübergängen zwischen der Schweiz und den Nachbarländern wurden zudem Engpässe festgestellt. Da der Straßenverkehr heutzutage einer der Hauptquellen für die Emissionen von Treibhausgasen bildet, sind Strategien für alternativer Treibstoffe und Antriebe zu priorisieren.

Die Binnenschifffahrt weist nur geringe Einschränkungen bezüglich der technischen Anforderungen vor. Die deutschen Abschnitte auf dem Rhein, der Neckar und der Mosel benötigen Fahrrinnenvertiefungen, Entfernung der Höhenbeschränkungen unter Brücken sowie Erweiterungen der Schleusenkapazität. RIS, ein Binnenschiffsinformationsdienst, ist elementar für den grenzüberschreitenden Verkehr, wo für eine beständige Umsetzung weitere Koordinationsprozesse notwendig sind.

Die acht Seehäfen weisen Probleme in ihrer Erreichbarkeit auf. Kapazitätsengpässe sind eine wichtige zukünftige Themenstellung, wenn Infrastrukturentwicklungen und eine höhere Nachfrage eine stärkere Anbindung an das Hinterland und einen verbesserten maritimen Zugang erfordern.

Die wichtigsten Passagierflughäfen sind alle an das Schienennetz angeschlossen. Sechs Frachtflughäfen und kleinere Flughäfen sollen bis 2050 an das Schienennetz angebunden werden.

Für Schiene-Straße-Terminals, die multimodale Verbindungen entlang des Korridors sicherstellen, wurden Engpässe im Bereich der Umschlagskapazität von Terminals und Binnenhäfen erkannt. Vorhaben, die die Behebung dieser Engpässe betreffen sind in mehreren Regionen angesiedelt, um die multimodale Kapazität der Terminals und deren Anbindungen zu erhöhen.

Eine Kategorisierung basierend auf den identifizierten kritischen Problemen wurde ausgearbeitet, um diese kritischen Probleme sortieren zu können: 1. Physischer Kapazitätsengpässe; 2. Fehlende Verbindungen (innerhalb des Korridors); 3. Interoperabilität / Einhaltung der TEN-T Anforderungen; 4. Multimodalität; 5. Verbindungen auf der letzten Meile; 6. Außenwirkungen / Nachhaltigkeit / Innovation; 7. Städtische Gebiete. In einem separaten Schritt wurde analysiert, ob ein kritisches Problem (und damit auch das jeweilige Projekt) relevant für grenzüberschreitende Prozesse ist.

Diese Unterteilung dient der einheitlichen Strukturierung in den nachfolgenden Arbeitsschritten und der endgültigen Kategorisierung der Projekte.

Transportmarktstudie

Das Ziel der Transportmarktstudie (TMS) für den Rhein-Alpen-Korridor war es, die aktuellen und voraussichtlichen Marktbedingungen in Verbindung mit der aktuellen und zukünftig erwarteten Auslastung der Verkehrsträger zu analysieren. Es wurde ein Modell entwickelt, welches drei Sichtweisen beinhaltet: 2010, 2030 („baseline") und die Erfüllung der TEN-T Standards 2030 („compliance"). Die Prognose für die „baseline" beruht einzig auf sozioökonomischen Annahmen; die Prognose „compliance" setzt die vollständige Erfüllung der TEN-T Standards bis 2030 voraus. Diese Szenarien wurden ausschließlich für die Korridorlinienführung definiert und zeigen das potentielle Wachstum auf, das sich durch die relevanten Annahmen für den Korridor ergibt. Schließlich liefert die Transportmarktstudie noch eine Reihe von Vorschlägen für die Implementierung eines gut funktionierenden multimodalen Korridors.

Die aktuelle Marktsituation[78] zeigt, dass bei grenzüberschreitenden Verkehren auf dem Rhein-Alpen-Korridor der Verkehrsträger Schiene einen Anteil von 12% hat, die Straße von 34% und das Binnenschiff von 54%. Das Volumen grenzüberschreitender Verkehre wird auf ungefähr 371,9 Millionen Tonnen im Jahr 2010 geschätzt, d.h. 37% der geschätzten Gesamtnachfrage auf dem Korridor inklusive aller Verkehrsströme (d.h. internationaler und nationaler Verkehr).

Für das „baseline" Szenario wird mit einem moderaten Wachstum der Güterverkehrsnachfrage bis 2030 gerechnet, d.h. mit einem jährlichen Zuwachs von

[78] Basierend auf ETIS Daten (2010)

1,7% für jeweils Schiene, Straße und Binnenschiff, also einem Gesamtwachstum von etwa 40% für alle drei Verkehrsträger. Werden die für die Erfüllung der TEN-T Standards notwendigen Maßnahmen umgesetzt, so ergibt sich für das „compliance" Szenario ein Wachstum von 2010 bis 2030 von jeweils 55% (Schiene), 36% (Straße), und 41% (Binnenschifffahrt). Der starke Anstieg der Schiene wird durch niedrigere Transportzeiten und –kosten begründet. Auf der anderen Seite wird die Straße vergleichsweise teurer und zeitintensiver, was zu einer weiteren Verlagerung auf die Schiene führt. Die Binnenschifffahrt wird sich weiterhin auf dem mehr oder weniger gleichen Niveau bewegen, angesichts der gleichbleibenden niedrigen Transportkosten und dem der Reife des Verkehrsträgers auf dem Korridor. Hinsichtlich der Märkte zeigen die Analysen, dass Importe und Exporte mit zusammen 53% den größten Anteil ausmachen, gefolgt vom Transit mit 26%, der vor allem einen besonders hohen Anteil in der Schweiz hat. Die Analysen in Bezug auf Quelle und Ziel zeigen einen höheren Wachstumstrend im Zentrum des Korridors auf, insbesondere für die Schiene in den Räumen Köln, Frankfurt und Mannheim, gefolgt von einem starken Wachstum durch die Schweiz und Italien. Das Binnenschiff betreffend sind die Verbindungen auf dem Rhein zwischen Rotterdam und Duisburg und weiterführend in das Rhein-Main-Gebiet die am meisten frequentierten Abschnitte auf dem Korridor. Für die Straße liegt das Wachstumspotential vor allem in den städtischen Gebieten. Der Bedarf an Kapazitäten bis 2030 wurde auch in den Angebotsanalysen bestätigt, sowohl für die Netz- als auch für Terminalkapazität.

