IMPLEMENTATION PLAN

book 5

update 2018

Rail Freight Corridor Rhine – Alpine

This document is an update of the Implementation Plan as referred to in Regulation (EU) 913/2010 replacing the version from 23rd April 2015.

Co-financed by the European Union
Connecting Europe Facility

Table of Contents

1. INTRODUCTION 4

2. CORRIDOR DESCRIPTION 6

2.1 Key parameters of Corridor lines 12
2.2 Corridor Terminals 13
2.3 Bottlenecks 14
2.4 RFC Governance 14

3. MARKET ANALYSIS STUDY 15

4. LIST OF MEASURES 15

4.1 Coordination of planned temporary capacity restrictions 15
4.2 Corridor One-Stop-Shop 15
4.3 Capacity Allocation Principles 15
4.4 Applicants 15
4.5 Traffic management 15
4.6 Traffic management in Event of Disturbance 15
4.7 Quality Evaluation 16
4.8 Corridor Information Document 16

5. OBJECTIVES AND PERFORMANCE OF THE CORRIDOR 17

5.1 Objectives 17
5.2 KPIs and Performance 18

6. INVESTMENT PLAN 24

6.1 List of projects 24
6.2 Capacity Management Plan 26
6.3 Deployment plan (ERTMS) 27
6.4 Reference to Union contribution 33

Annexes:

- ***Annex 5A: Feasibility of 740m train length***
- ***Annex 5B: List of projects***
- ***Annex 5C: Capacity Bottleneck Analysis***
- ***Annex 5D: Maps for ERTMS Deployment Plan***

Figures

Figure 1: Legend for the figures regarding corridor lines and terminals 6
Figure 2: View of the corridor in CIP 7
Figure 3: Example for Multi Corridor View 8
Figure 4: Connection to Vlissingen 8
Figure 5: New Connecting Line Andernach – Andernach Hafen 9
Figure 6: New Connecting Line Mainz-Bischofsheim - Frankfurt-Ost - Darmstadt 9
Figure 7: New Connecting Lines Wörth am Rhein – Karlsruhe West 10
Figure 8: New Connecting Line A Kehl - Appenweier 10
Figure 9: New Connecting Line A Taverne-Toricella – Lugano-Vedeggio 11
Figure 10: New Connecting Line A Mendrisio – Stabio 11
Figure 11: Information on key parameters on the map in CIP 12
Figure 12: compliance with TEN-T parameters 13
Figure 13: Set of RFC KPIs proposed by the sector 19
Figure 14: KPI Volume of offered, requested and pre-allocated capacity by C-OSS 20
Figure 15: KPI Number of requested Dossiers, clean and in conflict 20
Figure 16: KPI Volume of offered and requested reserve capacity by C-OSS 21
Figure 17: KPI International traffic volume 21
Figure 18: KPI Modal Split Ports 22
Figure 19: KPI ModaL Split Trans-Alpine Traffic 22
Figure 20: KPI Punctuality on RFC Rhine-Alpine 23
Figure 21: Cooperation RFC - CNC Rhine-Alpine 24
Figure 22 Visualisation of infrastructure projects in CIP 25
Figure 23 Gap analysis 2023 – on-board perspective 30
Figure 24 Union contribution on RFC Rhine-Alpine 33

Disclaimer:
The sole responsibility of this publication lies with the author. The European Union is not responsible for any use that may be made of the information therein.

This document serves for information only. RFC Rhine-Alpine and the involved IMs/AB/MoTs accept no liability for direct or indirect damages of material or immaterial nature arising from use or non-use of the published information. Moreover, all responsibility for the content of any external sites referred to by this document (links) is declined.

1. Introduction

The Rail Freight Corridors (RFCs) have been established to strengthen Europe-wide rail freight transport by lowering barriers at borders, improving performance quality and cooperation in the rail sector as well as the development of a network, that offers sufficient capacity and harmonised processes. All this shall support the modal shift from road to rail to meet the targets of the transport and environmental policy, like e. g. decarbonization.

Legally the RFCs are based on the Regulation (EU) 913/2010 which entered into force on 9 November 2010. The date for the establishment of RFC Rhine-Alpine was set on 10 November 2013. RFCs are obliged to publish an Implementation Plan (IP) as part of the Corridor Information Document (CID). The CID consists of 5 books, from which the Implementation Plan is foreseen as book 5 (Art 18d).

According to Art. 9(2) of Regulation (EU) 913/2010, the Management Board (MB) shall periodically review the Implementation Plan requested in Art. 18, taking into account progress made in its implementation, the rail freight market on the freight corridor and the performance measured in accordance with the objectives referred to in point (c) of Art. 9 (1).

The initial Implementation Plan of RFC Rhine-Alpine was published on 10 November 2013, followed by an update on 23 April 2015. In the meantime on 26 September 2016 the Executive Board (ExB) decided about a principal line connecting the Port of Vlissingen (as required in Annex II of the Regulation (EU) 1316/2013). It was agreed then that the adaptation would be integrated in the next full update of the Implementation Plan of RFC Rhine-Alpine.

Since the initial Implementation Plan in 2013 and the update in 2015 the measures agreed have been implemented as well as a common structure for the books of the CID which was developed under the umbrella of RailNetEurope (RNE).
RFCs recognised that information in some chapters of book 5 became redundant to the content of other books because the initial IPs included master descriptions for all the essential tasks, functionalities and measures to be implemented (e.g. C-OSS and coordination of works). In 2018 the RFC Network extended the guideline for book 5 to also cover a simplified approach for updates of the Implementation Plan, including optional references to the Customer Information Platform (CIP) which constitutes an important source of information. CIP is an IT application which was developed by RFC Rhine-Alpine in 2013 to inform e.g. about the corridor description and line properties. Today CIP is shared by almost all RFCs, for hosting and further development RNE has been mandated by the RFCs.
Thus CIP is the source to present the consolidated overview of the RFC Rhine-Alpine routes. In this update of the implementation plan only changes to the routing are indicated.

Chapters/subchapters identified as redundant will be referenced to books 1, 3 or 4 and CIP which have their own update procedures. Nevertheless the table of contents in the Implementation Plan update will be kept as originally defined.

- book 1 (Generalities, Art. 8 of Regulation (EU) 913/2010)
  - covers the description of RFC governance foreseen in chapter 2.4

- book 3 (Terminal Description, Art. 18 b of Regulation (EU) 913/2010)
  - covers chapter 2.2, Corridor Terminals

- book 4 (Capacity and Traffic Management, Art. 18 c of Regulation (EU) 913/2010)
    - covers topics from chapter 4, list of measures

- Customer Information Platform (CIP)
    - covers parts of chapter 2, Corridor Description, and chapter 2.1, Key Parameters (line properties)

This update of the RFC Rhine-Alpine Implementation Plan is mainly about new developments and a refresh of topics that are not covered by one of the other books, which have a yearly update procedure. The focus is on:

- Additional new RFC line sections
- Update on objectives and performance
- Capacity bottleneck analysis
- Update on list of projects (investment plan)
- Deployment Plan (ERTMS).

This update was elaborated by the Management Board, consulted with RAG and TAG and approved by the ExB of RFC Rhine-Alpine on 20 November 2018.

2. Corridor Description

The corridor routing is based on the annex of the Regulation (EU) 913/2010 amended by Regulation (EU) 1316/2013.
The connection to Vlissingen has been added in 2016 as required in Annex II of the Regulation (EU) 1316/2013.

The RFC Rhine-Alpine stretches from the North Sea in the Netherlands and Belgium to the Mediterranean Sea in Italy and crosses the heart of the EU along the so-called "Blue Banana". This is the most heavily industrialised North-South route in Central Europe and connects Europe's prime economic regions. The "Blue Banana" includes major ports and economically strong urban centres such as Rotterdam, Amsterdam, Vlissingen, Antwerp, Zeebrugge, Ghent, Duisburg, Köln, Mannheim, Basel, Milan and Genoa. All these centres are served and connected by the Corridor. The countries directly involved are The Netherlands, Belgium, Germany, Switzerland and Italy.

The following graph (Figure 1) describes the common definition of corridor lines and associated obligations.

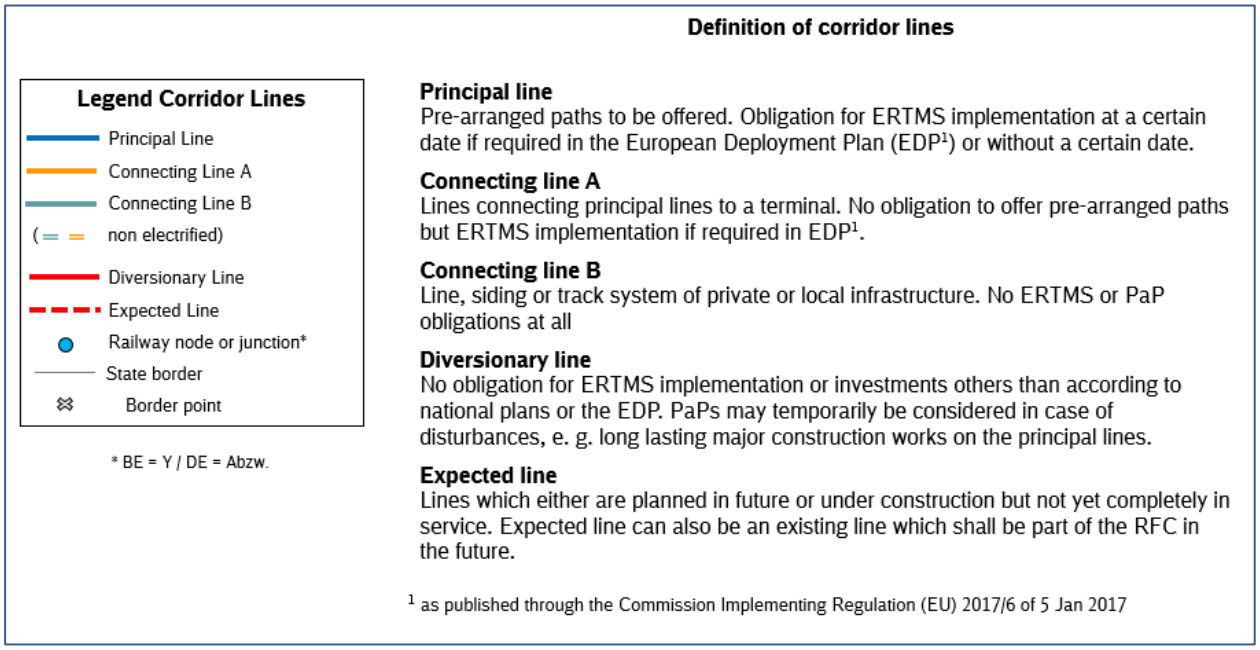

Figure 1: Legend for the figures regarding corridor lines and terminals

The first Implementation Plan of 2013 includes schematic maps and lists on the initial corridor routing and terminals. Today on RFC Rhine-Alpine the source for publication of the full corridor routing is CIP (link). In this update only changes after the update of 23 April 2015 are mentioned.

