Photo: Lithuanian Railways Infrastructure

RFC North Sea – Baltic

Corridor Information Document

Book 5

Implementation Plan

update 2020

Co-financed by the Connecting Europe Facility of the European Union

Rail Freight Corridor
North Sea – Baltic

Version Control

Version number	Chapter changed	Changes
Version for publication (12/10/2020)		

Rail Freight Corridor North Sea – Baltic

Table of contents

1.Introduction

Rail Freight Corridor North Sea – Baltic (RFC NS-B) went operational on the 10th of November 2015 according to Regulation (EU) 913/2010 of the European Parliament and of the Council of 22 September 2010 concerning a European rail network for competitive freight. At the start of the Corridor the extensions to the Czech Republic and Southern Poland (Katowice) were also included[1]. The initial RFC North Sea – Baltic ran through six EU Member States: starting in the North Sea ports of Antwerp, Rotterdam, Amsterdam, Wilhelmshaven, Bremerhaven and Hamburg spreading in central Germany through Aachen – Hannover/Berlin – Warsaw – Terespol (Polish-Belarus border) / Kaunas / Falkenberg – Prague / Wrocław – Katowice. Regulation (EU) 1316/2013 establishing the Connecting Europe Facility amended the annex of Regulation (EU) 913/2010 and foresaw an extension of the RFC NS-B to Riga and Tallinn at the latest by 10th of November 2020. The extension to Latvia and Estonia will become operational on the 12th of October 2020 at the time of the publication of the Corridor reserve capacity for timetable 2021.

The initial Implementation Plan of RFC North Sea – Baltic was approved by Decision of the Executive Board on the 13th of October 2015 and published on the 10th of November 2015. According to Art. 9(2) of the Regulation (EU) 913/2010, the Management Board shall periodically review the Implementation Plan. Taking this into account and given the extensions of the Corridor, an update was elaborated according to the common structure approved by RailNetEurope. The focus is on:

- Inclusion of Latvia (LV) and Estonia (EE),
- Changes to the routing decided since the first Implementation Plan and not yet formally integrated and additional changes due to new developments,
- Update of the Transport Market Study,
- Update on objectives and performance,
- Update of the Investment Plan,
- Update of the ERTMS Deployment Plan.

The update was elaborated by the Management Board, consulted with the stakeholders and approved by the Executive Board of RFC NS-B on the 15th of September 2020. It will be published on the 12th of October 2020.

[1] COMMISSION IMPLEMENTING DECISION (EU) 2017/178 of 31 January 2017 amending Implementing Decision (EU) 2015/1111 on the compliance of the joint proposal of the Member States concerned to extend the North Sea-Baltic rail freight corridor with Article 5 of Regulation (EU) No 913/2010 of the European Parliament and of the Council concerning a European rail network for competitive freight.

2. Corridor Description

RFC NS-B now runs through 8 Member States of the European Union: starting in the North Sea ports of Antwerp, Rotterdam, Amsterdam, Wilhelmshaven, Bremerhaven and Hamburg spreading into central Germany through Aachen – Hannover/Magdeburg/Berlin to Warsaw and the Polish-Belarus border in Terespol. A branch leads from Magdeburg to Prague via Falkenberg and Dresden. In Falkenberg starts the Southern branch in Poland to Wrocław and Katowice. Another branch leaves from Poznań to Kaunas and to Riga and Tallinn.

The designated railway lines of RFC NS-B are divided into:

1) Principal lines (on which Pre-arranged Paths (PaPs) will be offered);
2) Diversionary lines (on which PaPs may temporarily be considered in case of disturbances, e.g. long-lasting major construction works on the principal lines);
3) Connecting lines: lines connecting the Corridor lines to a terminal (on which PaPs may be offered but without obligation to do so);
4) Expected lines, i.e. any of above-mentioned which either are planned in future or under construction but not yet completely in service. Expected line can also be an existing line which shall be part of the RFC in the future.

In the following part a description of the Corridor with the changes in its routing is given since the start of the Corridor in November 2015.

Extension to Latvia and Estonia:

According to the amended Regulation (EU) 913/2010 the Corridor has to be extended from Kaunas to Riga and Tallinn by November 2020 at the latest. Since the Rail Baltica line (1425mm gauge) is not yet operational, the Corridor extension lines are part of the 1520mm gauge network and include (see Figure 2.1):

- A principal line from Kaunas to Riga and Tallinn
- A diversionary line from Kaunas via Vilnius, Daugavpils, Krustpils to Riga
- Connecting lines from
  - Vilnius to Kena,
  - Jelgava to Ventspils and Jelgava to Liepāja,
  - Tallinn to Port of Paldiski and from Tapa to Narva.

The future Rail Baltica line (1425mm gauge) is an "expected principal line" and until its realisation the specificities of the different track gauge system shall be considered in the establishment and operation of the Corridor.

In the 1520mm network, transport is organised according to the Agreement on International Railway Freight Communications (SMGS). The rewriting of transport documentation from SMGS to Convention concerning International Carriage by Rail (COTIF), or vice versa, is manual. This process is very labour-intensive and time-consuming. Noise charges or other noise prevention measures are derogated on the 1520mm network, due to the common 1520mm wagon park usage.

Latvia and Estonia undertake the capacity allocation process in cooperation with infrastructure managers of third countries on the 1520mm network and it has a significant impact on the schedule for capacity allocation in general.

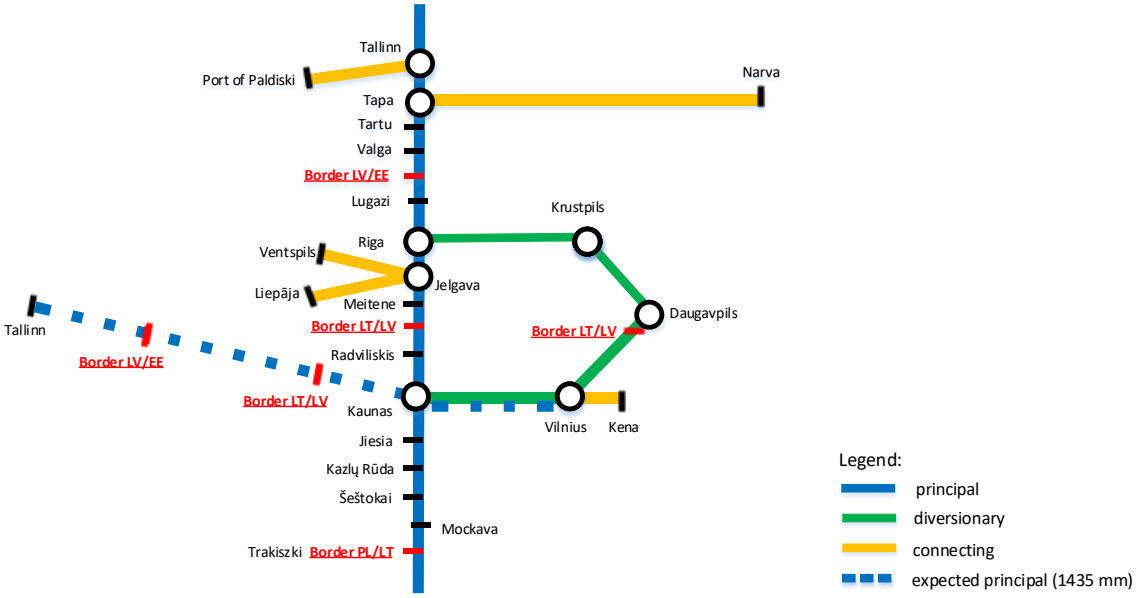


Figure 2-1: Extension of RFC North Sea – Baltic in Lithuania, Latvia and Estonia by 12th October 2020.

Changes to the routing decided since the first Implementation Plan and not yet formally integrated and additional changes due to new developements

On 14th September 2016 the ExBo decided[2] several changes on the routing and line status for TT 2018 regarding the following routes:

- Amsterdam/Antwerp – Bad Bentheim – Löhne;
- Amsterdam - Meteren;
- Magdeburg – Berlin via Brandenburg.

The decision was published but the Implementation Plan was not formally adapted.