Die Nachfrageanalysen haben auch Möglichkeiten für einen gut funktionierenden multimodalen Rhein-Alpen Korridor aufgezeigt. Punkte, wie die Entwicklung von multimodalen Anlagen, längere Züge, neue Serviceangebote und eine bessere Zusammenarbeit zwischen den Interessensvertretern wurden als mögliche Service-orientierte Verbesserungen hervorgehoben.

Korridorziele

Es wurden allgemeine Europäische Zielsetzungen identifiziert, von denen wiederum einige Ziele speziell für den Rhein-Alpen-Korridor abgeleitet werden konnten. Korridorziele können in die folgenden Untergruppen zusammenfasst werden:

Das globale Ziel – „Das transeuropäische Verkehrsnetz soll den sozialen, wirtschaftlichen und territorialen Zusammenhalt der Union stärken und zur Schaffung eines einheitlichen europäischen Verkehrsraums beitragen" – kann in vier Hauptthemen gegliedert werden:

- Territoriale und strukturelle Kohäsion: das Kernnetz muss die Erreichbarkeit und Konnektivität aller Regionen der Union gewährleisten;
- Effizienz zwischen verschiedenen Netzwerken: die Beseitigung von Engpässen, Erhöhung der Kapazität von überlasteten Sektionen und die Schließung von Verbindungslücken sowohl in den Hoheitsgebieten der Mitgliedstaaten als auch zwischen diesen Gebieten müssen Prioritäten für das Europäische Netzwerk sein;
- Nachhaltigkeit des Transports: alle Transportmodi müssen ausgebaut sein in Hinblick auf eine nachhaltige und ökonomische Effizienz;
- Erhöhung der Vorteile für den Nutzer: das Europäische Verkehrsnetz muss den Mobilitäts- und Verkehrsbedarf seiner Nutzer decken.

„Die Kernnetzkorridore sollten auch übergeordneten verkehrspolitischen Zielen entsprechen und die Interoperabilität, die Integration der Verkehrsträger und ihren multimodalen Betrieb erleichtern"[79]. Die Korridore sollten einen nahtlosen nationalen

[79] EU Verordnung 1315/2013, Artikel 4

und internationalen Transport sicherstellen unter Verwendung aller Verkehrsträger, den Umwelteinfluss minimieren und die Wettbewerbsfähigkeit steigern.

Folgende verkehrsträgerspezifische Ziele wurden definiert:

- Multimodalität und Intermodalität auf dem Korridor: Verknüpfung der Verkehrsträger in den Knoten, Echtzeit-Informationen in der Transportkette, Kommunikation mit den Nutzern an den Bahnhöfen, für den Frachtumschlag etc.;
- Schienenverkehr: Vollständige Ausrüstung der Kernnetz-Infrastruktur mit ERTMS, Interoperabilität der nationalen Netze, vollständige Elektrifizierung, Sicherheit, Anbindung der multimodalen Knoten zum Schienennetz, etc.;
- Straßentransport: Minderung der Überlastung der Straßeninfrastruktur, Interoperabilität auf dem Netz, Sicherheit, Verfügbarkeit von umweltfreundlichen Kraftstoffen, Minderung von Emissionen, etc.;
- Seehäfen, Binnenhäfen und Binnenschifffahrt: Minimum CEMT Klasse IV, adäquate Transportkapazität, ausreichende Brückendurchfahrtshöhen, gute Befahrbarkeit, RIS, Anbindung der Häfen an die Straßen- und Schieneninfrastruktur, etc.;
- Luftverkehr: mindestens ein Terminal, das allen Unternehmen offen steht, Verwirklichung des einheitlichen Europäischen Luftraums, Verfügbarkeit von umweltfreundlichen Kraftstoffen.

Spezifische Ziele für den Rhein-Alpen-Korridor sind die Verbesserung der grenzüberschreitenden Abschnitte, Verbesserung der Kapazität und das Beseitigen von Engpässen, Schließung von Verbindungslücken, Interoperabilität/Einhaltung der TEN-T Standards, Entwicklung der Multimodalität, Verbesserung der „letzte Meile", Bewältigung negativer externer Effekte/Nachhaltigkeit/Innovation und Berücksichtigung der Einflüsse auf Ballungsgebiete.

Maßnahmenprogramm

Das Maßnahmenprogramm definiert den Rahmen für den Arbeitsplan für den Korridor. Die Kernresultate der vorherigen Arbeitsschritte wurden zusammengefasst, konsolidiert und verdichtet. Notwendige Maßnahmen für die Verbesserung der Verkehrsinfrastruktur wurden abgleitet und zwar aus dem Abgleich der Ergebnisse der Transportmarktstudie, der Definition von quantitativen Anforderungen und den Korridorzielen, welche die qualitative Anforderungen aus Sicht der TEN-T Politik und der Verkehrsteilnehmer definieren und mit den gegenwärtigen Korridoreigenschaften verglichen wurden.