The following map shows the consolidated view of RFC Rhine-Alpine lines including the presentation of principal, diversionary, connecting and expected lines. More information can be foundin CIP (see figure 2) under Corridor Category (1):

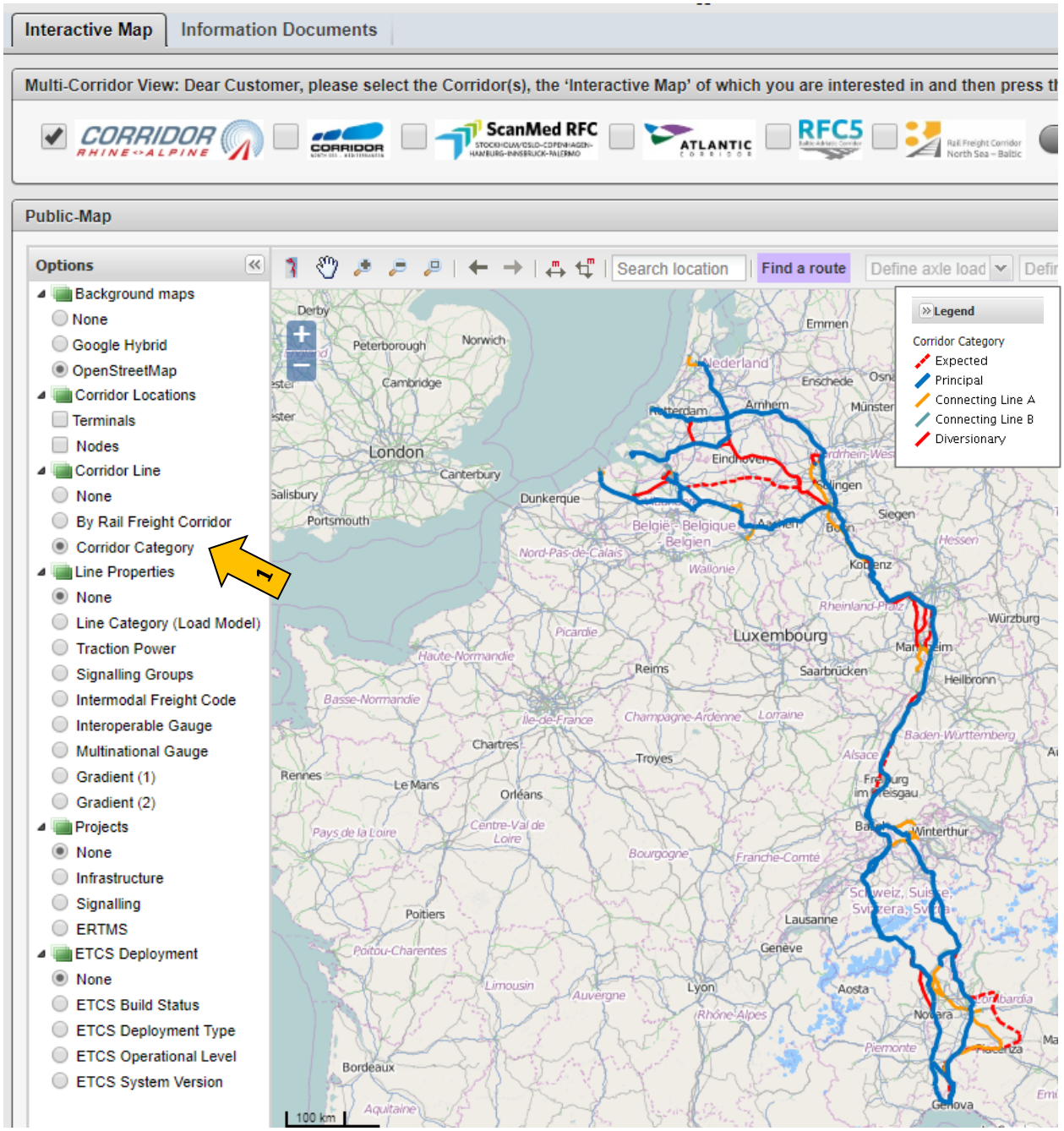

Figure 2: View of the corridor in CIP

The RFCs participating in CIP use the system also to inform about overlapping sections with other corridors. Overlapping sections appear in areas where the routing of two or more corridors are crossing or using the same infrastructure to reach destinations defined in the annex of Regulation (EU) 913/2010 like e. g. Rotterdam which is connected to RFC Rhine-Alpine, North Sea-Mediterranean and North Sea-Baltic. The multi-corridor-view in CIP enables harmonised map based information on all RFCs participating in CIP (see Figure 3).

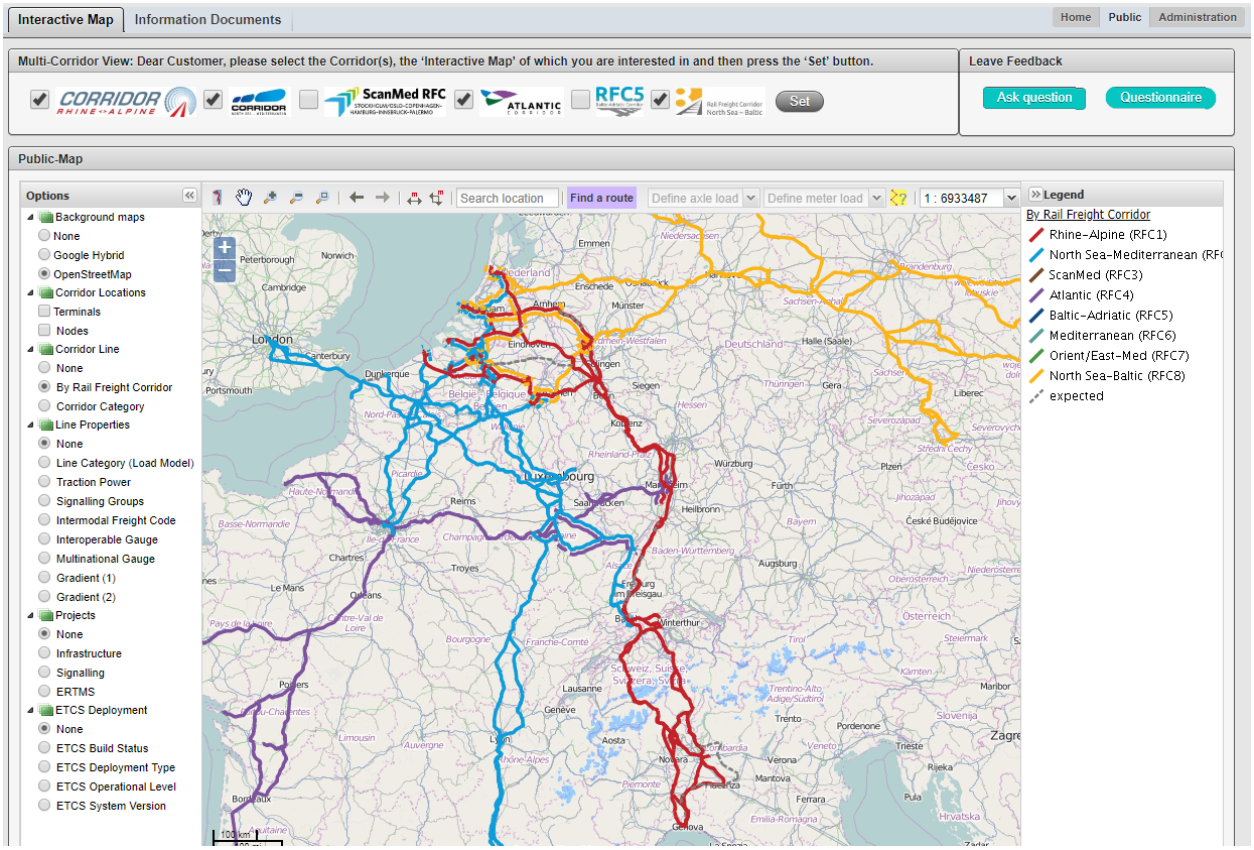

Figure 3: Example for Multi Corridor View

Integration of the connection to the port of Vlissingen

The Port of Vlissingen has been connected to the overall RFC Rhine-Alpine network via a principal line as agreed by the ExB in 2016 (Figure 4).

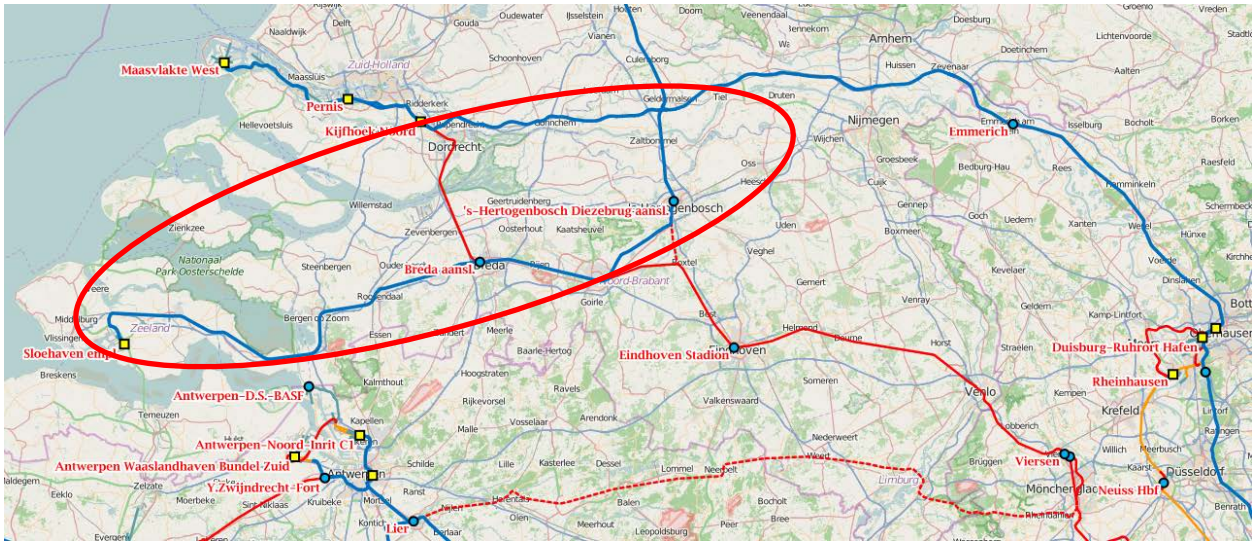

Figure 4: Connection to Vlissingen

New line sections

In the frame of this update the following new connecting lines are included in Germany and Switzerland, to connect further important terminals to RFC Rhine-Alpine. The terminals will be included in the next update of book 3 (publication on second Monday of January for the next TT year).

- Andernach – Andernach Hafen (Germany)

  The terminal in Andernach (Figure 5) is a strategic hinterland connection for the Port of Antwerp and served by regular train services via the Corridor.