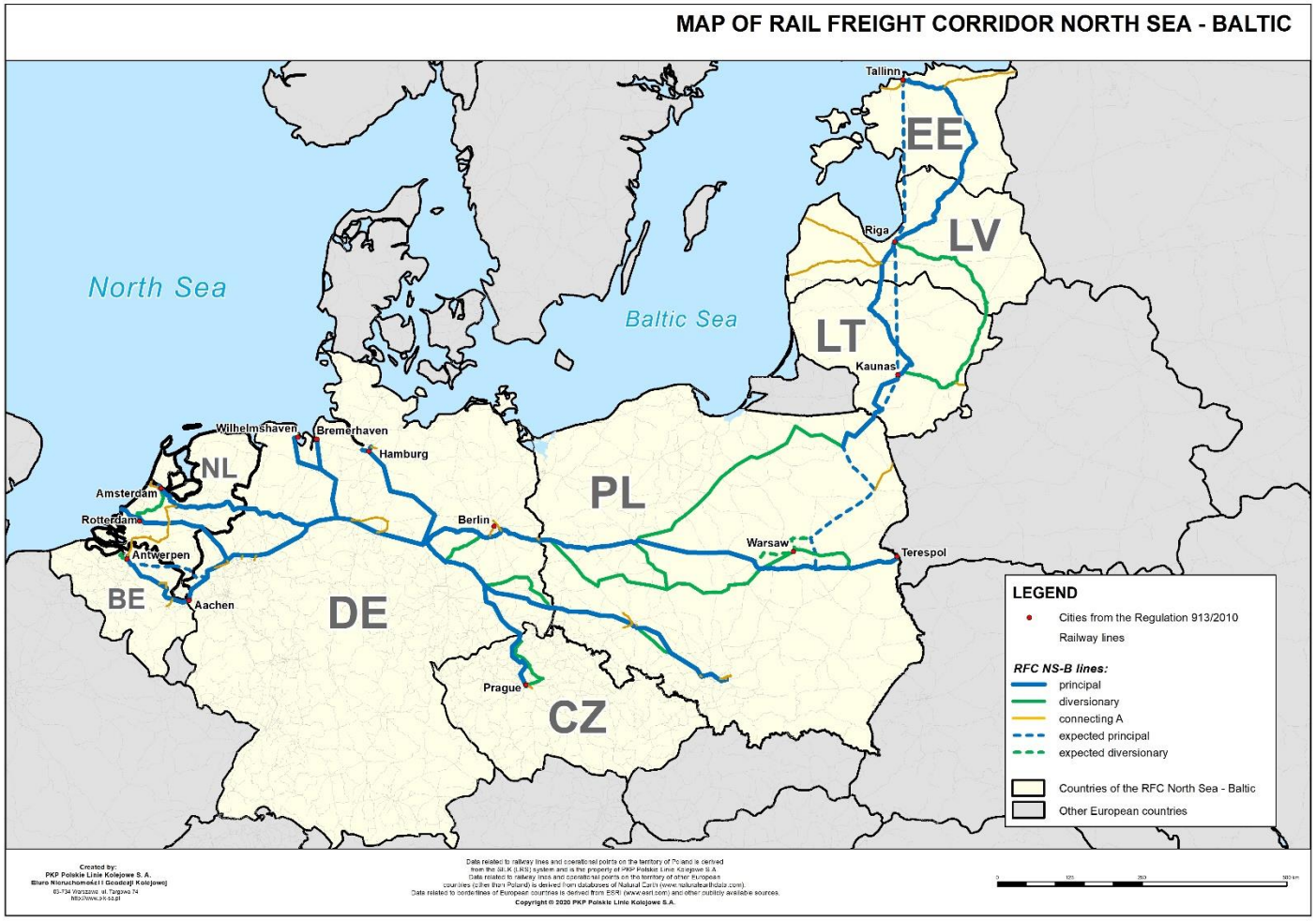
Other changes due to infrastructure developments or new developments are also formally integrated in this version of the Implementation Plan:

- The line from Knappenrode to Horka was upgraded (electrified and second track), re-opened in December 2018 and PaPs were offered on this route from TT2019. Therefore, the status of the line changed from “expected principal line” to “principal line”.
- The section between Swarzędz and Łowicz was launched after modernization in December 2019 and PaPs were offered on this route from TT2020. Therefore, the status of the line changed from “expected principal line” to “principal line”.
- The connecting line from Praha Malešice to Praha Žižkov is no longer a Corridor line and was removed.

The lines that are part of RFC North Sea – Baltic are shown on the map below (Figure 2-2) and listed in Annex 1. These lines will also be shown in CIP. Figure 2.1.1 (Chapter 2.1) shows the current lines and their status in a schematic way.

2 Decision of the Executive Board of the RFC North Sea Baltic approving modifications in the Implementation Plan for TT 2018.pdf

Figure 2-2: Map of RFC North Sea – Baltic in 2020 (status as of the 1st of September 2020).



Futher extensions are foreseen or being planned for the future. A description can be found below.

Proposed extensions

Since the implementation of the Corridor in November 2015, RFC NS-B formally received a number of requests for new extensions, which are not foreseen by the Regulation (EU) 913/2010. These extensions need to follow the procedure described in the Regulation. The Member States need to send jointly a letter of Intent to the European Commission including a proposal of the new routing drawn up after consultation of the Infrastructure Managers and applicants concerned. After examining the proposal, the European Commission will approve (or not) the extension by an Implementing Decision.

The proposed extensions concern the following sections:

- The section from Katowice to Medyka (Polish- Ukrainian border)
- The lines to the ports of Ghent and Terneuzen (part of North Sea Port)
- The inclusion of the port of Zeebrugge.
- The sections from Riga via Krustpils to Daugavpils and Rezekne as principal line. .

The Management Board analysed the proposed extensions based on the extension methodology developed by all RFCs and consulted applicants. The Executive Board sent a Letter of Intent for the extension to Medyka and the Belgian and Dutch ports to the European Commission on the 6th of December 2019 and a letter to Rezekne will be sent. If a positive answer is received from the European Commission, these lines will be formally included into the routing of RFC North Sea – Baltic.
These lines are included in **Figure 2-3** as “proposed extensions” but are not yet officially part of the Corridor.

Operational extensions

In November 2018, RFC Orient/East - Med was extended from Prague/Kolin towards the German ports of Bremerhaven, Wilhelmshaven, Hamburg and Rostock as foreseen by the Regulation. This led to overlapping sections with RFC North Sea – Baltic, except for Rostock and Kolin.

In view of the offer and allocation of capacity on these lines, RFC NS-B decided together with the RFC Orient/East-Med on an operational extension of RFC North Sea - Baltic

- between Dresden and Rostock as well as
- between Lysá na Labem and Kolin.