Durchführungsplan

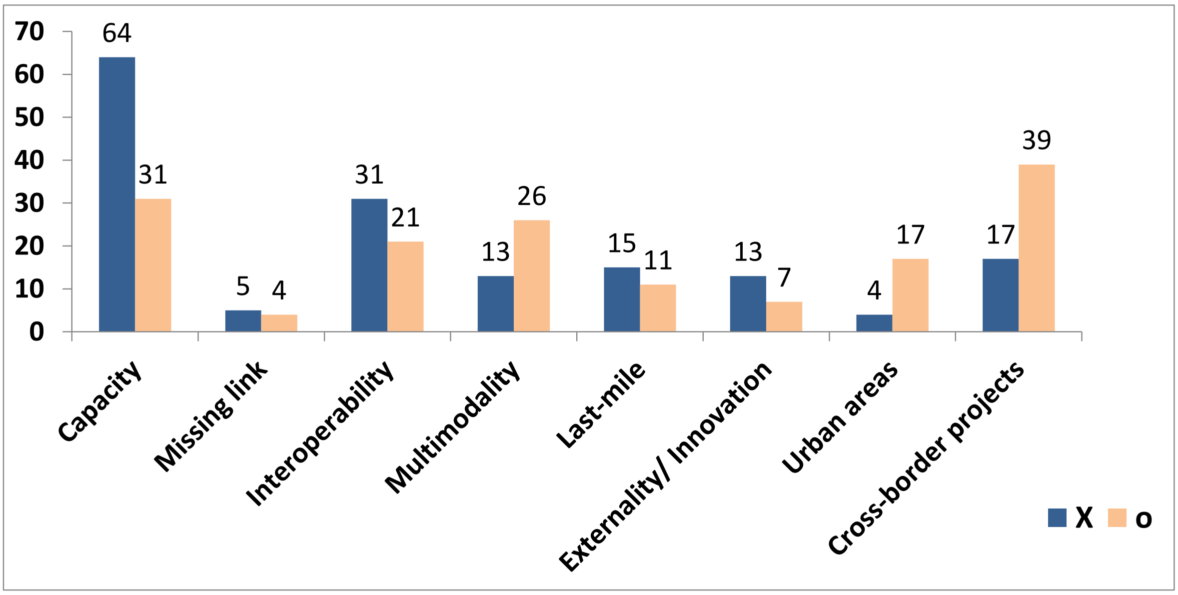
Der Durchführungsplan basiert auf der Identifizierung von Vorhaben, den Beitrag der Interessenvertreter und auf der bilateralen Koordination mit den Mitgliedsstaaten.

Um alle kritischen Probleme und Engpässe, die in den Korridoreigenschaften identifiziert worden sind, zu bewältigen, sieht der Durchführungsplan die Realisierung von insgesamt 175 Projekten auf dem Kernnetz des Rhein-Alpen-Korridors vor. 30 Maßnahmen davon betreffen die Schweiz und wurden daher separat betrachtet.

Von den verbleibenden 145 Projekten betrifft die Mehrheit die Schiene (60), gefolgt von der Binnenschifffahrt (28), den Seehäfen (19) und der Straße (15). Binnenhäfen (9), Lufttransport (7) und Schiene-Straße-Terminals (7) haben nur einen kleinen Anteil. In Bezug auf die Verteilung auf die einzelnen Mitgliedsstaaten werden die meisten Projekte in Italien durchgeführt (57). Deutschland betreffen 31 Maßnahmen, die Niederlande 22, Belgien 15, und Frankreich elf. Neun Projekte involvieren mehr als ein Land.

Bei den meisten Vorhaben (74) ist geplant, diese bis spätestens 2020 abgeschlossen zu haben (gemäß den jeweiligen internen Zeitplanungen). Dies betrifft im Besonderen Vorhaben für Binnenhäfen, Seehäfen und die Binnenschifffahrt, wo 37 von 56 Vorhaben bis Ende 2020 fertig gestellt werden sollen. Für 30 Vorhaben gibt es keine Informationen über das Jahr der Fertigstellung. Diese wurden daher als „Fertigstellung nach 2030" eingestuft. Für fünf Vorhaben wird erwartet, dass sie bis Ende 2014 beendet werden. Weiterhin wurden alle Vorhaben, die grenzüberschreitende Abschnitte betreffen, identifiziert. Dies wurde per Transportmodus auf Basis von Input der Europäischen Kommission durchgeführt. In Summe sind dies 56 Projekte mit grenzüberschreitender Relevanz.

Alle Vorhaben wurden ebenfalls entsprechend der definierten Kategorien der kritischen Probleme eingeteilt (X = Hauptziel des Vorhabens, o = zusätzliches Ziel):



Source: HaCon analysis

Investitionen

Basierend auf den verfügbaren Informationen zeigen die Analysen, dass sich die Gesamtkosten der Investitionen der identifizierten 145 Projekte auf ca. 47,615 Mrd. EUR belaufen. Für 19 Maßnahmen waren keine spezifischen Informationen über Kosten verfügbar. Weitere Analysen zeigten auf, dass 70 der 145 Vorhaben zumindest teilweise als „vorermittelte Projekte" gelten und somit unter CEF Finanzierungspriorität fallen. Die erwarteten Gesamtkosten dieser 70 Vorhaben belaufen sich auf 29,854 Mrd. EUR. Weitere 10 Vorhaben befinden sich sowohl auf dem Rhein-Alpen-Korridor als auch auf dem Skandinavien-Mittelmeer Korridor mit Kosten von ungefähr 2,158 Mrd. EUR. Zusätzlich zu den 80 (70 + 10) „vorermittelten Projekte" gibt es 52 Vorhaben, die mit mindestens einer der Förderprioritäten aus der Verordnung 1316/2013 verbunden sind. Die geschätzten Kosten dieser Vorhaben belaufen sich auf etwa 10,245 Mrd. EUR.

In Summe fallen demnach 132 Projekte (90% von insgesamt 145) unter die CEF Förderprioritäten mit geschätzten Gesamtkosten von 42,256 Mrd. EUR. Die meisten Vorhaben befinden sich in Italien (52), Deutschland (26) und den Niederlanden (19). Der größte Kostenanteil liegt in Deutschland mit 17,020 Mrd. EUR, gefolgt von Italien mit 14,367 Mrd. EUR.

Das Ziel „Überbrückung von fehlenden Verbindungen, Beseitigung von Engpässen, Verbesserung der Interoperabilität des Eisenbahnverkehrs und insbesondere Verbesserung grenzübergreifender Abschnitte" umfasst die größte Gruppe mit 86 Projekten und Gesamtkosten von 34,3 Mrd. EUR. Das Ziel „Optimierung der Integration und Interkonnektivität der Verkehrsträger und Steigerung der Interoperabilität von Verkehrsdiensten bei gleichzeitiger Gewährleistung der Zugänglichkeit der Verkehrsinfrastrukturen" betreffen 36 Vorhaben mit Gesamtkosten von 6,7 Mrd. EUR. Das Ziel „langfristige Gewährleistung nachhaltiger und effizienter Verkehrssysteme sowie die Möglichkeit zur Entkarbonisierung aller Transportmodi" wird nur von zehn Projekten verfolgt mit Gesamtkosten von 1,26 Mrd. EUR.