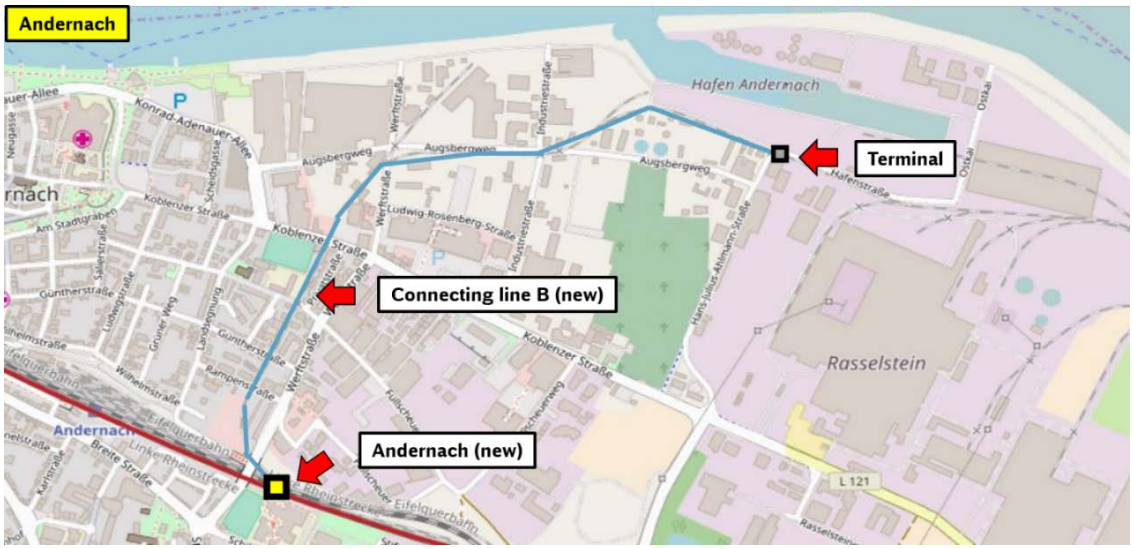

Figure 5: New Connecting Line Andernach – Andernach Hafen

- Mainz-Bischofsheim – Frankfurt-Ost – Darmstadt (Germany),

  The terminal in Frankfurt-Ost (Figure 6) is an important multimodal hub and connected by regular intermodal train services. It is already included in the corresponding CNC Corridor.

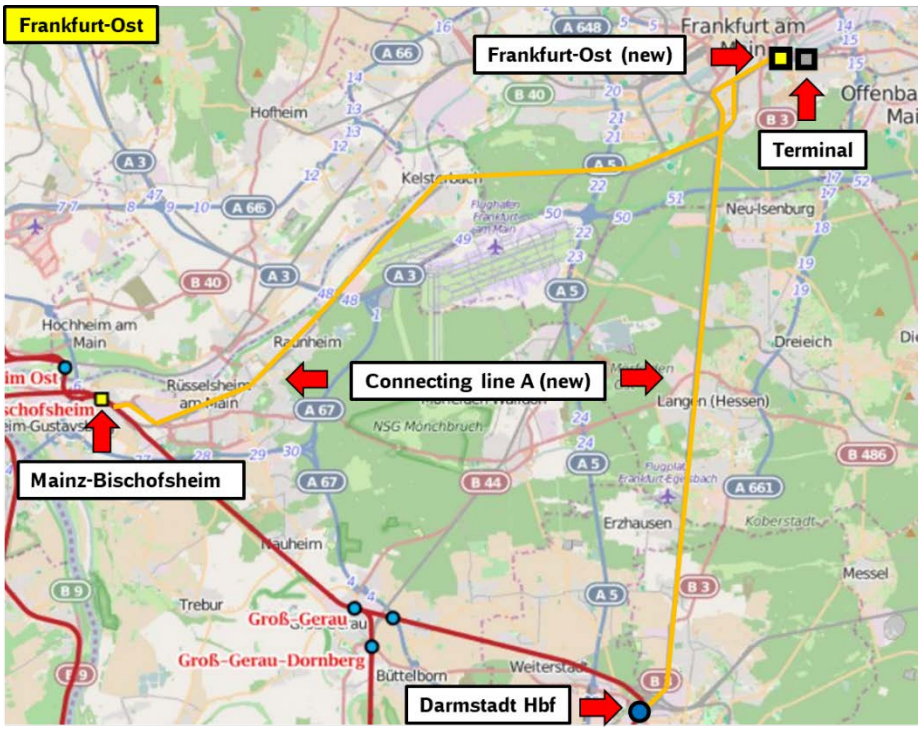

Figure 6: New Connecting Line Mainz-Bischofsheim - Frankfurt-Ost - Darmstadt

- Karlsruhe West – Wörth (Germany)

  The terminal Wörth (Figure 7) is an important multimodal hub and connected by regular intermodal train services.

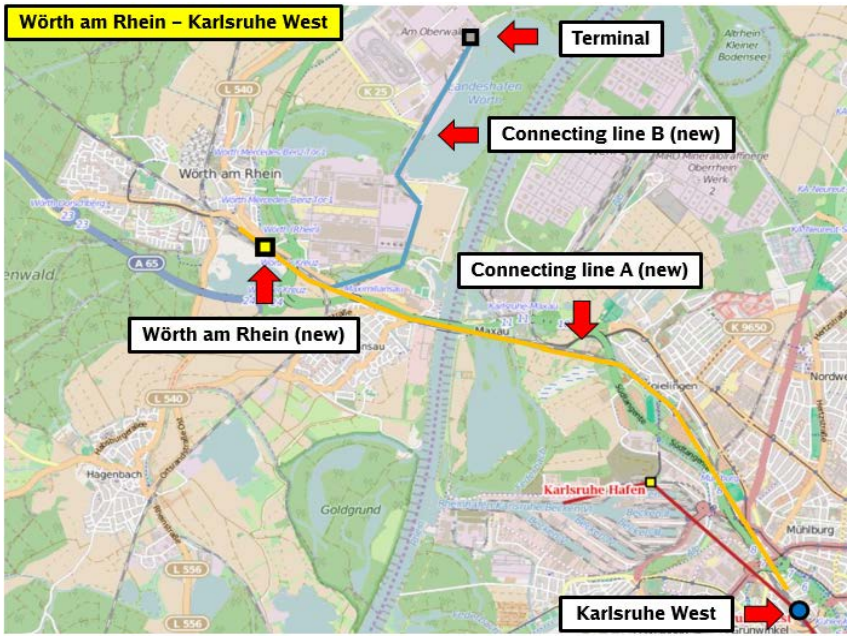

Figure 7: New Connecting Lines Wörth am Rhein – Karlsruhe West

- Appenweier – Kehl (Germany)

  The terminals in the port of Kehl (Figure 8) are an important multimodal hub and connected by regular train services.

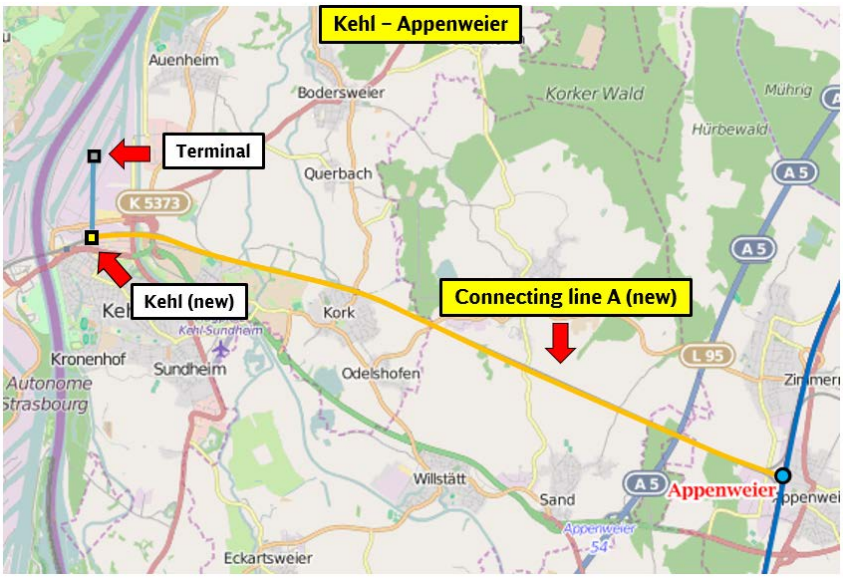

Figure 8: New Connecting Line A Kehl - Appenweier

- Taverne Torricella – Lugano-Vedeggio (Switzerland),

The terminal in Lugano-Vedeggio (Figure 9) is connected by regular intermodal train services. It is equipped to handle trains of the rolling highway system.

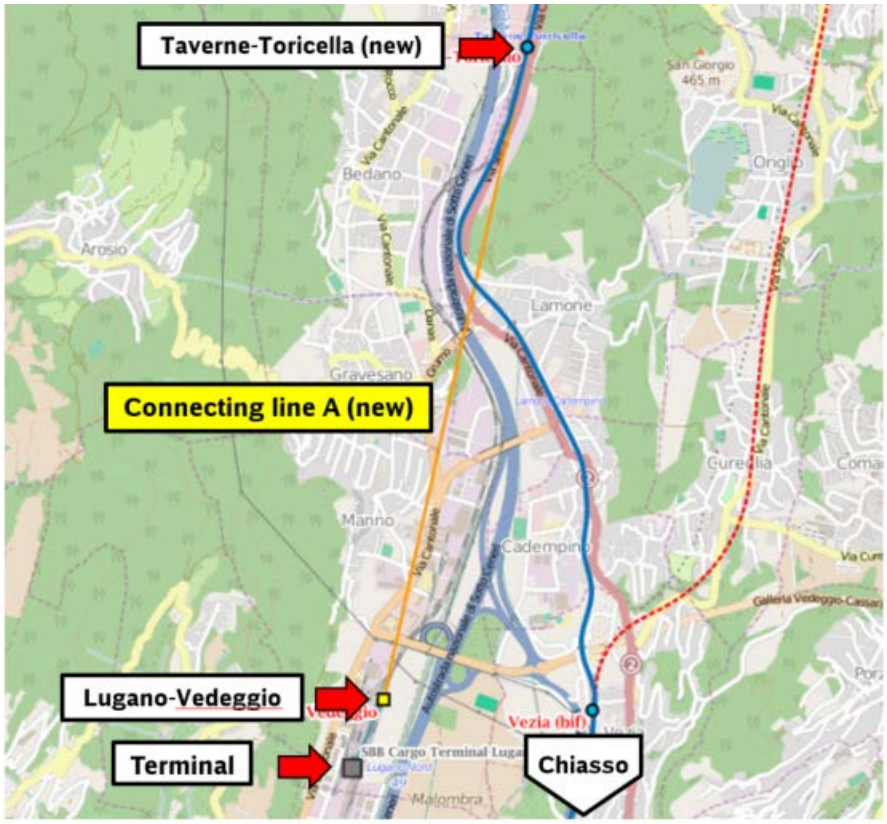

Figure 9: New Connecting Line A Taverne-Toricella – Lugano-Vedeggio

- Mendrisio – Stabio Cargo (Switzerland),

The terminal in Stabio (Figure 10) is connected by regular intermodal train services.

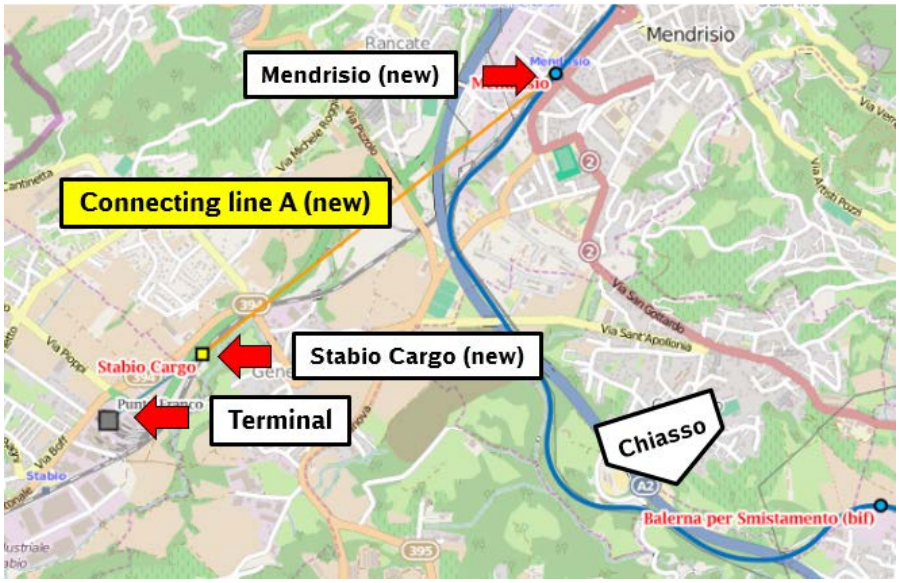

Figure 10: New Connecting Line A Mendrisio – Stabio

2.1 Key parameters of Corridor lines

Regulation (EU) 913/2010 – Article 9 (1.a) also requests a description of the characteristics of the freight corridor. Amongst others, RFC Rhine-Alpine therefore also uses CIP to inform about the following line properties:

- Line category (UIC load model)
- Electrification
- Signalling type
- Intermodal Freight Code
- Interoperable Gauge
- Multinational Gauge
- Gradient

In CIP, this information is given on the map (link). The user can select the different categories (1) to see the applicable values on the whole corridor but also on single line sections by a click on the route (2). There is also the option to create and download overviews of the line properties along dedicated routes by using the dynamic tool "Find a route" (3).