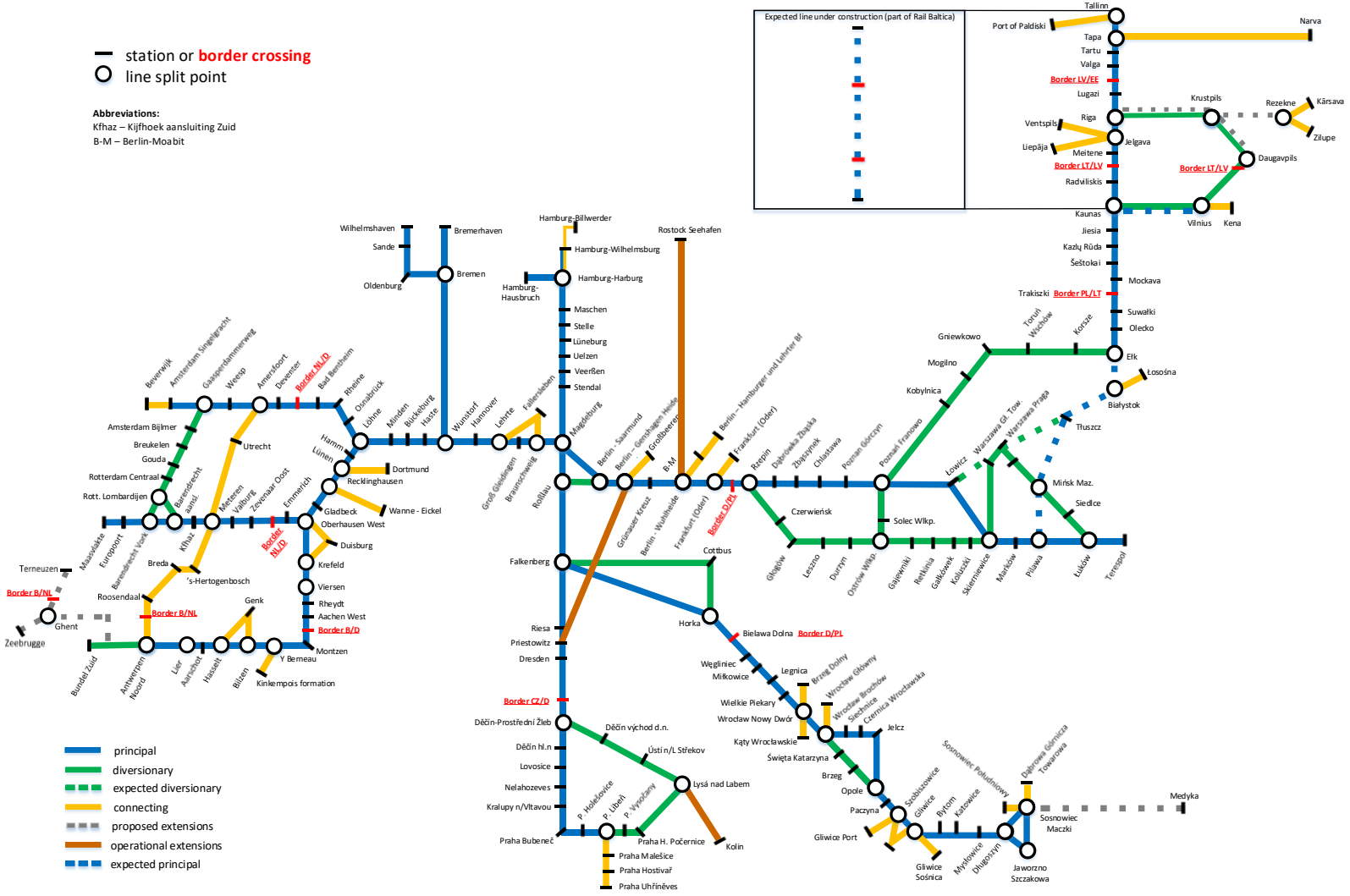
These operational extensions lines will not be included into the RFC North Sea – Baltic routing, but the Corridor One-Stop-Shop (C-OSS) of RFC NS-B is responsible for allocation/capacity management on these sections. These sections can be seen in Figure 2-3 as “operational extensions”, but are not officially part of the Corridor.

Both proposed and operational extensions are shown for information purposes only. In the following chapters of the Implementation Plan only the current lines will be shown.

"Iron Rhine"

Iron Rhine is mentioned as expected principal line in RFC NS-B. In the case (political) decision making on the Iron Rhine is executed, and the Iron Rhine would be reactivated, then the status will be principal line.

Figure 2-3: Possible future lines of RFC North Sea-Baltic

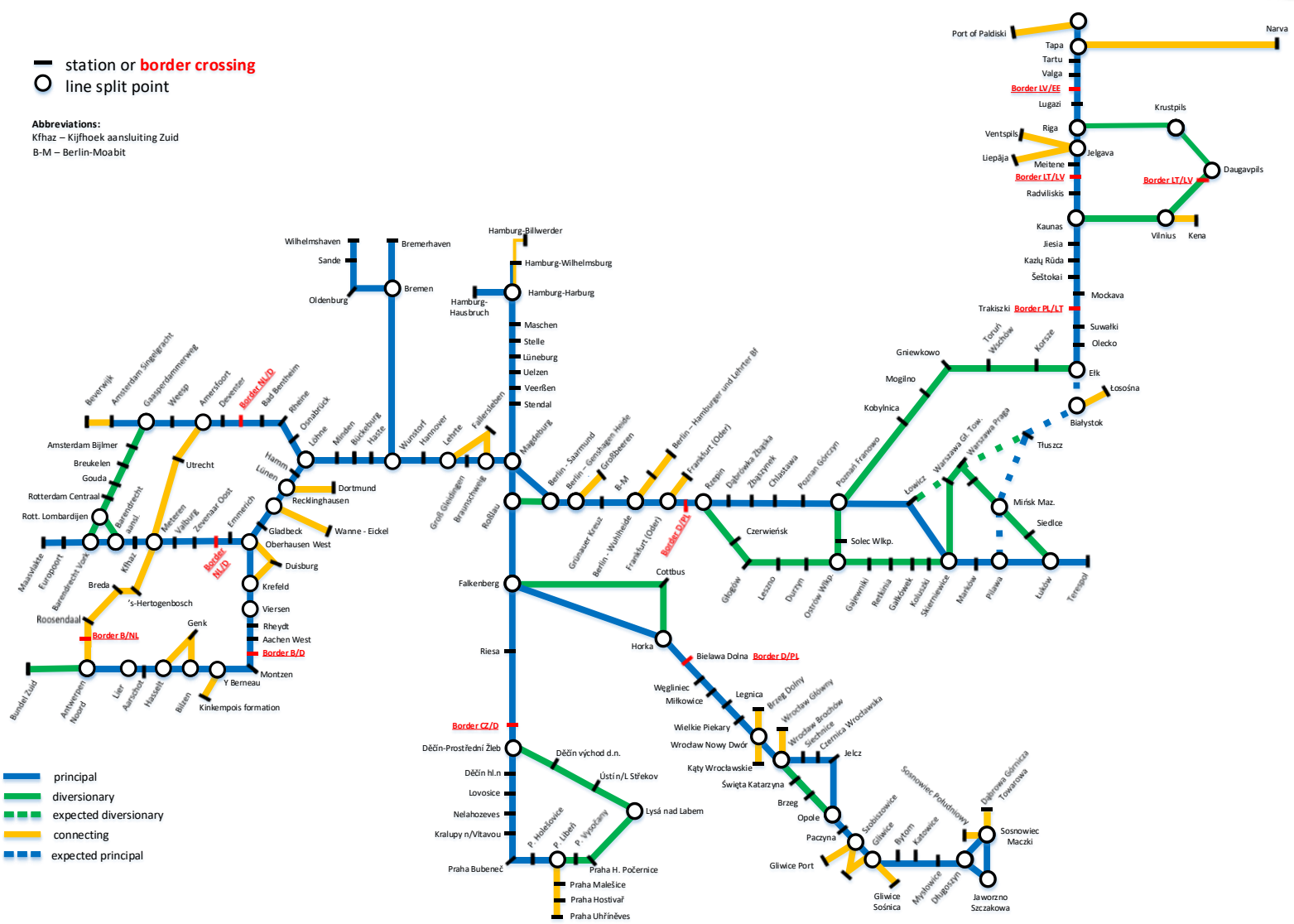


2.1 Key Parameters of Corridor Lines

Figure 2-1-1 shows the lines that are part of RFC NS-B in 2020 (status as of 1st of September 2020) with their status (principal, diversionary, connecting, expected principal).

RFC NS-B now has 8 964,30 km of lines in total, of which 4 480,32 km principal lines, 2 524,95 km of diversionary lines, 1 008,24 km of connecting lines and 950,74 km expected principal and expected diversionary lines.