Es sollte darauf hingewiesen werden, dass diese Analyse eine vorläufige Untersuchung ist und auf Teilinformationen basieren. Die Förderfähigkeit für eine CEF Förderung obliegt allein der Europäischen Kommission (namentlich INEA), die ihre Entscheidung auf der Evaluierung der eingereichten Vorhaben im Rahmen der CEF Aufforderung zur Einreichung von Vorschlägen basiert.

Management Summary (Italian)

I Regolamenti (UE) n.° 1315/2013[80] e 1316/2013[81] definiscono la base legale per la politica della rete transeuropea dei trasporti fino al 2030/50. Essi contengono gli "Orientamenti dell'Unione" ("Union Guidelines") che tracciano il modello di riferimento per la politica della rete di trasporto oltre a definire la rete principale di trasporto multimodale composta da nove corridoi principali (Core Network Corridors), da completarsi entro il 2030. In fine, i Regolamenti sopra menzionati definiscono il "Meccanismo per collegare l'Europa" ("Connecting Europe Facility") che gestisce il finanziamento europeo nel periodo 2014 – 2020.

I corridoi (Core Network Corridors) sono un nuovo strumento a livello dell'UE, con l'obiettivo di facilitare lo sviluppo di un'infrastruttura coerente, coinvolgendo tutti gli attori più rilevanti, cioè gli Stati Membri e gran parte degli stakeholder (per esempio, i gestori delle infrastrutture, le autorità regionali, ecc.). Tale sviluppo dei corridoi è supportato dalla Commissione Europea, sia attraverso attività di coordinamento che per mezzo di strumenti di finanziamento.

Sulla base delle linee guida TEN-T, ai fini dello sviluppo di ciascun corridoio, entro il 2030, deve essere elaborato un "Work Plan" che definisca lo stato di implementazione dello stesso con l'obiettivo di pianificare lo sviluppo delle infrastruttura in maniera efficiente e di consentire il buon funzionamento sia delle singole modalità di trasporto che le interazioni tra le diverse modalità senza soluzione di continuità, con riferimento sia al traffico passeggeri che al traffico merci.

Lo studio sul corridoio Reno-Alpi, appartenente al Core Network TEN-T, contiene tutte le analisi propedeutiche all'elaborazione del work plan. Lo studio costituisce la base per l'identificazione dei progetti necessari allo sviluppo futuro del corridoio entro il 2030, sia al fine di supportare l'ulteriore rafforzamento del mercato interno e della competitività globale europea e di assicurare coesione economica, sociale e territoriale, sia nell'ottica del miglioramento dell'accessibilità delle infrastrutture di trasporto a livello europeo.

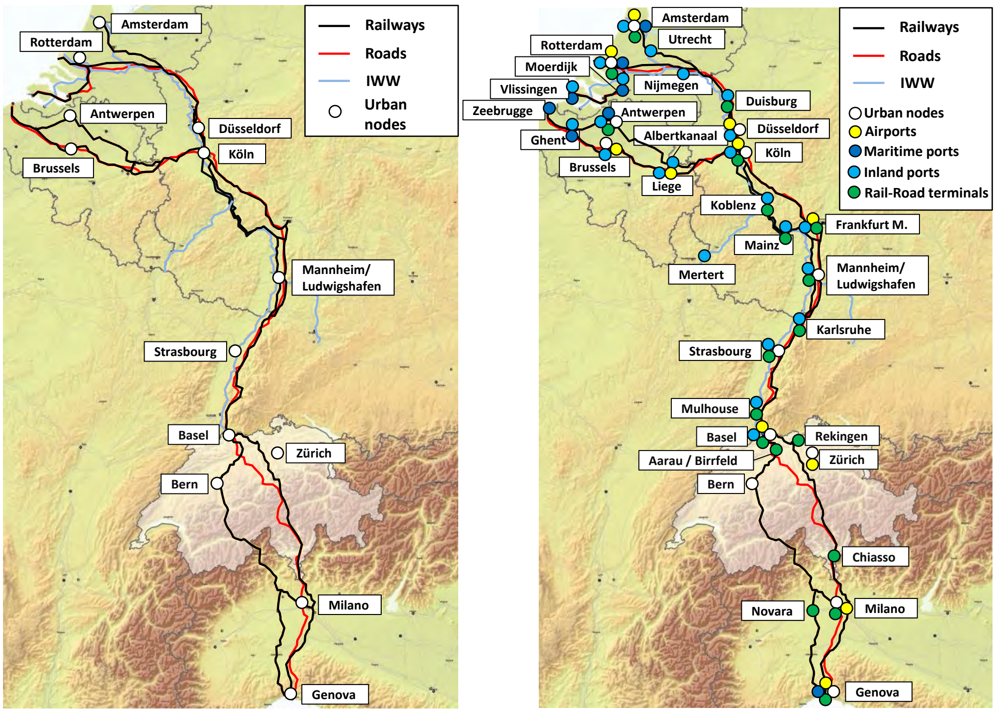
Il corridoio Reno-Alpi integra l'esistente del precedente corridoio TEN-T e della politica dei trasporti (in particolare i Progetti Prioritari 5 e 24, il corridoio ERTMS A e il "Rail Freight Corridor" Reno-Alpi) e fa leva su importanti investimenti in infrastrutture che sono già stati completati. Per queste ragioni, il Corridoio multimodale Reno-Alpi sembra predestinato ad essere uno dei punti di riferimento nel processo di implementazione dei nove corridoi multimodali previsti per la rete CORE TEN-T, attraverso una "nuova generazione di sviluppo infrastrutturale", cioè, tra le altre cose, attraverso un rafforzamento della multimodalità, l'ottimizzazione dell'utilizzo dell'infrastruttura o la promozione di approcci innovativi.