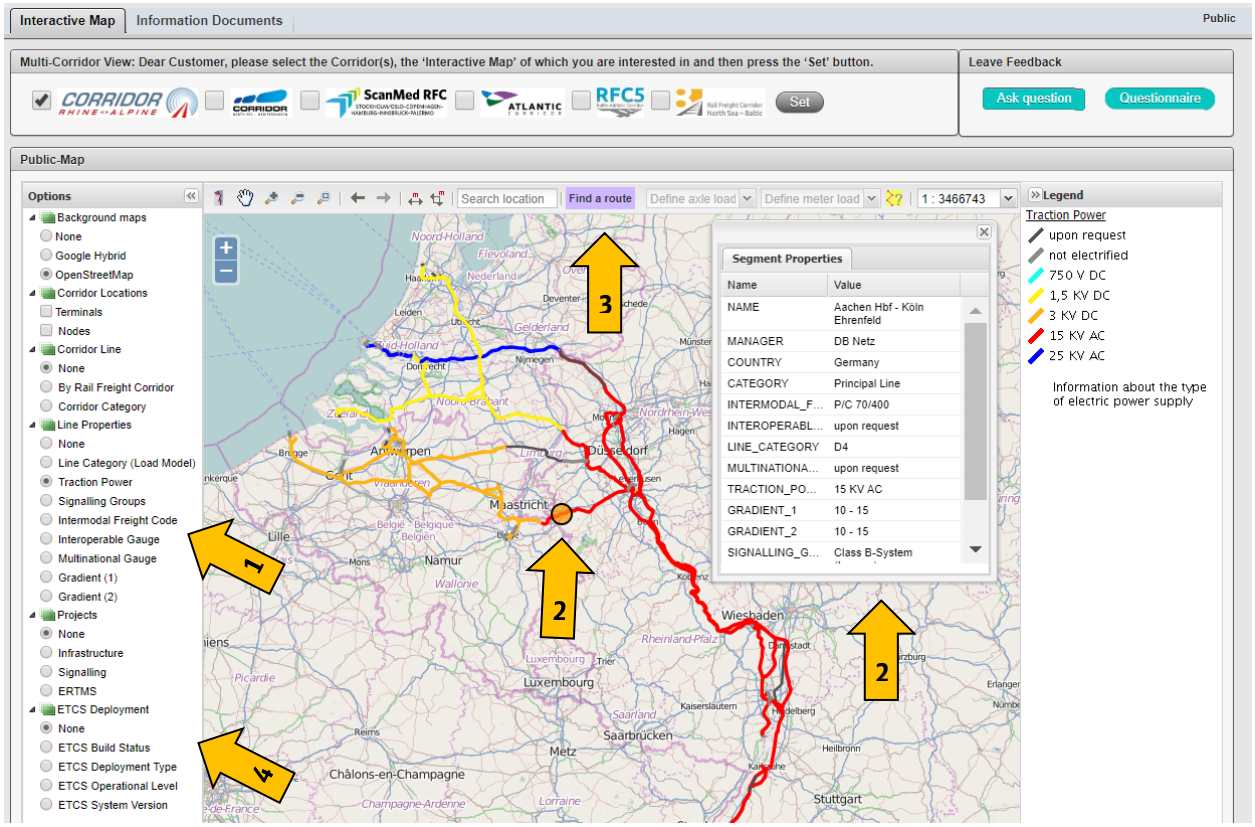

Figure 11: Information on key parameters on the map in CIP

Considering the infrastructure requirements set in Art. 39 of the Regulation (EU) 1315/2013 for TEN-T lines, RFC Rhine-Alpine informs as follows:

TEN-T requirement	included in CIP	Compliance with objectives
Electrification	X	all principal and most connecting lines A and diversionary lines are electrified
Axle load	X	included as parameter Line Category (UIC load model) in CIP. 22.5 t axle load fulfilled on all principal and connecting lines A
Line Speed		Design speed intended to be presented in CIP as soon as data from RINF data base are available via RNE
Train length 740 m		Status is regularly analysed for RFC Rhine-Alpine, see graphical overview in Annex 5A
Deployment of ERTMS	X	Separate category on the map in CIP (4), see also Annex 5D
Track gauge 1435 mm		all RFC lines fulfil this requirement

Figure 12: Compliance with TEN-T parameters

2.2 Corridor Terminals

According to the "Corridor Information Document Common Texts and Structure", the list of corridor terminals requested in Art 18 (b) of Regulation (EU) 913/2010 is published as book 3 of the Corridor Information Document as the single source to avoid redundancies. The current version of book 3 can be downloaded in CIP (link). Book 3 is updated annually per TT period.

2.3 Bottlenecks

In this Implementation Plan, capacity bottlenecks are defined as sections on the corridor, where the total demand for traffic (freight trains and passenger trains) exceeds or could exceed the available capacity on this section. So the study is focussing on the number of trains that can run. To compare the demand for capacity with the available capacity, the time period that is examined has to be defined. For a long-term capacity bottleneck study, often daily train figures are considered. But there is not a uniform way for counting used by all countries. Thus the capacity bottleneck analysis is based on national studies focussing on problems in line capacity on RFC Rhine-Alpine. Capacity problems in nodes and handover stations have been considered as far as dedicated studies have been available. In general, bottleneck analyses do not include additional capacity restrictions during the building phase of projects, that are realised to remove a bottleneck.

Chapter 6.2 Capacity Management Plan shows the latest capacity bottleneck analysis completed in 2017. It includes scenarios for the development until 2020 and 2025 based on the nationally planned investments on the corridor lines. In the next update the analysis will be extended with a scenario for 2030.

2.4 RFC Governance

According to the “Corridor Information Document Common Texts and Structure”, information on the actual RFC Governance structres (e. g. Executive Board, Management Board, Working Groups, joint offices) is given only in book 1 to avoid redundancies. Book 1 can be downloaded in CIP (link) under Information Documents.

3. Market Analysis Study

The latest Transport Market Study of RFC Rhine-Alpine has been carried out from May 2012 until December 2012. In accordance with Regulation (EU) 913/2010 an excerpt of this study - the essential elements - is available in annex 2 to the IP edition published in April 2015. A Transport Market Study focussing on growth drivers will be available in 2019.

4. List of Measures

According to Article 9 of Regulation (EU) 913/2010 in the initial Implementation Plan the measures for fulfilling requirements of Articles 12 to 19 were described, comprising one stop shop, capacity allocation, coordination of works, authorised applicants, traffic management, traffic management in the event of disturbance, information on the conditions of use of the freight corridor and quality of service on the freight corridor. After implementation of the Corridor the state of play and further development regarding concrete measures and procedures is decided by the Management Board and included in the CID book 4 “Procedures for Capacity and Traffic Management”. The basis for the capacity allocation part is the framework for capacity allocation (FCA) which is decided by the Executive Board.

Therefore the subchapters 4.1 – 4.6 are not applicable for updates. Book 4 can be downloaded in CIP (link). In chapter 5, in addition strategic objectives of the Management Board are defined, including “International Path Offer” and “Temporary Capacity Restrictions”.

4.1 Coordination of planned temporary capacity restrictions

See Book 4, chapter 4.

4.2 Corridor One-Stop-Shop

See Book 4, chapter 2.

4.3 Capacity Allocation Principles

See Book 4, chapter 3.

4.4 Applicants

See Book 4, chapter 3.2.

4.5 Traffic management

See Book 4, chapter 5

4.6 Traffic management in Event of Disturbance

See Book 4, chapter 5.3.

As a new measure, for disruptions longer than 3 days with a high impact on international traffic, RFC Rhine-Alpine with its member IMs/AB and related RFCs developed and implemented a handbook on International Contingency Management (link). The two main elements of the ICM handbook are an international re-routing overview on the one hand and a coordinated telco procedure on the other hand. The re-routing overview is consulted with railway undertakings. Further regular information on international contingency management is provided in book 4.

4.7 Quality Evaluation

Performance monitoring report

See Chapter 5 of this Implementation Plan

User satisfaction survey

See Chapter 5 of this Implementation Plan

4.8 Corridor Information Document

The Corridor Information Document (Art. 18), consisting of the books 1-5 has been elaborated according to the "Corridor Information Document Common Texts and Structure" and can be found in CIP under "Information Documents/Corridor Information Documents" for those RFCs using the CIP platform (link). So this chapter is not applicable for Implementation Plan updates.

According to the Sector Statement Declaration on Rail Freight Corridors ("Boosting International Rail freight", Brussels 20 May 2016), the RFC Network pushes further harmonisation of the CID to increase usability for customers (link).

5. Objectives and Performance of the Corridor

5.1 Objectives

The current objectives of the Management Board of RFC Rhine-Alpine are defined in the Memorandum of Understanding signed in June 2017 by the CEOs of the Infrastructure Managers/Allocation Body participating in RFC Rhine-Alpine (link). Based on the Sector Statement on Rail Freight Corridors[1] and to enable best use of new infrastructure developments, the CEOs set the focus on topics which will have a major impact in the next years to improve the competitiveness of their customers.

International path offer:

- Strong improvement of quality and quantity of the corridor's commercial offer
- Best use of current and future infrastructure capacity
- Implementation of the proposals of the RNE Task Force for improving the quality of the timetable offer

Temporary Capacity Restrictions (TCR):

- Full implementation of coordination processes according to RNE guideline
- Set up a coordination process for TCR during the running timetable
- Joint information from Infrastructure Managers on RFC Rhine-Alpine to customers regarding the impact of TCR on international train runs

Cross-border interoperability:

- Engage in improving seamless interoperability together with Railway Undertakings (RUs)/Railway Undertaking Advisory Group (RAG), EU Commission, Ministries of Transport, European Union Agency for Railways and National Safety Authorities regarding the priority topics mentioned in the Sector Statement

ERTMS Roll-out:

- Observe the roll-out of ERTMS on RFC Rhine-Alpine to identify crucial missing links, with specific focus on international train runs
- Identify challenges for RUs during and after ERTMS roll-out in the countries along RFC Rhine-Alpine and present the results to the respective partners (MoT, EU, NSAs) for them to take appropriate measures

Performance KPIs / performance reports

- Development and use of new measurement method for train performance management together with RNE
- Support from IM experts especially in the areas of operations and timetabling to solve identified punctuality problems

[1] See also chapter 4.8

International Contingency Management

The International Contingency Management has been added as additional focus topic in 2018:

- Quicker organisation of re-routings at both IMs and RUs; RUs are asked to prepare more flexible use of international deviation routes
- Increased capacity on deviation routes (from infrastructure measures)
- Improved day-to-day cooperation of national traffic management experts.