Figure 2-1-1: Type of lines



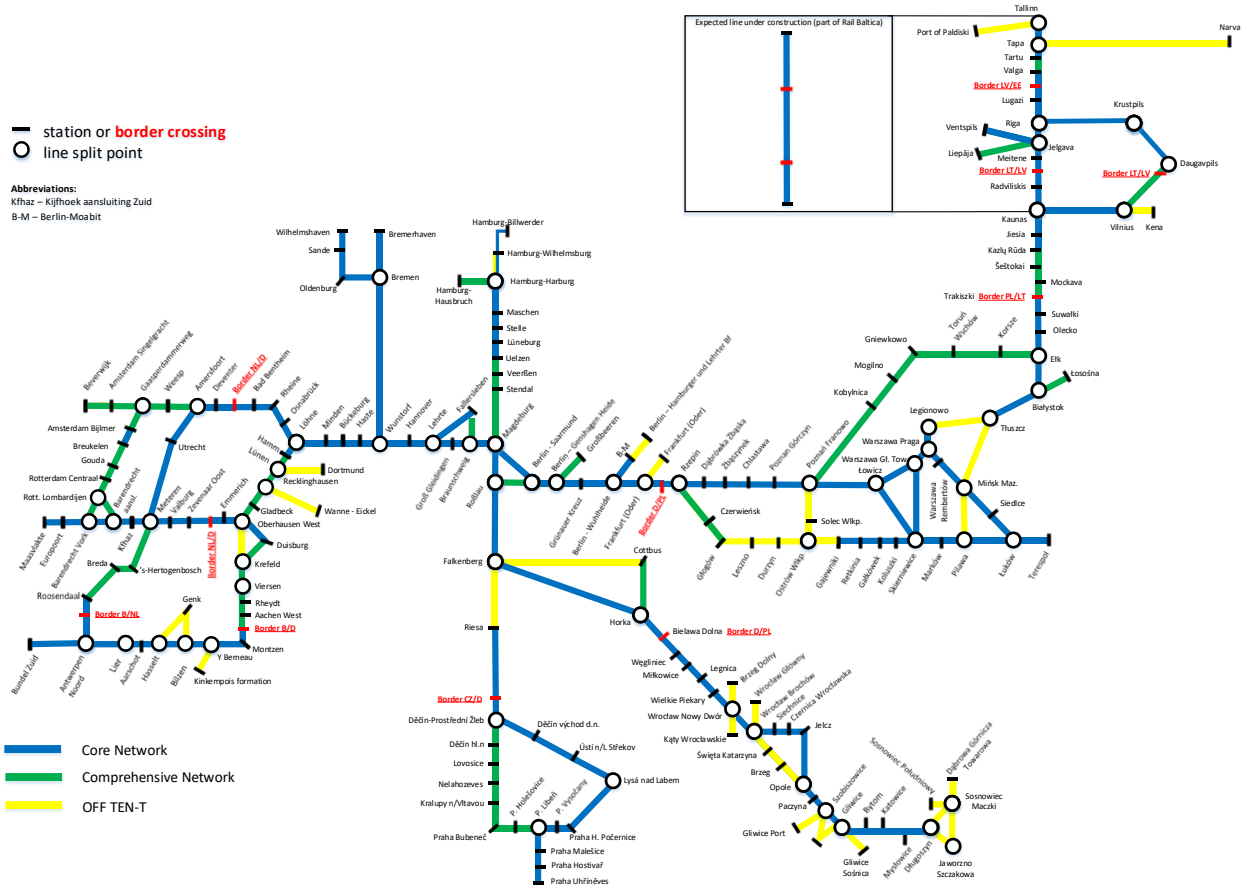
2.1.1 Infrastructure parameters

Figures 2-1-2 until 2-1-8 show several infrastructure parameters of the lines belonging to RFC NS-B in 2020 (status as of 1st of September 2020):

- Type of network (Figure 2-1-2)
- Number of tracks (Figure 2-1-3)
- Type of power source (Figure 2-1-4)
- Max train length (Figure 2-1-5)
- Axle load (Figure 2-1-6)
- Max line speed (Figure 2-1-7)
- Profile and loading gauge (Figure 2-1-8).

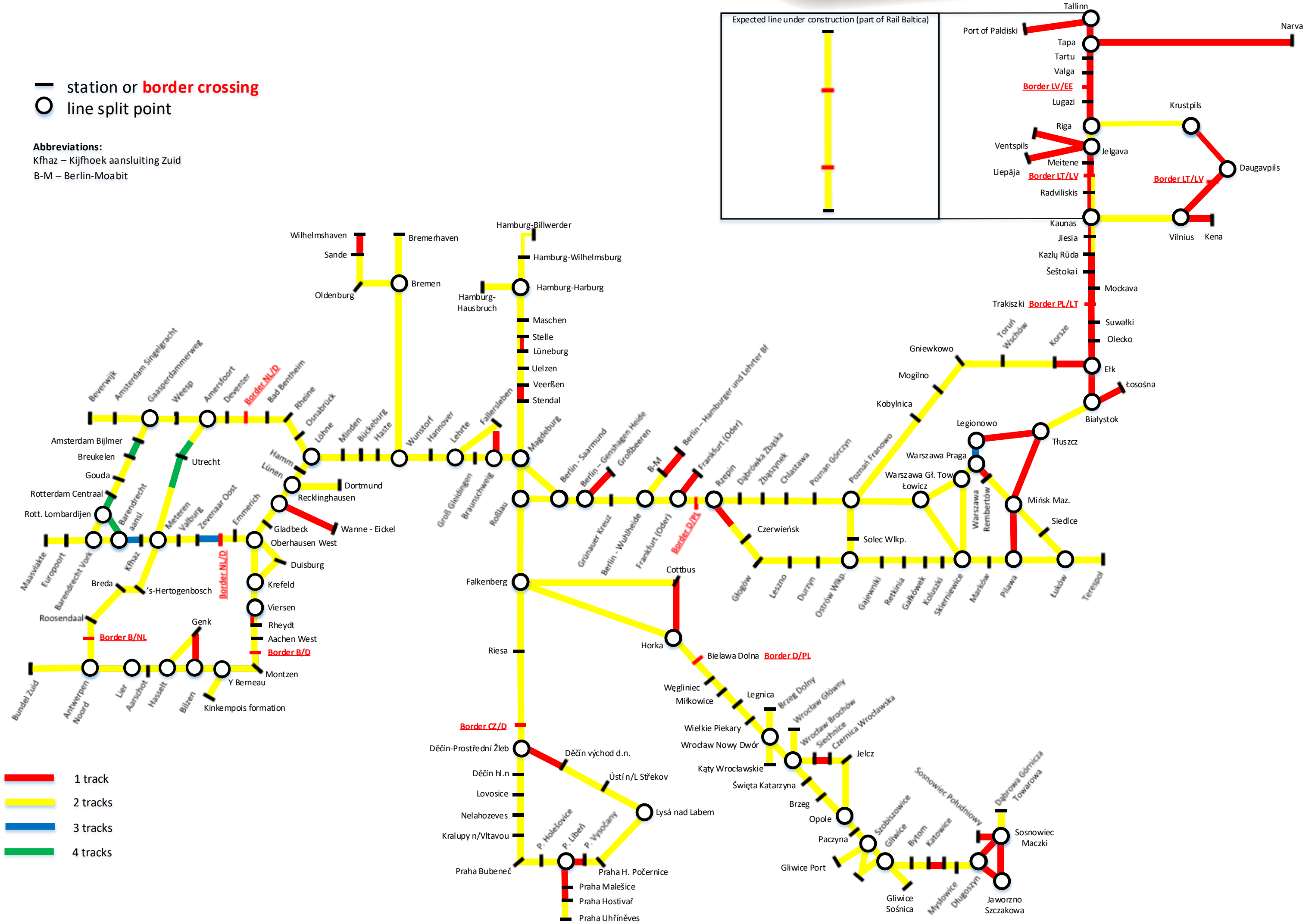
Latvia and Estonia undertake the capacity allocation process in cooperation with infrastructure managers of third countries on the 1520mm network and it has a significant impact on the schedule for capacity allocation in general.