Il Corridoio è una delle direttrici più utilizzate per il traffico merci in Europa dato che connette le regioni più densamente popolate (oltre 70 milioni di abitanti) ed economicamente rilevanti. Il Corridoio risulta, inoltre, essere tra i più sviluppati in riferimento all'adozione degli standard tecnici definiti dai regolamenti TEN-T. Tuttavia, si ritengono necessari ulteriori investimenti nelle infrastrutture al fine di stimolare e supportare la crescita economica, l'occupazione e lo sviluppo di una rete di trasporto multimodale sempre più eco-compatibile e sostenibile. Pertanto, risulta fondamentale sensibilizzare l'opinione pubblica in merito all'opportunità e alla coerenza di tali investimenti. Il Corridoio Reno-Alpi collega i porti del Mare del Nord di Anversa, Rotterdam e Amsterdam e il porto italiano di Genova attraversando la Svizzera e alcuni dei maggiori centri economici dell'Europa occidentale. Inoltre, il Corridoio

[80] Regolamento (UE) n. 1315/2013 del Parlamento europeo e del Consiglio, dell'11 dicembre 2013, sugli orientamenti dell'Unione per lo sviluppo della rete transeuropea dei trasporti
[81] Regolamento (UE) n. 1316/2013 del Parlamento europeo e del Consiglio, dell'11 dicembre 2013, che istituisce il meccanismo per collegare l'Europa e che modifica il regolamento (UE) n. 913/2010

presenta numerosi nodi di intersezione con le direttrici di collegamento est-ovest. Gli stati attraversati sono l'Olanda, il Belgio, il Lussemburgo (Moselle), la Germania, la Svizzera, il nord Italia ed in fine la parte orientale della Francia, ovvero l'area di Strasburgo.

Il Corridoio Multimodale Reno-Alpi



Source: Regulation 1316/2013 Annex 1, Part 1

Il Corridoio presenta un'infrastruttura ferroviaria e stradale continua, ovvero (almeno) una connessione tra Rotterdam/Bruges e Genova senza soluzione di continuità. Per quanto riguarda le vie d'acqua interne navigabili, la situazione risulta più complessa. Nella parte svizzera del corridoio, tale modalità risulta essere molto limitata, nella parte italiana non sono presenti vie d'acqua interne navigabili afferenti all'allineamento del corridoio mentre le vie d'acqua presenti in Belgio sono identificate, dai Regolamenti TEN, come parte dell'allineamento di un altro corridoio multimodale (Mare del Nord-Mediterraneo). Questi collegamenti, tuttavia, assumono un'importanza rilevante per il Corridoio dato che recepiscono flussi di traffico transnazionale considerevoli dal Belgio verso l'Olanda e la Germania. Pertanto, se per un verso questi flussi di traffico sono stati considerati nelle analisi di mercato trasportistico legate al Corridoio, per altro verso i progetti infrastrutturali afferenti alle vie d'acqua interne, localizzate in Belgio, non sono trattati all'interno di questo studio. Per ciò che riguarda il trasporto su strada, i collegamenti principali sono quasi esclusivamente costituiti da autostrade ad alto scorrimento, tuttavia, la maggior parte di queste infrastrutture stradali non sempre risultano essere adeguate ai livelli attuali di domanda di trasporto. L'infrastruttura ferroviaria del corridoio presenta, a livello transfrontaliero, svariate sezioni destinate a servizi di alta velocità/capacità oltre a percorsi alternativi in caso di interruzioni. Infine, le infrastrutture aeroportuali del Corridoio assumono un'importanza rilevante per quanto concerne il traffico passeggeri, includendo hub quali gli aeroporti di Francoforte, Amsterdam, Zurigo, Brussels and Milano.

Coinvolgimento degli stakeholders

Gli stakeholder sono stati coinvolti in maniera graduale attraverso quattro forum fo Corridoio. Il Forum di Corridoio è un organismo consultivo che fornisce le basi per il dibattito e le attività di coordinamento. Quindi, il Work Plan è il risultato di un ampio processo di consultazione, che assicura la massima condivisione e verifica da parte di tutti i partecipanti, circa le esigenza d'implementazione delle misure considerate. Complessivamente, sono stati identificati più di 400 stakeholders, molti dei quali hanno preso parte ai quattro Fourm di Corridoio e a due altre sessioni di lavoro focalizzate su tematiche specifiche.

Integrazione degli studi esistenti

La ricerca e analisi di pubblicazioni e studi ha permesso di individuare numerosi documenti di rilevanza per il Corridoio a livello europeo, nazionale e di corridoio. Gli studi sono stati raggruppati nelle seguenti categorie:

- Documenti per la pianificazione trasportistica a livello macro-regionale;
- Studi e documenti pianificatori relativi a singoli progetti infrastrutturali;
- Studi contenenti analisi previsionali dei traffici e dell'evoluzione del mercato dei trasporti
- Documenti di Governance e pianificazione strategica.

Caratteristiche del corridoio

L'analisi delle caratteristiche tecniche del Corriodoio è stata sviluppata in due fasi. In una prima fase sono state identificate le caratteristiche tecniche delle infrastrutture verificandone la coerenza con i requisiti definiti dal Regolamento 1315/2013. Nell'ambito di questa fase, gli eventuali gap identificati per ciascuna modalità di trasporto sono stati evidenziati come criticità, insieme ad ulteriori colli di bottiglia individuati, come per esempio problemi relativi alla capacità, ecc. Al fine di risolvere tali criticità e colli di bottiglia, sono stati definiti vari progetti lungo il corridoio (si veda il piano di implementazione). Il risultato di questo esercizio è stato condiviso e validato dagli Stati Membri e dagli stakeholders durante i Forum di Corridoio.