In addition to the focus topics, the signatories acknowledged the great significance of upgrading the infrastructure for 740 m trains and will strive to offer paths for 740 m trains along the whole corridor. Last but not least RFC Rhine-Alpine supports the idea to make information on Estimated Time of Arrival (ETA) available between all stakeholders in the rail freight transport chain.

5.2 KPIs and Performance

Train performance Management

The aim of the Corridor Train Performance Management (TPM) is to measure punctuality, analyse weak points and recommend corrective measures, thus managing the performance of international train services and improving punctuality across borders and handover points. See also book 4, chapter 6.

User Satisfaction Survey

Mandated by almost all the RFCs, RNE organises an annual User Satisfaction Survey among the users of the RFC, as requested by Art. 19(3) of the Regulation (EU) 913/2010. The results are presented to and discussed with all stakeholders in the Executive Board, the Railway Undertaking Advisory Group and the Terminal Advisory Group. The results of the survey are published on CIP (link)/ (see tab “Information Documents”).

Key Performance Indicators

The following KPIs published by RFC Rhine-Alpine are defined in the “RNE Guideline on Key Performance Indicators of Rail Freight Corridors”, which has been agreed on RFC level and in the RNE GA.

- Service level of the C-OSS (as defined in the FCA):
  - Volume of offered, requested and pre-allocated capacity by the C-OSS
  - Number of requested dossiers (clean and in conflict)
  - Volume of offered and requested reserve capacity at C-OSS
- International traffic volume
- Punctuality on RFC Rhine-Alpine

In addition RFC Rhine-Alpine publishes the following KPIs

- Modal Split Ports
- Modal Split Trans-Alpine Traffic

Further RFC KPIs and performance reports have been agreed between the RFCs/RNE and ECCO[2] group of the RAG speakers:

- Commercial Speed of PaPs
- Delay reasons
- Average dwell time at selected locations
- Number of trains affected and amount of delays caused by deviations from planned temporary capacity (under development)
- Ratio between the capacity allocated by the C-OSS versus the total allocated capacity (under development)

The Network of Executive Boards (NExBo) approved the selection and definitions on 7 February 2018. Some additional KPIs are still under development (in light green and red)

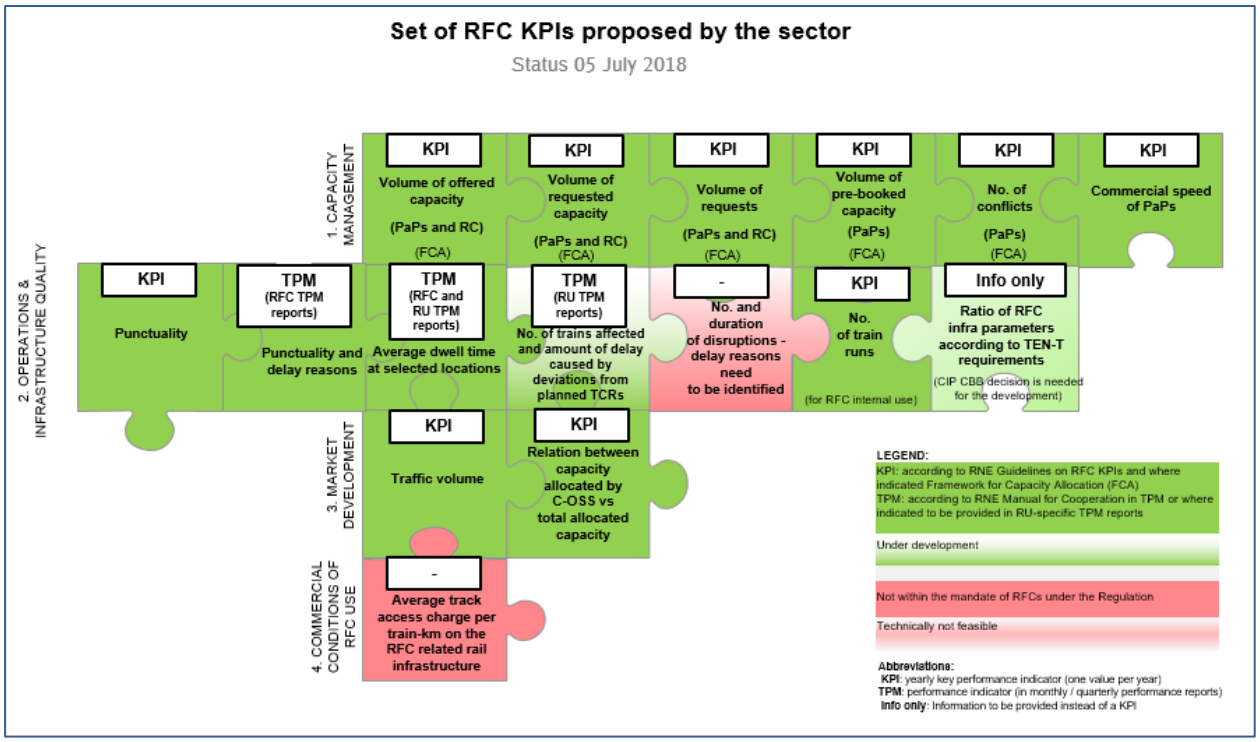

Figure 13: Set of RFC KPIs proposed by the sector

Publication

Information on KPIs is published in the Performance Monitoring Report which is part of the Annual Report on RFC Rhine-Alpine. The Annual Report is available on the RFC website (link to download area) and in CIP (link).

Furthermore, monthly KPI reports on punctuality are published since the beginning of 2018 in CIP/Information Documents/Key Performance Indicators/RFC Rhine-Alpine (link to CIP).

A joint reporting of the RFCs on KPIs is available on the website of RNE (link).

[2] Efficient Corridor Coordination Organisation

Definitions of the KPIs

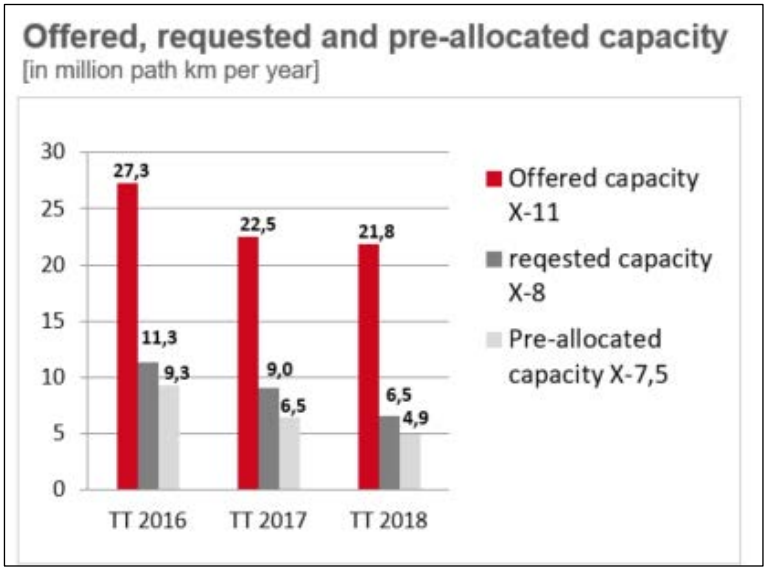

Figure 14: KPI Volume of offered, requested and pre-allocated capacity

Definition:
This indicator shows the volume of PaPs in the phases of PaP publication (X-11), PaP requesting (X-8) and PaP pre-allocation (X-7.5) in million path-km per year.

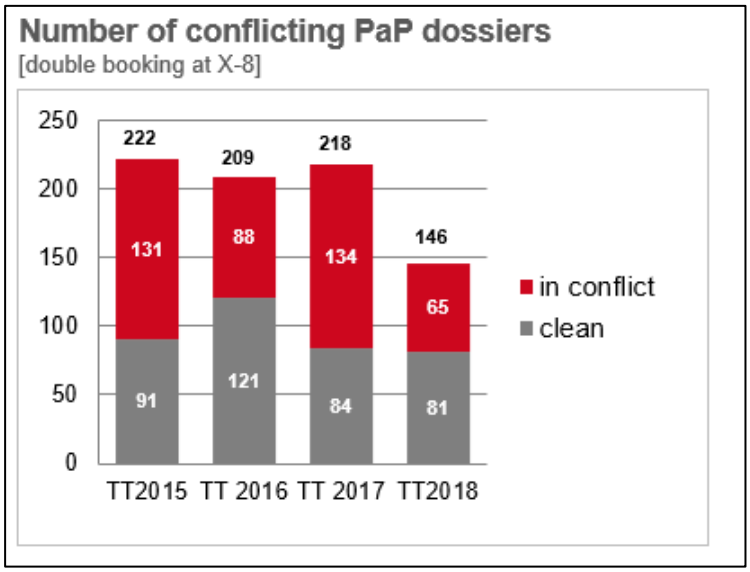

Figure 15: KPI Number of requested Dossiers, clean and in conflict

Definition:
This indicator shows the number of conflicting dossiers (path requests placed in PCS that referred to the same PaP on RFC Rhine-Alpine).

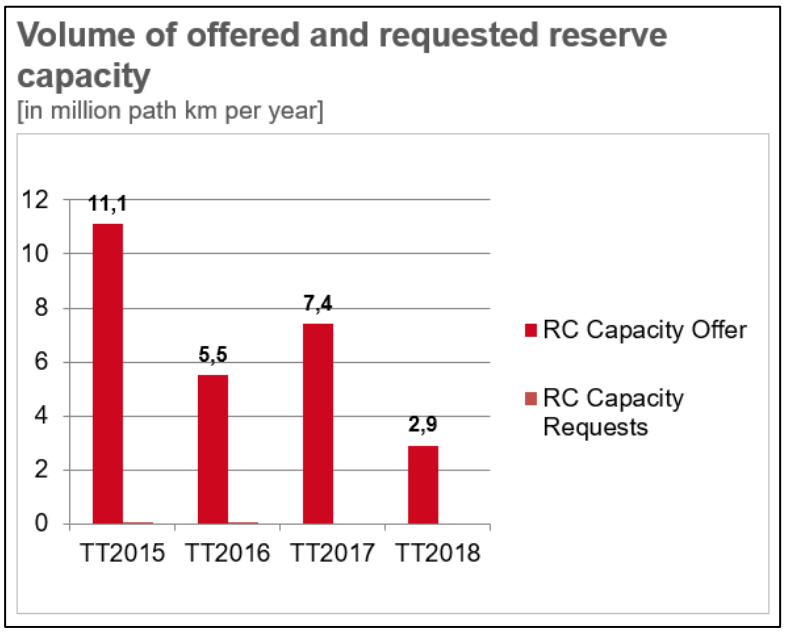

Figure 16: KPI Volume of offered and requested reserve capacity

Definition:
This indicator shows the volume of Reserve Capacity offered (X-2) and requested in million path-km per year (no requests so far).