Figure 2-1-2: Type of network according to the Regulation (EU) 1315/2013



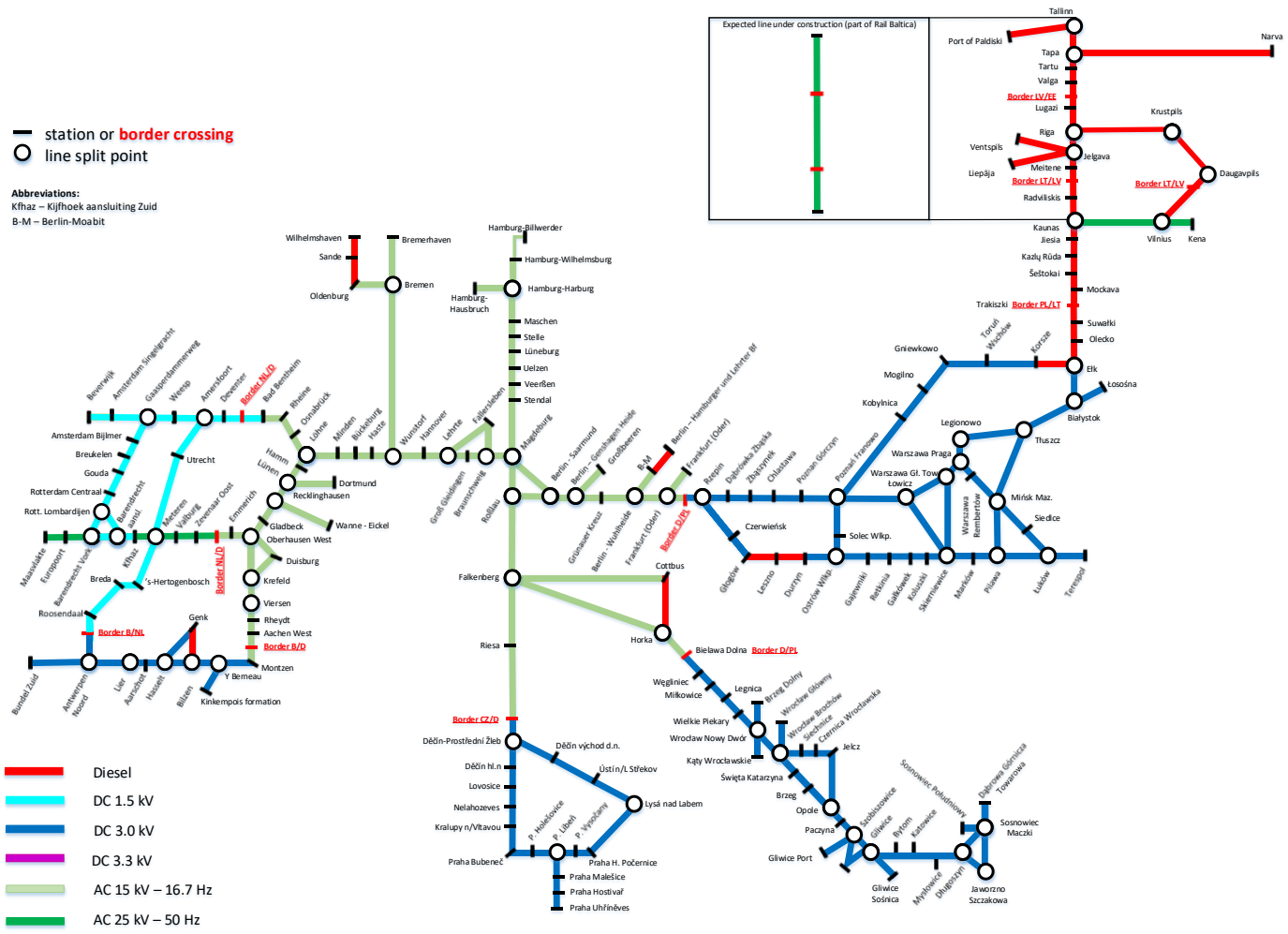
The majority of the corridor lines (principal/diversionary lines) are part of the TEN-T core network. However there are a number of lines that belong to the TEN-T comprehensive network. In a few cases the lines are out of the TEN-T network (this mainly concerns connecting lines).

Figure 2-1-3: Number of tracks



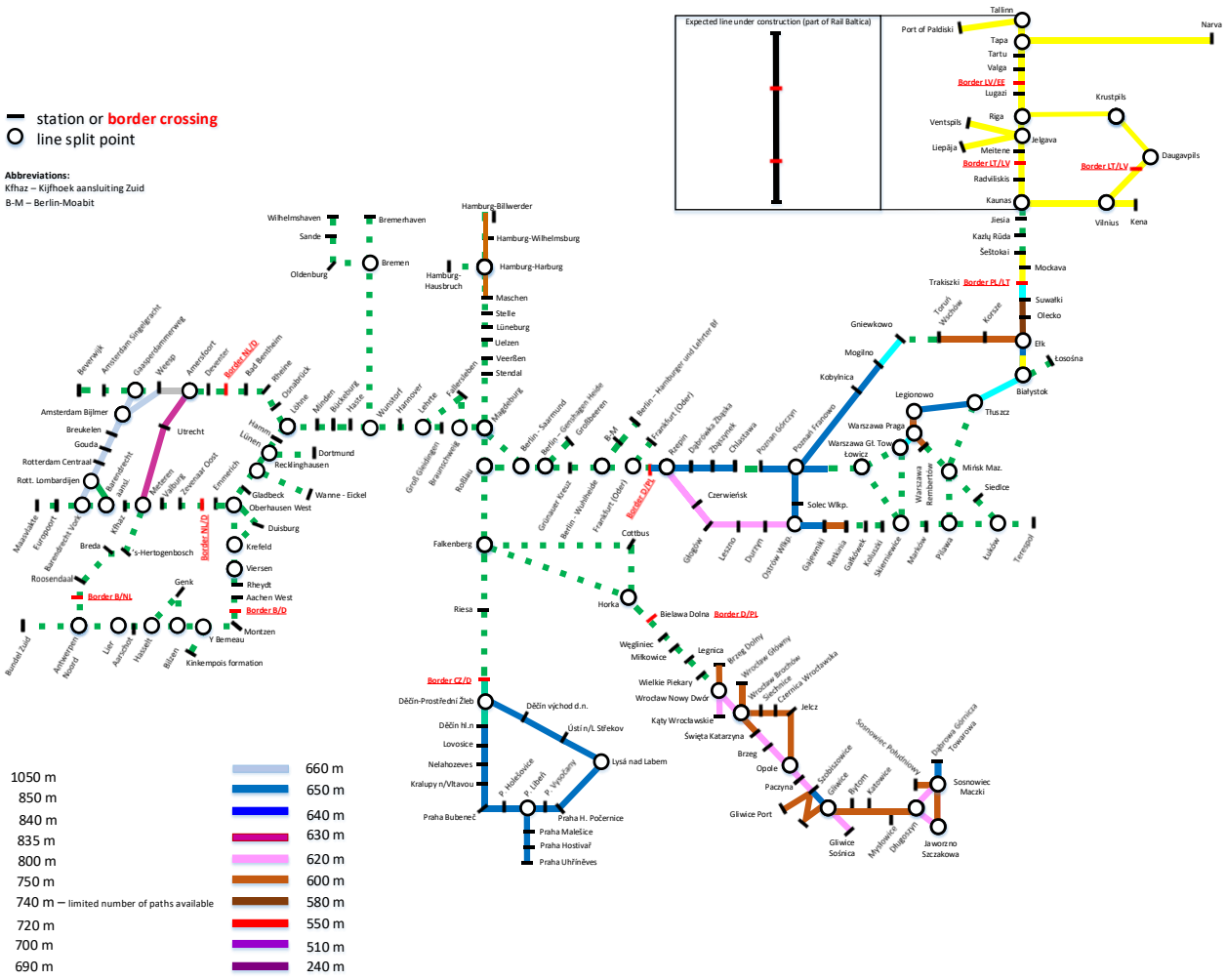
The majority of the corridor lines are double track lines, except in Lithuania, Latvia and Estonia. The future Rail Baltica line will be double-track.