L'analisi di conformità dell'<u>infrastruttura ferroviaria</u> agli standard TEN-T ha rivelato che, i requisiti relativi all'elettrificazione e allo scartamento dei binari sono pienamente soddisfatti lungo l'intero allineamento del corridoio. Oltre il 92% delle sezioni ferroviarie consentono una velocità superiore ai 100 km/h e possono sopportare il carico assiale di 22,5 tonnellate. Ad oggi, l'operatività di convogli di lunghezza pari a 740 m è possibile sull'87% delle sezioni ferroviarie mentre l'implementazione dello standard ERTMS è ancora in fase embrionale con solo il 12,3% delle sezioni ferroviarie equipaggiate con tale tecnologia. Sebbene l'infrastruttura sia in gran parte conforme agli standard TEN-T dal punto di vista strettamente tecnico, si rileva che altri fattori, legati all'operatività dell'infrastruttura, quali la sicurezza e la prevenzione del rumore, debbano essere presi maggiormente in considerazione dalle future proposte progettuali. L'inquinamento acustico provocato dal materiale rotabile è spesso identificato come una criticità per le sezioni ferroviarie che passano attraverso aree densamente popolate come nel caso del Corridoio Reno-Alpi. Lungo l'allineamento del corridoio sono state identificate diverse sezioni dove la domanda di traffico eccede l'attuale capacità. Anche i tempi di percorrenza potrebbero essere ridotti e i principali nodi ferroviari possono essere ottimizzati nell'ottica di migliorarne l'accessibilità e la qualità del servizio per gli utenti.

L'<u>infrastruttura stradale</u> è quasi totalmente conforme ai requisiti TEN-T. I due terzi delle strade principali sono dotati di sistemi di pedaggiamento. Ciò nonostante, l'analisi dei flussi di traffico gravitanti sull'infrastruttura ha portato all'identificazione di zone affette da forte congestione in corrispondenza di molte aree urbane posizionate lungo le tratte autostradali nonché la scarsità di aree di sosta per i mezzi pesanti. Per quanto riguarda le sezioni transfrontaliere, sono state identificate criticità legate alla congestione del traffico in entrata e uscita dalla Svizzera. Considerando che il trasporto su gomma risulta essere una delle principali fonti di emissione di gas serra, la diffusione di carburanti maggiormente eco-compatibili è una priorità.

Le vie d'acqua navigabili presentano inadeguatezze parziali con riferimento ai parametri tecnici di Corridoio. Le sezioni presenti sul territorio tedesco lungo il Reno, il Neckar e la Mosella necessitano di dragaggi, di interventi sull'altezza dei ponti che attraversano i canali e dell'aumento della capacità delle chiuse. L'assistenza tramite i River Information Services (RIS) appare cruciale per il traffico transfrontaliero dove, al tempo stesso, è necessario un maggiore coordinamento tra gli Stati Membri per l'implementazione della tecnologia.

Gli otto porti marittimi sono interessati da criticità riguardanti l'accessibilità. Criticità relative alla capacità sono un tema molto rilevante nel prossimo futuro, quando l'aumento della domanda renderà necessario anche un rafforzamento delle connessioni intermodali con il territorio circostante e il miglioramento dell'accessibilità marittima.

Tutti i principali hub aeroportuali, interessati dal traffico passeggeri, sono connessi alla rete ferroviaria. Sei degli aeroporti che servono il Corridoio, sia hub merci che aeroprti di capacità limitata, dovranno essere collegati alla rete ferroviaria entro il 2050 e necessitano di miglioramenti infrastrutturali.

Per quanto riguarda i terminal intermodali, presenti lungo l'allineamento del corridoio, sono state identificate criticità legate alla limitata capacità. Al tempo stesso, sono stati identificati progetti che dovranno far fronte a tali criticità, localizzati in varie regioni lungo il corridoio.

Sulla base delle criticità identificate, è stata adottata la seguente categorizzazione: 1. Criticità legate alla capacità delle infrastrutture di far fronte alla domanda; 2. Criticità legate all'assenza di collegamenti all'interno della rete; 3. Criticità legate all'interoperabilità dei sistemi di trasporto e alla conformità con i requisiti TEN-T; 4. Criticità che affliggono lo sviluppo della multimodalità; 5. Assenza dei collegamenti "Last-Mile" dei centri logistici; 6. Criticità legate alla diffusione di nuove tecnologie anche nell'ottica dello sviluppo sostenibile delle infrastrutture; 7. Criticità localizzate nelle aree urbane.

Tali categorie hanno consentito un approccio comune durante le fasi successive dello studio e nella categorizzazione dei progetti infrastrutturali destinati a risolvere le criticità identificate.

Analisi del mercato dei trasporti

Lo scopo dell'analisi di mercato dei trasporti per il Corridoio Reno-Alpi è stato quello di analizzare le condizioni di mercato attuali e prospettiche in combinazione con il livello di utilizzo attuale e futuro delle infrastrutture. L'analisi ha impiegato un modello di calcolo con il quale sono state effettuate tre simulazioni relative a differenti scenari: 2010 (basis), 2030 (baseline) e 2030 (Compliance). La simulazione "Baseline" è basata solo su assuzioni inerenti la sfera socio-economica mentre la simulazione "Compliance" prevede la completa conformità delle infrastrutture del Corriodio ai requisiti TEN-T. Tali scenari sono definiti rigorosamente per l'allineamento del Corridoio e, nei limiti delle assunzioni fatte, hanno consentito di stimare la crescita potenziale del traffico sul Corridoio.

Le attuali caratteristiche[82] del mercato mostrano che il 12% del traffico transfrontaliero sul corridoio Reno-Alpi avviene tramite ferrovia, per il 34% attraverso il trasporto su gomma e per il 54% attraverso le vie d'acqua interne. Il volume di tali traffici è stato stimato in 371,9 milioni di tonnellate nel 2010 e rappresenta il 37% del traffico totale stimato (nazionale e internazionale) per l'intera area attraversata dal corridoio.

Nello scenario "baseline", si assiste ad una crescita moderata della domanda di trasporto merci fino al 2030 con un incremento annuale del 1,7%. Ciò si traduce in una potenziale della domanda, al 2030, pari a circa il 40% per ciascuna delle modalità di trasporto, quali trasporto su gomma, trasporto ferroviario e trasporto fluviale. Con l'applicazione degli interventi previsti dallo scenario "Compliance" tali incrementi, relativi al periodo 2010-2030, variano rispettivamente in 55%, 36% e 41%. La crescita significativa del trasporto ferroviario è dovuta ad assunzioni circa la riduzione dei tempi di percorrenza e delle tariffe. D'altra parte, il trasporto su strada sta diventando più costoso e svantaggioso dal punto di vista dei tempi di percorrenza comportando un passaggio dei flussi di traffico verso il trasporto ferroviario.