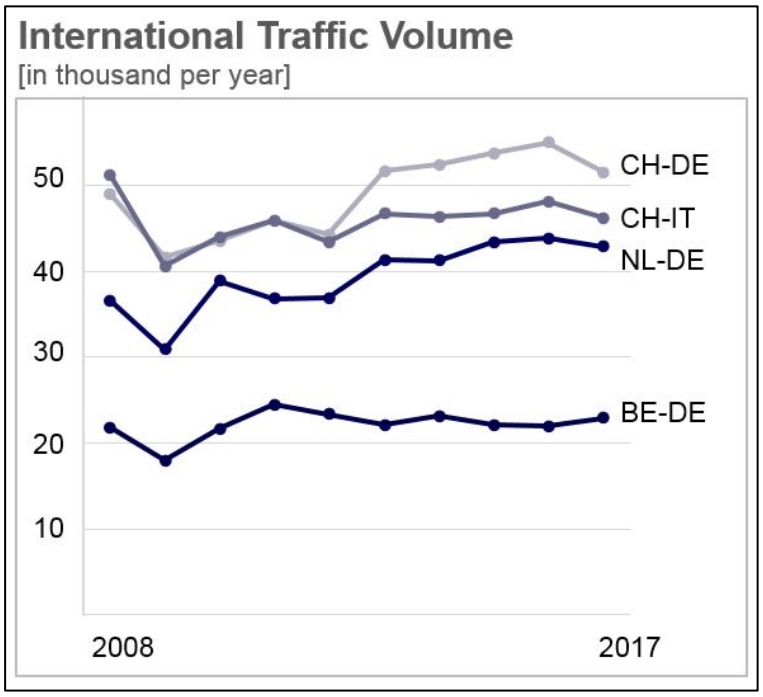

Figure 17: KPI International traffic volume

Definition:
Number of international freight trains per year crossing a border of RFC Rhine-Alpine in both directions, regardless of origin or destination. If several cross-border sections exist these have been summed.
The border crossing of Bad Bentheim is summarised with Venlo and Emmerich, although not assigned to RFC Rhine-Alpine. Due to the works, traffic between the Netherlands and Poland / Czech Republic is regularly shifted from Emmerich (NL/DE) to the Bad Bentheim border. This is the reason why (to keep figures comparable) also the border of Bad Bentheim is shown in this KPI.

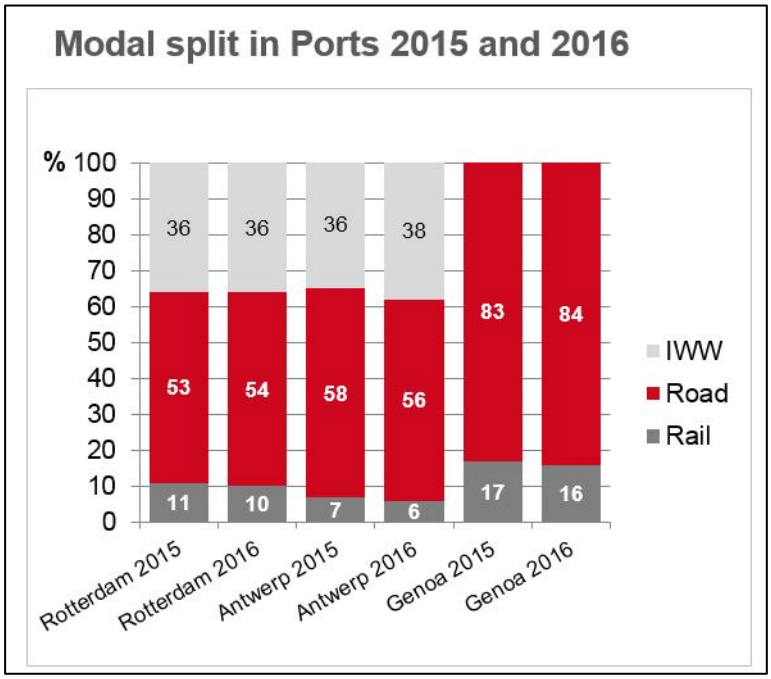

Figure 18: KPI Modal Split Ports

Definition:
Modal split [%] of freight traffic at Port of Rotterdam, Antwerp and Genoa;
the modal split is calculated for hinterland container traffic on the basis of TEUs (Twenty-Foot-Equivalent-Unit, a measure for container handling).

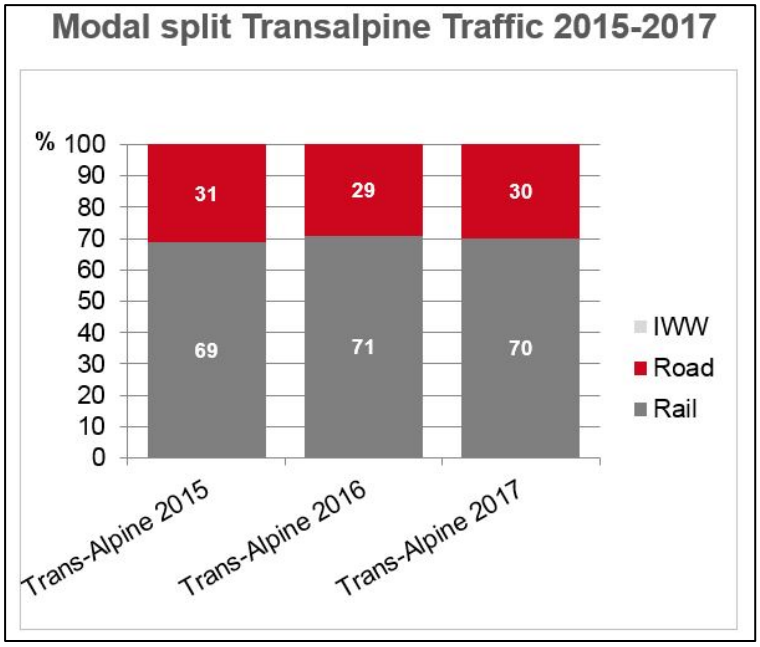

Figure 19: KPI Modal Split Trans-Alpine Traffic

Definition:
Modal split [%] for Trans-Alpine freight traffic crossing Switzerland is based on net tons.

Punctuality on RFC Rhine-Alpine

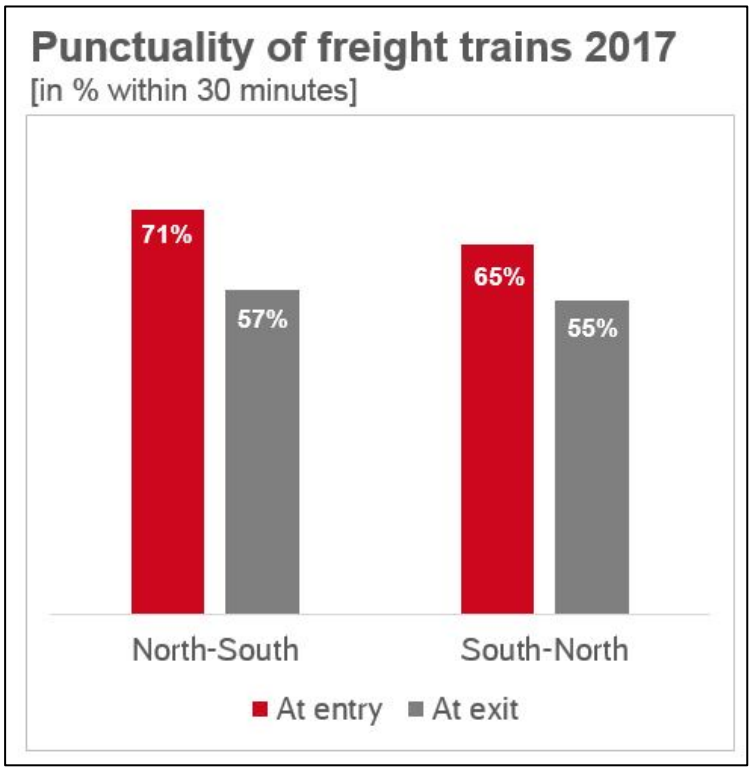

Figure 20: KPI Punctuality on RFC Rhine-Alpine

Definition:

2017 common RFC punctuality KPI based on RNE database (TIS). Considered are all international freight trains crossing at least one border and a defined point on the corridor.
Measured are the trains at their entry and exit points on the RFC by direction. In addition to the 30 minutes threshold used by the RFCs, a 15 minutes threshold which was decided at the Platform of Infrastructure Managers in Europe (PRIME), can be shown.

6. Investment Plan

According to Article 11 of the Regulation (EU) 913/2010 the Management Board shall draw up and periodically review an indicative investment plan. This chapter includes a list of the foreseen projects on the Rail Freight Corridor, details of the indicative medium and long-term bottleneck analysis and the deployment planning related to the interoperable systems (ERTMS) along the freight corridor.

Investments on the RFC Rhine-Alpine are based on national investment plans and correlate with the work plan developed for the Core Network Corridor (CNC) Rhine-Alpine. Projects may include EU-funding if applicable.
The CNCs are an initiative of the EU to implement a core network by removing bottlenecks, building missing cross-border connections and promoting modal integration and interoperability for passenger and freight traffic to turn Europe's patchwork of roads, railways, airports and canals into a 'genuinely European' unified trans-European transport network. The National Ministries are obliged to comply with the TEN-T requirements of the Regulation (EU) 1315/2013 on the defined network, including the deployment of ERTMS by 2030. As regards ERTMS the European Commission decided on a European Deployment Plan (2017/6/EU) which includes the corridor deployment by and beyond 2023.

RFC and CNC Rhine-Alpine cooperate to prioritise and promote planned investments (Figure 21) while the railway networks associated to CNCs and RFCs are not fully aligned.

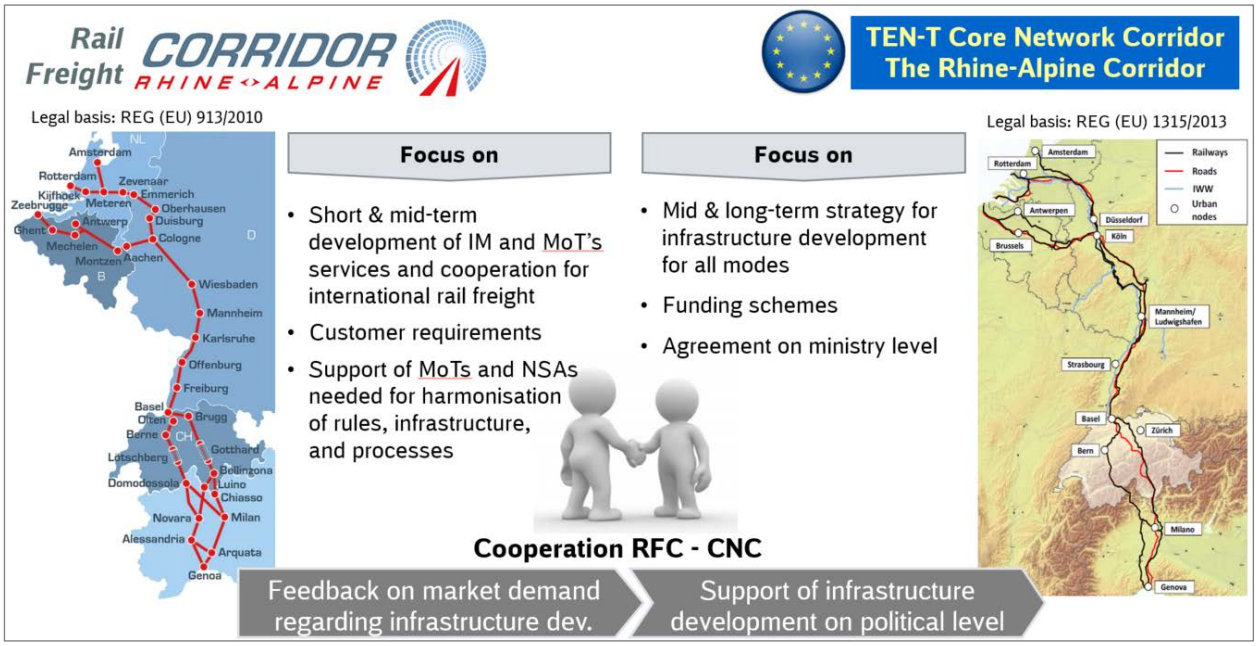

Figure 21: Cooperation RFC - CNC Rhine-Alpine

6.1 List of projects

In Art. 11, §1(a) of the Regulation (EU) 913/2010 it is requested that the investment plan includes a "list of projects foreseen for the extension, renewal or redeployment of railway infrastructure". The latest version of the RFC Rhine-Alpine list of projects is attached in Annex 5B.