Figure 2-1-4: Type of power source



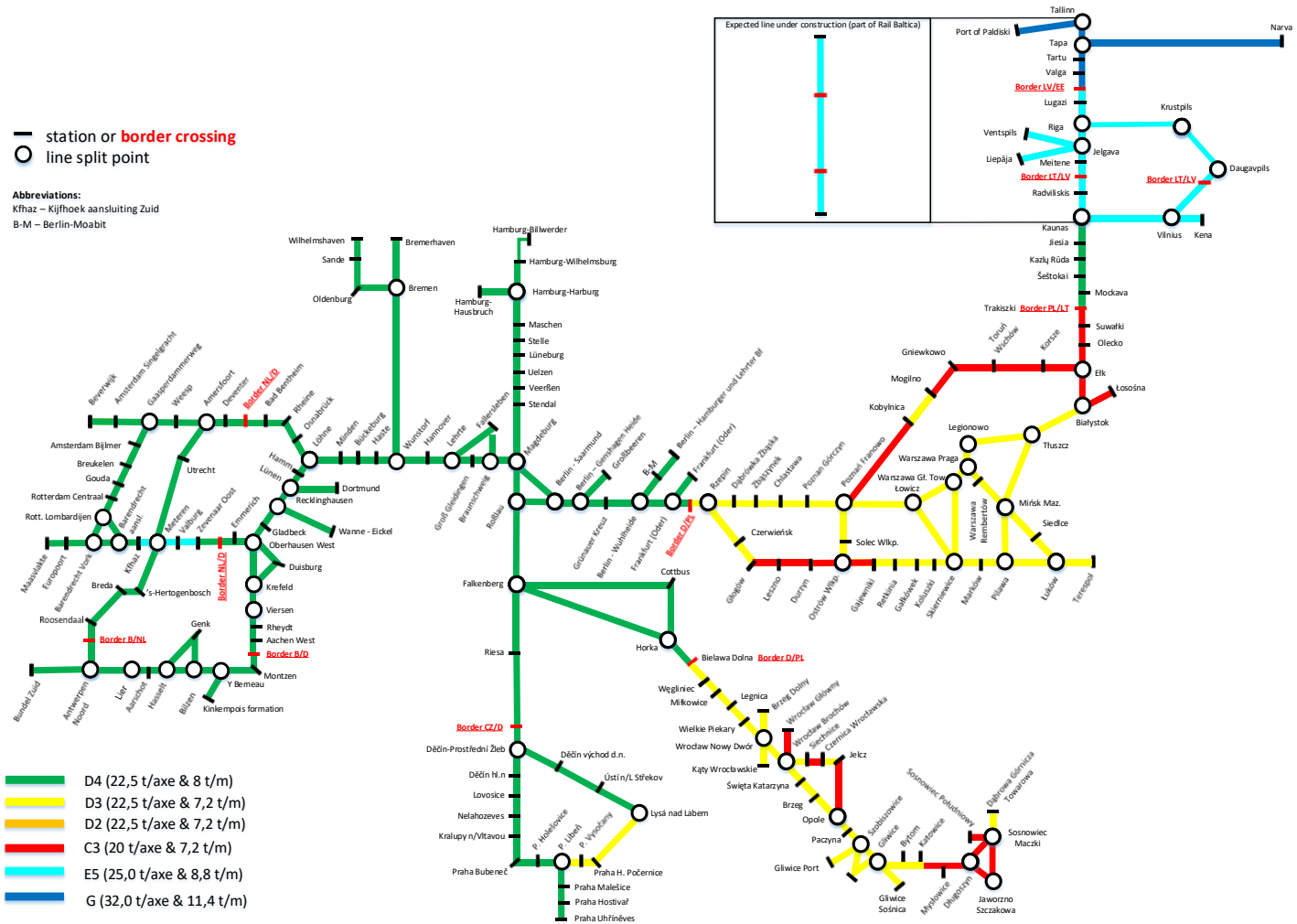
Almost each country has a different voltage and frequency value. A significant percentage of the route in Lithuania, Latvia and Estonia is not electrified.

Figure 2-1-5: Maximum train length



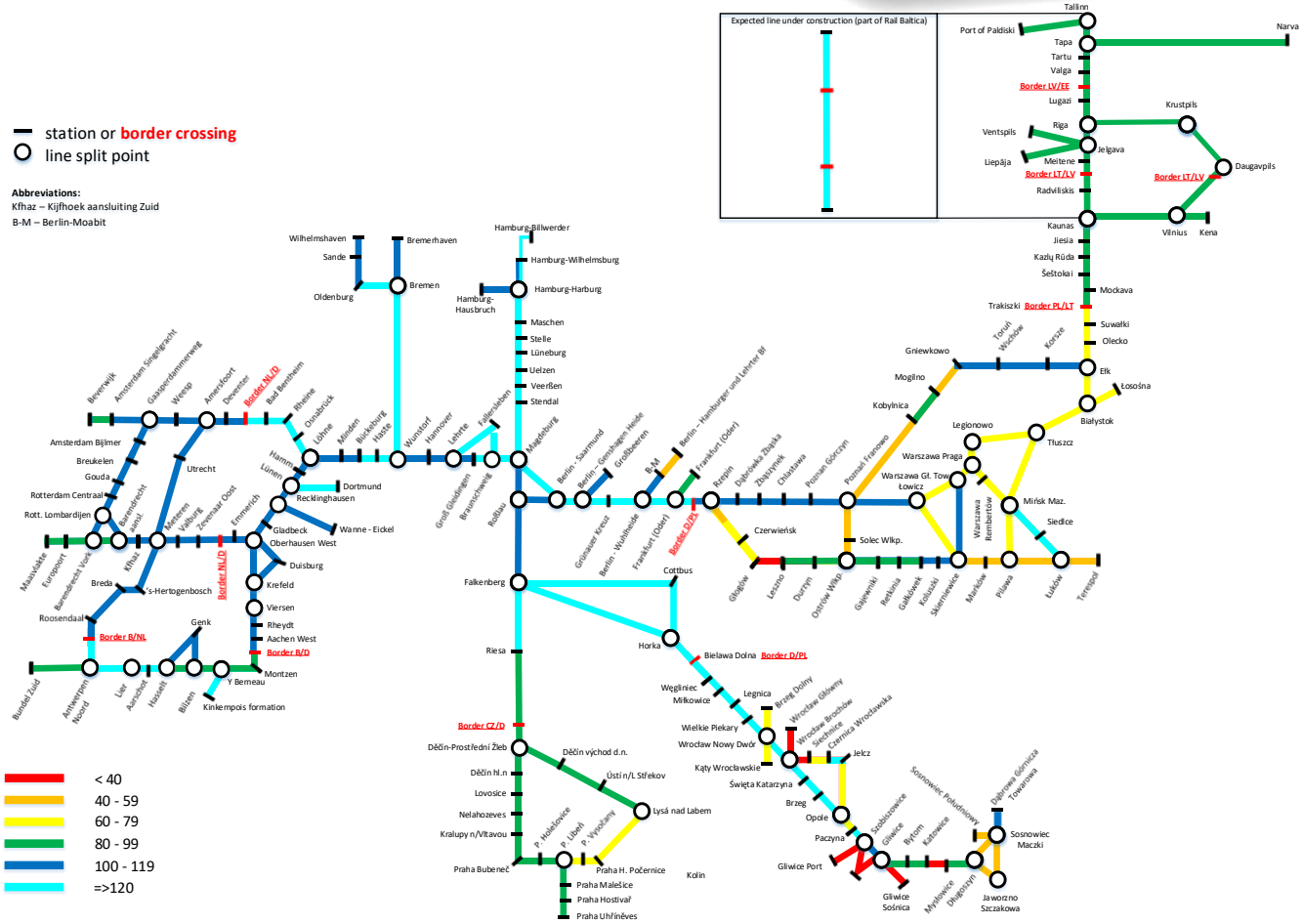
The maximum train length on the corridor lines varies from 1050 m to 240 m. At the moment of writing the Implementation Plan, journeys for 740 m trains on the entire corridor without restrictions are not possible, except for Latvia and Estonia.