L'analisi dell'offerta indica, altresì, l'esistenza di opportunità di sviluppo per il Corridoio multimodale Reno-Alpi. Lo sviluppo di piattaforme multimodali, treni più lunghi, nuovi servizi e il miglioramento della cooperazione tra gli stakeholders sono tra i possibili spunti di miglioramento.

Obiettivi di corridoio

Lo studio ha portato all'identificazione di nove obiettivi specifici per il Corridoio Reno-Alpi che discendono dai due obiettivi della rete europea dei trasporti.

Gli obiettivi del Corridoio possono essere suddivisi come schematizzato di seguito.

L'obiettivo generale –"La rete transeuropea dei trasporti rafforza la coesione sociale, economica e territoriale dell'Unione e contribuisce alla creazione di uno spazio unico europeo dei trasporti[…]"- può essere declinato in quattro temi principali:

- Coesione territoriale e strutturale: il Core Network deve assicurare l'accessibilità e la connessione di tutte le regioni dell'Unione Europea;
- Efficienza tra i diversi network: la rimozione delle strozzature, l'incremento della capacità delle infrastrutture sovra-utilizzate e la realizzazione di collegamenti mancanti all'interno dei territori degli Stati membri e tra di essi;
- Sostenibilità del trasporto: lo sviluppo di tutti i modi di trasporto deve essere coerente con la realizzazione di trasporti sostenibili ed economicamente efficienti.
- Aumento dei benefici per gli utenti: la rete europea dei trasporti deve assicurare il soddisfacimento delle esigenze di trasporto e mobilità dei suoi utenti.

"È opportuno inoltre che i corridoi della rete centrale perseguano obiettivi più ampi in materia di politica dei trasporti e facilitino l'interoperabilità, l'integrazione modale e le operazioni multimodali"[83]

Sono stati definiti I seguenti obiettivi in relazione alle modalità di trasporto:

- Multimodalità e intermodalità lungo il corridoio: interconnessioni tra le modalità di trasporto nei nodi, disponibilità di informazioni in tempo reale lungo la

[82] Analisi basata su dati ETIS 2010
[83] Regolamento (UE) 1315/2013

catena del trasporto, disponibilità di informazioni destinate agli utenti delle stazioni, Trasbordo delle merci, etc.

- Trasporto ferroviario: infrastrutture dotate della tecnologia ERTMS, interoperabilità dei network nazionali, elettrificazione, sicurezza, nodi multimodali connessi alla rete ferroviaria, ecc.;
- Trasporto stradale: riduzione della congestione, interoperabilità, sicurezza, disponibilità di carburanti alternativi, riduzione delle emissioni nocive, ecc.;
- Porti, Porti fluviali e vie d'acqua interne: adeguamento alla classe IV CEMT, adeguamenti relativi alla capacità delle infrastrutture, interventi sull'altezza dei ponti finalizzati alla continuità della rete di trasporto fluviale, River Information Services (RIS), interconnessioni stradali e ferroviarie, ecc.;
- Trasporto aereo: almeno un terminal accessibile da tutti gli operatori, implementazione del "Single European Sky", disponibilità di carburanti alternativi.

Gli obiettivi specifici per il Corridoio Reno-Alpi riguardano il miglioramento delle sezioni transfrontaliere, l'ampliamento della capacità delle infrastrutture e la rimozione delle strozzature, l'implementazione dei collegamenti mancanti, la conformità con i requisiti definiti per la rete TEN-T sviluppando, al contempo, la multimodalità, le connessioni "last mile", la sostenibilità e l'innovazione, considerando gli impatti sulle aree urbane.

Programma delle misure

Il programma delle misure definisce il quadro operativo per il work plan. I risultati delle precedenti fasi dello studio sono stati riassunti e consolidati. Le misure necessarie per il miglioramento dell'infrastruttura di trasporto sono state identificate attraverso l'esame dei risultati dello studio di mercato in coerenza con requisiti di natura quantitativa, gli obiettivi di corridoio i quali definiscono requisiti di natura qualitativa derivanti dalla politica europea in materia di TEN-T e con le esigenze espresse dagli stakeholders. I requisiti quantitativi e qualitativi, così definiti, sono stati confrontati con le attuali caratteristiche del Corridoio giungendo all'identificazione degli interventi infrastrutturali rilevanti.

Piano di implementazione

Il piano di implementazione si è basato sull'identificazione dei progetti, gli input ricevuti dagli stakeholders e la coordinamento bilaterale con gli Stati Membri.

Per far fronte a tutte le criticità identificate, il piano di implementazione prevede la realizzazione di 175 progetti lungo il tracciato del Corridoio Reno-Alpi, 30 dei quali sono localizzati in territorio svizzero e quindi trattati separatamente.