The status of the decision-making on a project is a crucial element in the evaluation of potential future capacity bottlenecks. The decision-making processes on planning approval, building licence and financing are different from country to country. But using the available information on RFC Rhine-Alpine three stages are distinguished in decision-making:

How far is the decision making on a project	**Meaning**
Secured (S)	All necessary decisions are taken and money is available
Planned (P)	First decisions are taken and financial reservations are planned
To Be Decided (TBD)	Solutions how to solve problems are known, but no formal decisions are taken yet and financial funds are not yet known

For all the projects the decision status is mentioned in the list of projects in Annex 5B.

The project information is also available on the map in CIP (Figure 22):
By default all RFCs are shown when a user logs in. The RFC of choice can be selected by taking the other corridors out [1] and click on “set” to make the selection effective. Under line properties the user should use the default value “By Rail Freight Corridor” [2] or alternatively any other value under line properties to ensure the visualisation of corridor lines. Now the type of project (Infrastructure, Signalling or ERTMS) the user wants to see on the map can be selected [3]. If a project is assigned to a line segment a strap in green colour can be seen. If the user clicks on the segments or nodes on which a project is indicated [4], a window with more detailed information will pop up [5].

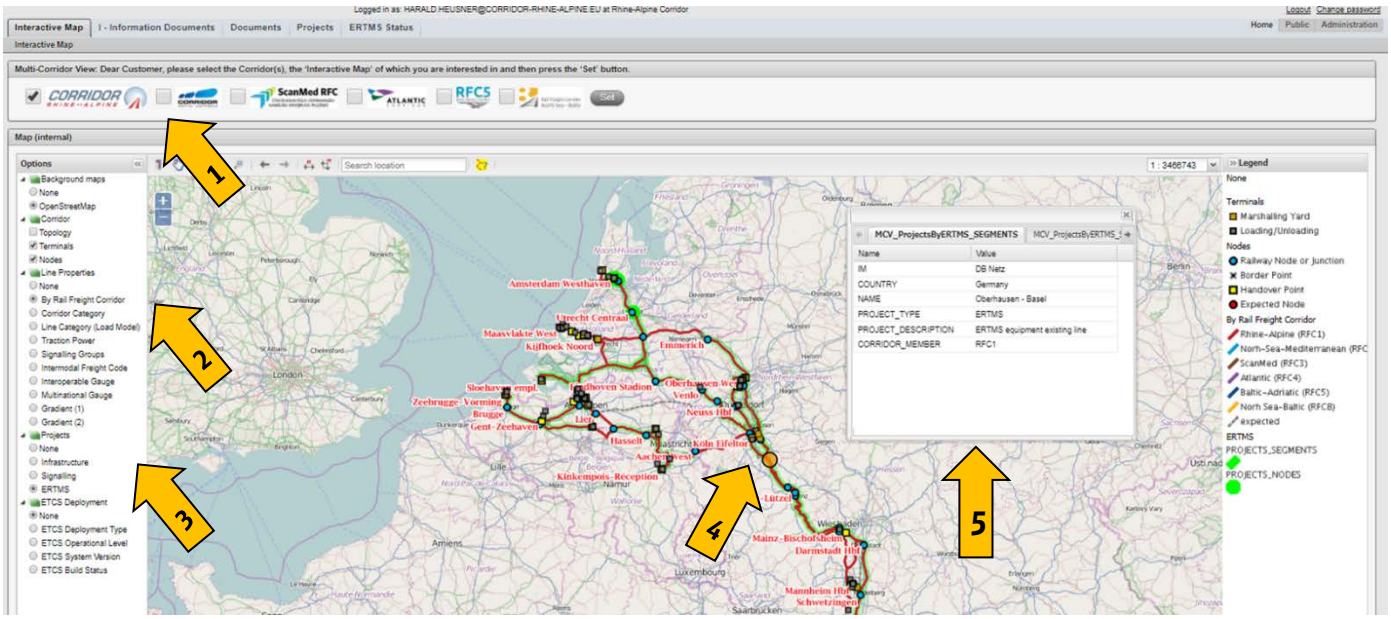

Figure 22 Visualisation of infrastructure projects in CIP

6.2 Capacity Management Plan

In the analysis of potential bottlenecks in future years, the information on the expected number of trains and the information about the expected go-live moment of projects is used. By combining this information with available capacity, bottlenecks can be identified. The latest Capacity Bottleneck Analysis (CBA) on RFC Rhine-Alpine from 2017, is attached as Annex 5C.

Based on the list of projects included in the CBA, three “what if” scenarios to show capacity bottlenecks have been developed with the aim to visualize the impact of the fact that in most cases not all decisions have been taken that are essential to realise the project.

The list of projects in the 2017 CBA reflects the status of projects and investments in 2016. As a consequence some information is outdated.
An update of the CBA based on the actual list of projects (chapter 6.1) is under way and expected to be released in 2019. It will be uploaded in CIP as soon as available.

6.3 Deployment plan (ERTMS)

Introduction

In order to keep up with the substantial technical progress in the frame of digitalisation as well as to prepare for the growing traffic demand and to offer the best quality for competitive rail freight services, the establishment of interoperability through a common European train control system is a paramount prerequisite. Subsequently, the implementation of ERTMS is part of the European policy.

The following chapter describes the ERTMS Deployment plan of RFC Rhine-Alpine, according to Art. 11, 1(b) of the Regulation (EU) 913/2010. Legally the deployment by the Member States along RFC Rhine-Alpine is based on the currently applicable European Deployment Plan (link to EDP) for the European Rail Traffic Management System which is included in the Commission Implementing Regulation (EU) 2017/6 of 5 January 2017. This Regulation lays down the timetable for the deployment of ERTMS on the Core Network Corridors (CNC) as set out in its Annex I schemes. In this context it has to be mentioned that the railway networks associated to CNCs and RFCs are not fully aligned.

Member States are also obliged to fulfil/implement the technical specifications for interoperability (TSI). Referring to section 7.4.4 of the annex to the Commission Regulation (EU) 2016/919 on the "Control-Command and Signalling" subsystems (TSI CCS), the Member States were asked to notify their national Implementation Plans (NIPs) to the Commission until 5 July 2017. The collection of the NIPs is published under the following address of the Commission (link to NIPs).

In addition to the EDP, on 14 November 2017 the EU Commission published a working document on actions and associated objectives to achieve interoperability and drive ERTMS deployment (Delivering an effective and interoperable European Rail Traffic Management System (ERTMS) – the way ahead) also known as ERTMS Deployment Action Plan. Therein it is specified that both, the CNC and RFC, which have as their constituent members certain of the addressed stakeholder groups (Ministries, NSAs and Infrastructure Managers), should also be used effectively to support ERTMS deployment.

With the aim to develop rail freight on its lines, the RFCs defined their role during the consultation phase in a joint statement in September 2017 as follows:

- Be a dialog platform for all stakeholders
- Act as an alert maker & moderator for the issues raised by its stakeholders
- Act as a forum to address technical issues with impact on operations tackled by its stakeholders.

With this in mind RFC Rhine-Alpine initiated in November 2017 a workshop with RUs and other stakeholders. The main findings were:

- Business cases for vehicle/On-Board Unit investments are mostly negative, especially for retrofitting
- The suppliers are often not able to deliver good affordable solutions for the retrofitting of On-Board Units (OBUs)

- Stable ERTMS roll-out planning and ERTMS specifications are required to reduce risks for investments in rolling stock
- Specific infrastructure measures on RFC Rhine-Alpine could improve ERTMS business cases for RUs (cost decrease/ simplification of loco use)
- "ERTMS only" is important for real benefits for the RUs as they can waive different national on-board systems.

The workshop documents can be found in CIP (link).

Details of the corridor roll-out planning

The following chapter contains details of the ERTMS deployment planning on RFC Rhine-Alpine. The information is indicative and can differ from the NIPs due to different update procedures, deadlines and dates for publication.

RFC Rhine-Alpine is based on the ERTMS Corridor A according to the TSI CCS 2012/88/EU, Chapter 7 (previous EDP), on which the Member States involved had to implement ERTMS on the assigned lines until the end of 2015 (or 2020 as defined in the TSI CCS). Belgium was not part of the ERTMS Corridor A, hence also not the connection from the German-Belgian border to the railway lines in the Rhine valley. This changed with the establishment of the RFC Rhine-Alpine in November 2013.
Joint coordination of trackside deployment on the ERTMS Corridor A was started in 2006. In the following years progress developed very differently. Today the ERTMS Corridor A has been merged with the RFC Rhine-Alpine and a new EDP has come into force covering the CNC, but the status of ERTMS deployment in each country along the RFC is still quite different due to the following context.

In **The Netherlands**, the deployment started on the Betuweroute between Kijfhoek and Zevenaar which was inaugurated in 2007 as a dedicated freight line only equipped with ETCS B2, SRS 2.3.0d. Between 2007 and 2015 the connection to the Port of Rotterdam (Havenspoorlijn with ETCS L1) and from Zevenaar Oost to the German border (ETCS L2) have been converted to ERTMS. No class B systems are available on the lines equipped with ETCS, which makes ERTMS equipment on the vehicle indispensable. In 2018, the challenge is that the vehicles using the Betuweroute have to be updated to a newer baseline (Baseline 3 release 2), which is the current standard for future ETCS installations.

The planning of ERTMS deployment on the other main railway lines is ongoing and not yet decided by the Parliament (expected in April 2019). The Dutch strategy includes the immediate removal of the class B-system on lines equipped with ERTMS. The draft national ERTMS roll out plan includes early OBU transition to ERTMS B3 enabling ERTMS only roll out on the infrastructure. Therefore ERTMS OBU roll out is prepared in a separate programme. ERTMS on the Rotterdam – Venlo route by 2029-2031 is under consideration in the Dutch National roll-out plan and will enable ERTMS only operations from that date.

In **Belgium**, the outlined ERTMS implementation of the corridor lines is part of a country-wide migration concept by 2022 in order to improve the safety level on the whole network. After the whole network is equipped, it is intended to remove the class B-system. All vehicles in Belgium have to be operable with ERTMS in the near future, whereby ETCS L1 and L2 B3 tracks shall be equipped with System Version 1.x to allow B2 locos. On the other hand, ETCS L1 LS B3 tracks shall be equipped with B3 System Version 2.x in order to allow the operations in Limited

Supervision. Consequently in order to permit B2 vehicles to still run on those lines, the TBL1+ system will be kept until the majority of the RUs running on those lines will have migrated to B3 as well. Nevertheless, the decommissioning of the Class B has been decided by a Royal Decree, ERTMS only operations are required by 16.12.2025.

In **Germany,** the release of SRS 3.4.0 was a major factor to start planning on the RFC lines as many interlockings still are not ready for a L2 installation. Due to the structure of the existing interlockings a mixed installation of L1 LS and L2 is planned. Nevertheless corridor lines (more than 1000 km track length) cover only a small part of the whole network.
Most of the vehicles in Germany are not equipped with ERTMS. Unlike the Netherlands or Belgium, at the moment ERTMS equipment of all vehicles is not foreseen. The existing class B systems, especially PZB, are planned to be operational in parallel to an ERTMS installation for a transition period.
When and where ERTMS only operations will be possible is not decided at the moment.