Figure 2-1-6: Axle load



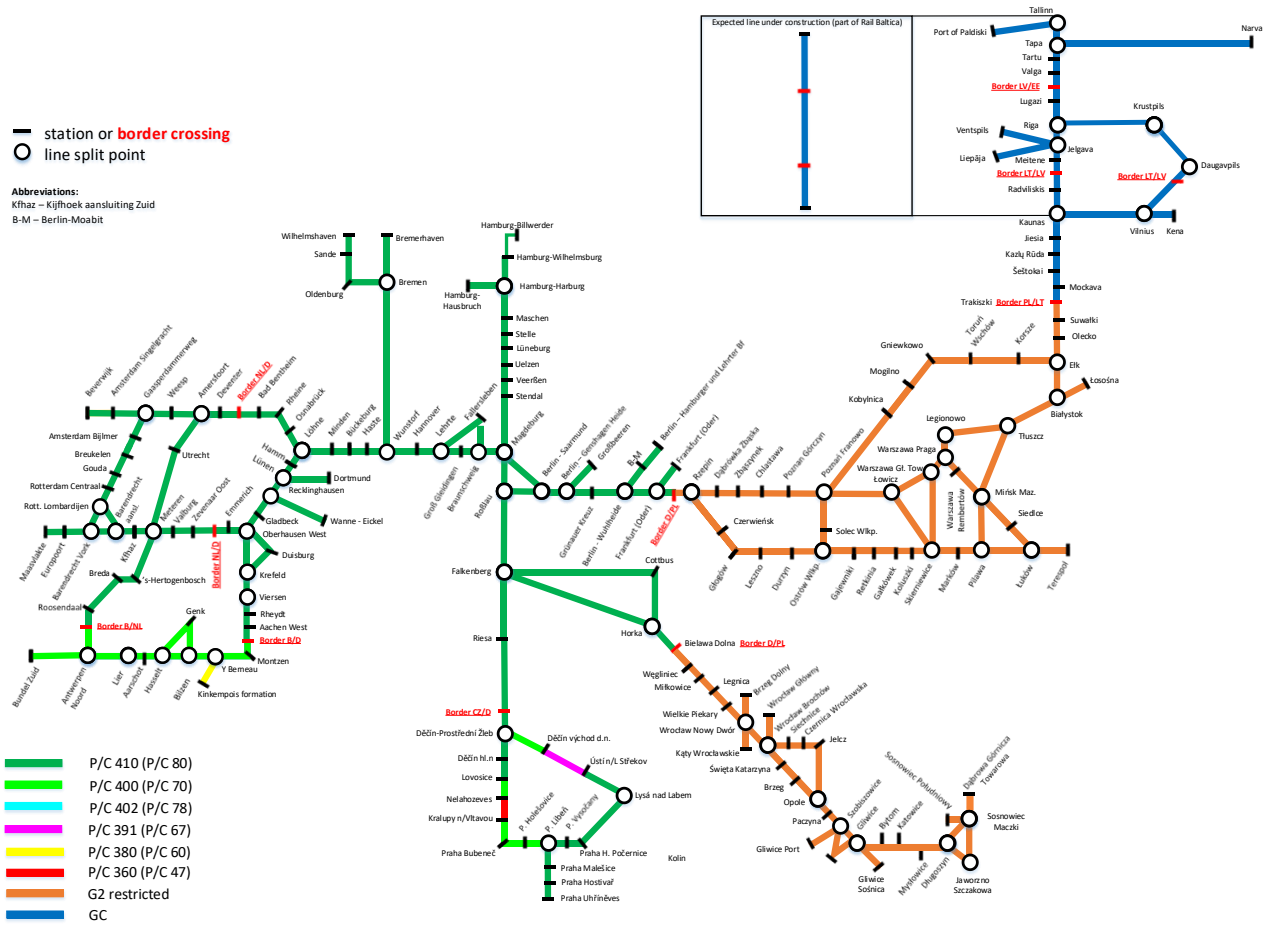
In the major part of the Corridor the allowed axle load is 22.5 t and meter load is 8 t, whereas the possibilities in Poland are more restricted. On the other hand in Latvia the axle load is 25 t and in Estonia even 32 t.

Figure 2-1-7: Max line speed



In the majority of the Corridor, the allowable maximum speed on lines for freight trains is 100 km/h or more excepted in certain regions where the speed is limited down to 40 km/h. For most of the sections there is no difference between values for odd and even direction apart from certain sections where the difference is relatively small. Maximum speed of freight trains on the 1520mm network is significantly lower than on the 1435mm network, mostly due to single track for mixed train operation (passenger and freight).

Figure 2-1-8: Profile and loading gauge



For the purpose of describing the loading gauge, the parameters given in the IM network statement were used (except Poland), i.e. Belgium and Germany – the profile parameter, the Netherlands, Lithuania, Latvia and Estonia – the loading gauge parameter.

2.2 Corridor Terminals

According to the requirements of Regulation (EU) 913/2010, the list of terminals is provided in the Corridor Information Document. More detailed information on terminals can also be found in the Customer Information Platform (CIP).

The new terminals belonging to RFC NS-B in Lithuania, Latvia and Estonia are listed in the table below: They will be included in the Corridor Information Document with the next annual update in January 2021 for TT2022.

Country	Terminal	Handover station
Lithuania	Kaunas Intermodal Terminal	Palemonas
Lithuania	Vilnius Intermodal Terminal	Vaidotai
Latvia	Noord Natie Ventspils Terminals	Ventspils
Latvia	Reefer Cargo Terminal	Ventspils
Latvia	Ventplac	Ventspils
Latvia	Eurohome Latvija, Ltd.	Ventspils
Latvia	Riga Container Terminal LLC (RIGACT)	Riga/Šķirotava
Latvia	Baltic Container Terminal Ltd.	Riga/Šķirotava
Latvia	Steveco Logisitcsin	Riga/Šķirotava
Latvia	DB Schenker Latvia	Riga/Šķirotava
Latvia	Baltmarine Terminal	Riga/Šķirotava
Latvia	Rīgas Pasažieru terminmāls	Riga/Šķirotava
Latvia	Starts Riga	Riga/Šķirotava
Latvia	B Port	Riga/Šķirotava
Latvia	Extron Baltic	Riga/Šķirotava
Latvia	Jaunmīlgrāvja ostas kompānija	Riga/Šķirotava
Latvia	KS Terminal	Riga/Šķirotava
Latvia	MT Osta	Riga/Šķirotava
Latvia	Man-Tess Tranzīts	Riga/Šķirotava
Latvia	Port Magnat	Riga/Šķirotava
Latvia	Rīgas Centrālais terminmāls	Riga/Šķirotava
Latvia	Riga Nordic Terminal	Riga/Šķirotava
Latvia	Rīgas universālais terminmāls	Riga/Šķirotava
Latvia	Vega Stividors	Riga/Šķirotava
Latvia	WT Terminal	Riga/Šķirotava
Latvia	Laskana LSEZ	Liepaja
Latvia	Duna LSEZ	Liepaja
Latvia	Metsa Forest Latvia	Liepaja
Latvia	Piemare LSEZ	Liepaja
Estonia	Port of Muuga	Muuga/Maardu

Estonia	Paldiski Northern Port	Paldiski
Estonia	Paldiski South Harbour	Paldiski
Estonia	Port of Sillamäe	Vaivara
Estonia	Tartu intermodal terminal	Tartu
Estonia	Ülemiste intermodal terminal	Ülemiste/Tallinn

2.3 Bottlenecks

For this update of the Implementation Plan, capacity bottlenecks were not yet identified.

The Capacity Management Plan (Chapter 6.1) including the bottlenecks will be elaborated in the next Implementation Plan update.

2.4 RFC Governance

The existing governance structure of RFC NS-B was adapted to integrate the representatives of Latvia and Estonia into the Corridor:

- the **Executive Board**: the Joint Declaration of Intent Regarding the Establishment of the Executive Board of Rail Freight Corridor North Sea – Baltic was adopted by all ministries of the Corridor on the 22nd of November 2019 integrating the representatives of the ministry of transport from Latvia and Estonia in the Executive Board and replacing the Agreement regarding to the Executive Board of RFC North Sea-Baltic adopted on 8 October 2014;
- the **Management Board**: a cooperation agreement was signed on the 13th of January 2020 between the EEIG and “Latvijas Dzelzceļš” (LDZ), “LatRailNet” (LRN) and Eesti Raudtee (EVR) to integrate the Latvian and Estonian Infrastructure Managers and Latvian Allocation Body into the Mangement Board. As of January 2021, LRN, LDZ as well as EVR will become members of the EEIG, the legal form of the Management Board;
- the **Advisory Groups**: Latvian and Estonian applicants and terminal operators and owners are invited to join the ’Railway undertaking Advisory Group (RAG) and the Terminal Advisory Group (TAG).

The Project Management Office and the Working Groups were extended with the representatives from Latvia and Estonia.

3. Transport Market Study

In view of the Article 9 of Regulation 913/2010, the RFC NS-B Management Board (MB) has commissioned a consortium of consultant firms to carry out an update of the Transport Market Study (TMS) performed in 2014, including the analysis of the extension to Latvia and Estonia and other possible extensions. The TMS final report was delivered on 12th December 2019 and the General Assembly approval was given on 28th January 2020. The Executive summary can be found here.

3.1 Introduction

To enhance a European network for competitive rail freight, Regulation (EU) 913/2010 stipulates the implementation of initial rail freight Corridors and a package of measures to improve the competitiveness of rail freight services along these Corridors. The RFC NS-B was established in November 2015. A mandatory part of the implementation plan for the RFC NS-B was to undertake the TMS that was finalized in March 2014. This study was conducted in line with Article 9(3) of Regulation (EU) 913/2010. According to this Regulation, the Management Board of Rail Freight Corridors (RFCs) shall carry out and periodically update transport market studies related to the observed and expected changes in the traffic on the freight Corridor, as a consequence of the Corridors being established. Market studies should cover the different types of traffic, both regarding the transport of freight and the transport of passengers and should review, where necessary, the socioeconomic costs and benefits stemming from the establishment of the freight Corridors.