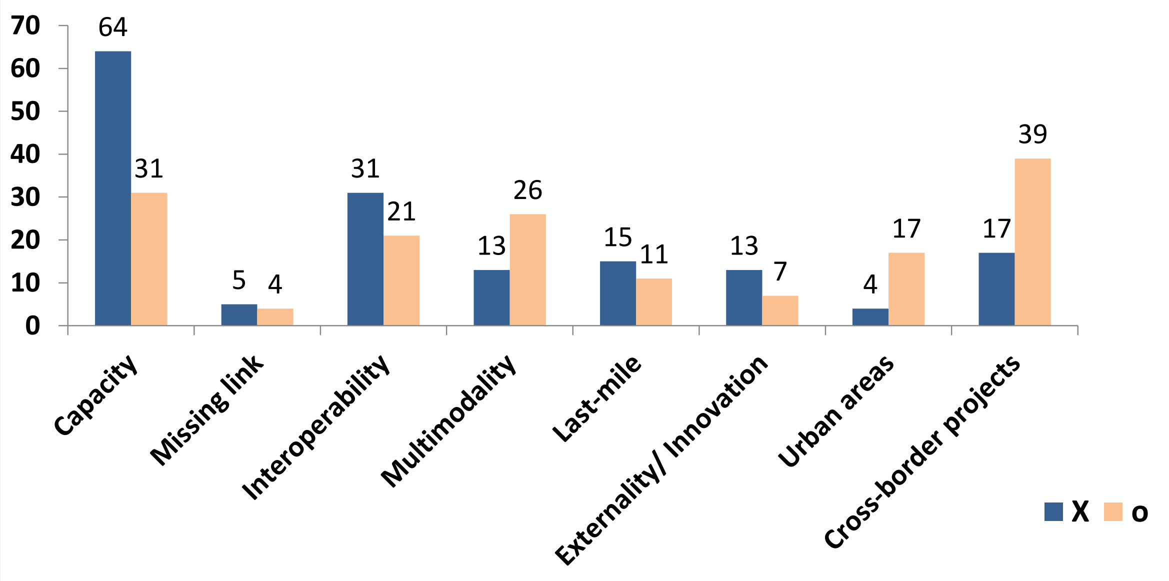
Con riferimento ai restanti 145 progetti, la maggior parte (60) riguardano la modalità ferroviaria, 28 riguardano le vie d'acqua interne, 19 riguardano le aree portuali, 15 riguardano il network stradale, 9 riguardano i porti fluviali, 7 riguardano gli aeroporti e 7 sono incentrati sullo sviluppo dei centri intermodali. Con riferimento alla distribuzione dei progetti tra gli Stati Membri interessati dal corridoio, prima viene l'Italia con 57 progetti, seguita dalla Germania (31), l'Olanda (22), il Belgio (15), e la Francia (11). Infine, 9 progetti riguardano più di uno Stato Membro.

In generale, la maggior parte dei progetti (74) prevedono il loro completamento entro il 2020 (in accordo con il loro piano interno di implementazione). Tali progetti riguardano principalmente porti fluviali, porti marittimi e vie d'acqua interne, dove 37 dei 56 progetti previsti dovrebbero essere completati entro il 2020. Per 30 progetti, non ci sono informazioni sui tempi di completamento. Cinque progetti dovrebbero concludersi entro la fine del 2014. Le infrastrutture del Corridoio ricadenti nel "Core

Network Corridor" (come illustrato nelle caratteristiche del corridoio) devono essere rese conformi con tutti i parametri tecnici TEN-T entro il 2030.

Lo studio ha permesso anche di identificare tutte le sezioni transfrontaliere. I risultati dell'analisi hanno portato all'idividuazione di 56 progetti rilevanti per sezioni transfrontaliere.

Tutti i progetti sono stati classificati in base alle criticità sulle quali hanno impatto (X = obiettivi principali del progetto / o = ulteriori obiettivi del progetto).



Fonte: Analisi HaCon

Investimenti

Sulla base dell informazioni disponibili, l'analisi degli investimenti ha portato ad una stima del costo totale dei 145 progetti identificati pari a circa 47.615 milioni di euro. Tale valore non include però i costi di 19 progetti per i quali non sono disponibili informazioni di dettaglio. Ulteriori analisi hanno portato all'identificazione di 70 progetti che, almeno in parte, rispondono alle caratteristiche degli interventi sulle sezioni del corridoio Reno-Alpi individuate, in via preliminare, dal Regolamento 1316/2013 ("pre-identified sections") e quindi potenzialmente correlati con le priorità di finanziamento della Connecting Europe Facility. Il costo stimato dei 70 progetti identificati è pari a 29.854 milioni di euro. Altri 10 progetti, per un costo totale stimato in 2.158 milioni di euro, sono localizzati su sezioni appartenenti sia all'allineamento del corridoio Reno-Alpi che all'allineamento del corridoio Mare del Nord-Mediterraneo e rispondono alle caratteristiche degli interventi identificati in via preliminare su quest'ultimo. In aggiunta ai summenzionati 80 (70+10) progetti "pre-identificati", altri 52 progetti possono essere associati alle priorità di finanziamento della Connecting Europe Facility definite nel Regolamento 1316/2013. Il totale stimato di questi ulteriori 52 progetti è pari a circa 10.245 milioni di euro.

In totale, 132 progetti, circa il 90% dei progetti identificati, ricadono nelle priorità di finanziamento della Connecting Europe Facility per un costo totale stimato in 42.256 milioni di euro. La maggior parte dei progetti è localizzata sul territorio italiano (52), 26 sono localizzati in Germania, 19 in Olanda. I costi più alti sono associati ai progetti localizzati in Germania (17.020 milioni di euro) e in Italia (14.367 milioni di euro).

All'obiettivo di "eliminare le strozzature, accrescere l'interoperabilità ferroviaria, realizzare i collegamenti mancanti e, in particolare, migliorare le tratte transfrontaliere” rispondono la maggior parte dei progetti identificati (86) per un costo totale stimato in 34,3 miliardi di euro. All’obiettivo di “ottimizzare l'integrazione e l'interconnessione dei modi di trasporto e accrescere l'interoperabilità dei servizi di trasporto, assicurando nel contempo l'accessibilità alle infrastrutture di trasporto” risponde un numero più contenuto di progetti (36) per un costo totale stimato in 6,7 miliardi di euro. Infine, l’obiettivo di “garantire nel lungo periodo sistemi di trasporto sostenibili ed efficienti, al fine di prepararsi ai futuri flussi di trasporto previsti e di consentire la decarbonizzazione” può essere associato solo a 10 progetti per un costo totale stimato in 1,3 milioni di euro.

Le analisi svolte rappresentano un esercizio preliminare basato su informazioni parziali. Il giudizio sull’ammissibilità delle singole proposte progettuali al finanziamento da parte della Connecting Europe Facility è sotto la responsabilità della Commissione Europea (in particolare dell’Innovation and Networks Executive Agency – INEA), la quale deciderà in merito a valle della valutazione delle domande di finanziamento presentate in riferimento ai bandi pubblicati.