In **Switzerland**, the operation of ERTMS in L2 has already been well proven since years on the HSL line from Rothrist to Mattstetten, as well as on the Lötschberg base tunnel line and since 2016 the Gotthard Base Tunnel. In addition to the HSL lines, miscellaneous conventional ETCS L2 lines have been taken into service, mainly on the Gotthard route.
The existing class B systems ZUB and Signum have been substituted by an economical migration concept based on the deployment of the ETCS mode L1 LS. This concept substitutes the class B systems in CH without limiting operation of existing national vehicles and allowing the use of vehicles equipped with ERTMS at the same time (P 44). ERTMS only operations is already possible on the Swiss network (with subordinate exceptions).
Besides this, Switzerland has already completed major investments for equipping their fleet with ERTMS. Migration to B3 OBUs could also become a challenge due to the cost for retrofit of locos and the radio strategy for replacing GSM-R.

In **Italy**, the successful operation of ERTMS in L2 has already been well proven since years on the HSL network, connecting Torino – Milano – Bologna – Firenze and Roma – Napoli. For the conventional lines during the last years major investments had just been made for the upgrading of the class B system into SCMT, which is based on the use of balises thus presenting a good basis for the implementation of ERTMS. The corridor lines will be mixed level lines with ERTMS and the existing class B system. The operational scenario and the relevant risk management for the implementation of the ERTMS L1 and L2 (the choice depends on the existing signalling systems) have been defined. Starting with the expected Go Live of the border sections in 2019 RFC lines are expected to be equipped with ERTMS stepwise until 2026.
When and where ERTMS only operations could be possible is not decided at the moment.

RFC Rhine-Alpine ERTMS Deployment Planning state of play

Graphical overviews and maps on the state of play of ERTMS deployment planning are provided in Annex 5D. The corridor sections are shown with their planned completion dates, ERTMS deployment type, the system version, etc. as well as a “gap-analysis” and an overview on the border crossings.

Selected information on ERTMS deployment is also available on the map in CIP in the area ETCS Deployment on the bottom of the left-hand side of the screen and in the information documents

area (link). In the period until the next update of the Implementation Plan, the deployment overview in CIP will regularly be updated.

Current challenges:

- **Solutions on cross-border sections**

Today's existing ERTMS trackside installations in Europe are mostly implemented and managed by one infrastructure manager without crossing borders. On RFC Rhine-Alpine, ERTMS will be applied and operated internationally, including border crossings. However, the installation and authorisation of the trackside part is still in the hands of each Member State. The currently available ERTMS specifications, product developments as well as authorisation rules will be proven on RFC Rhine-Alpine in an international corridor environment. On the cross-border sections the interaction is much more complex due to different national technical requirements and different operational rules. Overview of the cross-border solutions can be found in Annex 5D (Figures 9 – 18).

Based on the NIPs, ERTMS only operations on the whole corridor cannot be expected before 2030. Nevertheless major parts of the corridor will be ready for ERTMS operations by 2023.

- **Closure of gaps between the networks and connection to important terminals**

ERTMS is only beneficial for vehicle owners and railway undertakings when they can remove class B equipment. This requires a seamless network of lines between the major ports, terminals and industrial loading facilities. Until 2023 the extension of trackside equipment on RFC Rhine-Alpine lines will constantly increase. However, some main line sections will not yet be ready for ERTMS operations. This will reduce benefits from the vehicle/on-board perspective (Figure 23). Further maps with gap analysis (trackside) can be found in Annex 5D (Figure 7, 8)

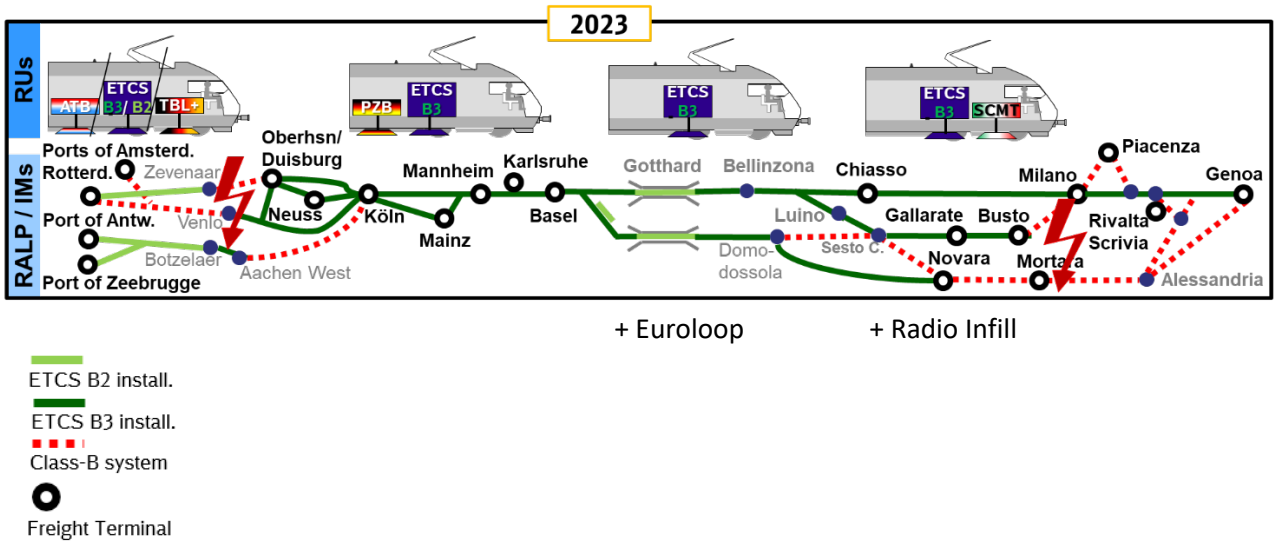

Figure 23 Gap analysis 2023 – on-board perspective

- **Equipment of rolling stock with B3 on-board**

The success of ERTMS is heavily depending on the availability of vehicles with the necessary on-board equipment. In this respect, the ministries and infrastructure managers of RFC Rhine-Alpine

support the vehicle owners by a regular monitoring of the ETCS deployment, by participation in selected sector working groups and other initiatives.

General issues of importance for the usage of ERTMS on RFC Rhine-Alpine

The following topics - which are naturally not part of the ERTMS deployment monitoring of an RFC – are relevant to achieve a fully workable interoperable ERTMS system and proper preparation of B3 OBUs for ERTMS operations.

1. **Vehicle authorisation process** (in the frame of the 4th Railway Package)

   Under the following link the implementing Regulation (EU) 2018/545 establishing practical arrangements for the railway vehicle authorisation and railway vehicle type authorisation process can be found.

   The European Union Agency for Railways developed a guideline on practical arrangements for the vehicle authorisation process. This document and further explanations on the vehicle authorisation regime that applies as of 16 June 2019 are available on its webiste.

   For vehicle owners it is important to know that from 2019 on, new vehicles have to be equipped with B3 OBUs if an ETCS installation is foreseen. Derogations have to be requested beforehand.

2. **Security of the on-board – track side communication (Key management)**

   ETCS L2 uses GSM-R for the exchange of data. GSM-R is an open communication carrier which needs to be protected. This is done by encrypted codes (keys). IMs organise Key Management Centres for the generation, distribution, storage and communication of the keys. Users shall take care of the procedures on a national level. In general RU/vehicle owner have to choose a Home KMC which will get in contact with the IMs.

   Key management can be done offline or online. At the moment only offline key management is offered by the IMs, although the technical specifications for online key management have been released (SRS 3.6.0, subset 114, 137). This may change when keys with unlimited lifespan will no longer be released due to an increase of ETCS vehicles. Limited lifespan of keys will raise efforts for the involved parties. This will support migration to online key management.

   Preparations to develop an online key management have been started at DB Netz, but it may be available only in certain areas of the network as long as the radio system is not ready for online key management of the vehicles.

Infrastructure Manager	Also Home KMC for RUs/vehicle owners	Key Lifespan	Link or contact person
ProRail	No		kmc@prorail.nl
Infrabel	No	5 year minimum	kmc@infrabel.be
DB Netz	Yes	Limited	link
SBB / BLS	Yes	Unlimited	Erich.Imhof@sbb.ch
RFI	Yes	Unlimited	kmc@rfi.it

3. Driver Machine Interface (DMI) language

The DMI as part of the on-board equipment is an essential element of ERTMS operations. Regarding the text messages, the requested language can be different from country to country. On RFC Rhine-Alpine the following national languages have to be respected:

The Netherlands:	English
Belgium:	Dutch, French
Germany:	German
Switzerland:	German, French, Italian (change of language inside CH)
Italy:	Italian

The DMI language is part of the settings a driver must type in during the start-up procedure of his locomotive. The basic settings remain until the end of mission. Nevertheless, the DMI language can be changed manually if the vehicle owner requested the option from the supplier. Usage of a non-agreed DMI language can lead to misunderstandings between driver and operation centre and in so far to safety issues. To ensure the use of the correct DMI language, IMs may request a change of the DMI language at borders in their bilateral cross-border agreements which have to be respected by RUs.

4. Operational Rules

When a train is operated under ERTMS, the respective national operational rules have to be respected. On cross-border sections additional or deviating rules may apply for the use of ETCS. The relevant provisions can be found in the bilateral cross-border agreements which are available at the national infrastructure managers (part of the operational regulations relevant for network access).

International ERTMS users have to take into account that the level of integration and harmonisation of operational rules is much lower in L1 than in L2 (e.g. change of braking curves at borders is included in L2).

With ETCS B3, the braking curve depends on train data and the parameters (national values) transmitted by the trackside. This is independent of ETCS L1 or L2. The main issue is how the brake percentage λis determined and in which mode a train is braked (P or G)

5. Radio technology

a) GSM-R
At present, radio frequency spectrum and migration from GSM-R to LTE is under discussion at national and European level. The future radio technology is an important element in the development of a high-performance L2 network including the urban areas. A change in the radio technology will have an impact on the vehicle equipment.

b) Transmission of information in L1 mode
In L1 mode data can be transmitted to an OBU by balises, Euroloop or Radio Infill. Transmission by balises is the standard configuration. On RFC Rhine-Alpine, Switzerland and Italy have chosen additional options. Switzerland uses Euroloop and Italy Radio Infill. In Italy, rolling stock equipped with B2 that has an STM (SCMT) does not need the Radio Infill functionality until SCMT will be decommissioned. Rolling stock with ETCS Baseline 3 OBUs need the Radio Infill functionality independent from an equipment with NTC SCMT. Regarding “Radio Infill” a 'Notified National Technical Rule' (NNTR) has been opened at ERA.

6.4 Reference to Union contribution

RFC Rhine-Alpine has been benefiting from European co-financing for several years. At the moment the corridor is receiving money under the following CEF Actions. More info can be found on the INEA website.

Project number	Project description
2016-PSA-RFC01	Support to the longterm development, governance and harmonisation processes of Rail Freight Corridor Rhine-Alpine within the European rail freight network compliant with the Regulation (EU) 913/2010
2014-DE-TM-0299-S	Support and coordination of Rail Freight Corridor Rhine-Alpine for its long term sustainable operation as required by the EU Regulations 913/2010,1315/2013 and 1316/2013 (link)

Figure 24 Union contribution on RFC Rhine-Alpine