The scope of the TMS subject of this report concerns the existing Corridor alignment as established in November 2015 and the additional planned and proposed extensions. More specifically, according to the amended Annex to Regulation (EU) 913/2010, the RFC NS-B has to be extended to Riga (Latvia) and Tallinn (Estonia) by November 2020 at the latest. Accordingly, the TMS includes in its scope the analysis of the planned extension from Kaunas to Riga and Tallinn. In a view of possible application for extension of the Corridor, the MB of RFC NS-B also decided to analyse possible Corridor extensions from Rostock to Priestewitz/Dresden via Berlin in Germany; Praha-Libeň to Kolín in the Czech Republic and from Katowice to Medyka (near the Ukrainian border) in Poland. The analysis of these proposed extensions is therefore part of the scope of this TMS update.

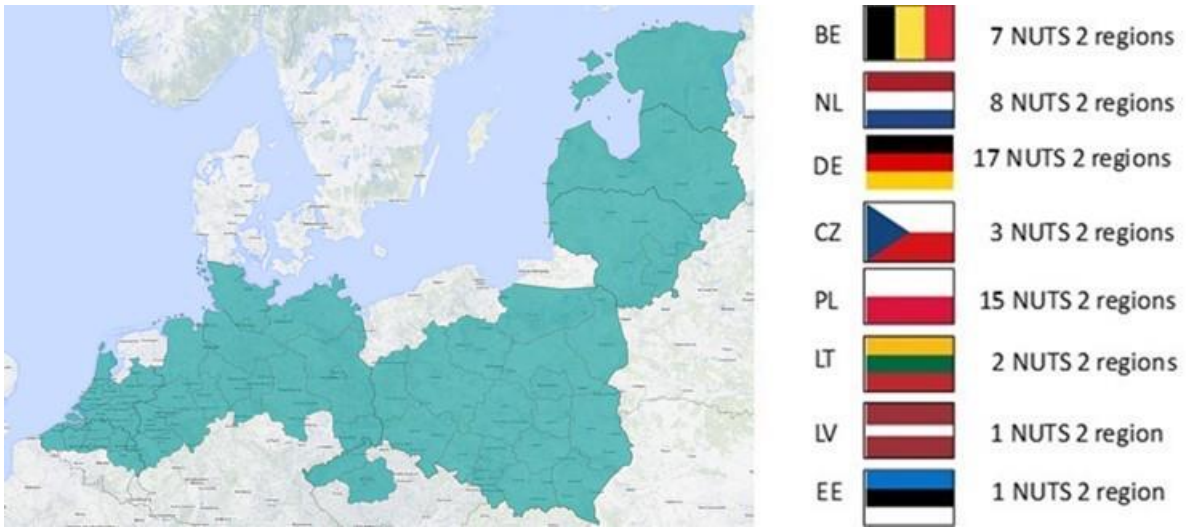
The updated TMS encompasses the period between 2017 (adopted as base year for the study in line with the latest available year of train data by the concerned RFC NS-B Infrastructure Managers) and 2022 (assumed for the elaboration of short-term forecasts to be elaborated

as part of the scope of the TMS). No long-term forecasts have been estimated within the scope of this study. Referring to long-term transport and traffic estimates, the TMS is however including a summary of the results of the analyses performed for the development of the Rail Baltica Global Project, that is currently expected to be operational by 2026.

3.2 Catchment area of the North Sea-Baltic Rail Freight Corridor

The RFC NS-B catchment area has been defined with reference to NUTS 2 regions. As a starting point, in line with the approach adopted in the 2014 TMS, NUTS 3 regions have been identified and verified. Changes in the NUTS 3 regions, e.g. due to consolidation of administrative districts in Germany, have been considered for the initial alignment. In the second step, based on the Corridor extensions, the new Corridor sections have been identified at the level of NUTS 3. Finally NUTS 2 regions have been identified, which form together the catchment area of the RFC NS-B (see Figure 3-1 below).

Figure 3-1 – Catchment area of the RFC NS-B



Source: Tplan Consulting elaboration

3.3 Corridor alignment: existing alignment and planned and proposed sections

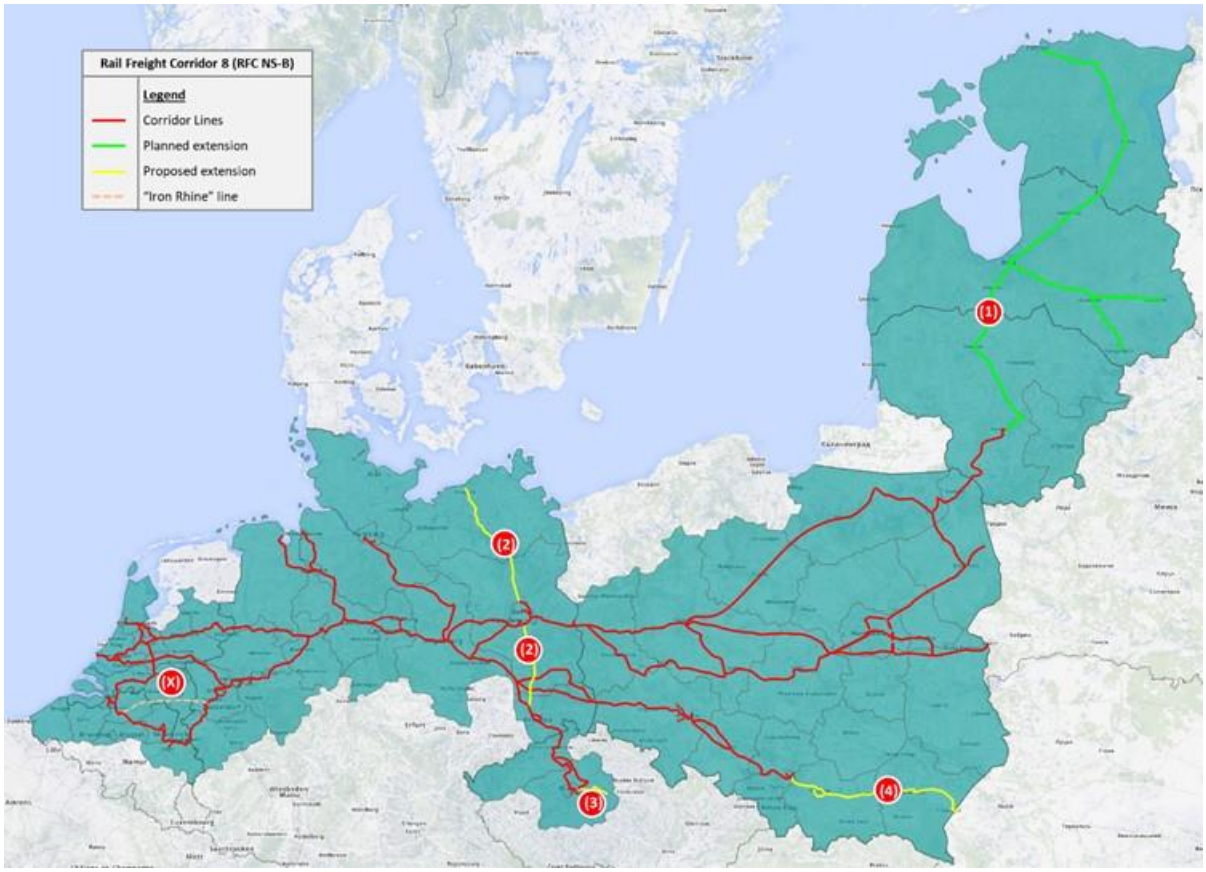
The existing Corridor alignment is pictured in the following Figure 3-2. The existing lines are visualised in red, reflecting the sections encoded in the Customer Information Platform at February 2019. The “Iron Rhine” line (marked with an “x” in Figure 3-2 and represented as a dotted orange line), currently only partially in operation, belongs to the RFC NS-B as expected principal line. It may be realized in the future. This line has not been further analysed in this TMS.

Additionally, Figure 3-2 shows the planned and proposed extensions of the Corridor:

- (1) Kaunas (LT) to Riga (LV), with extensions in Latvia towards the borders with Russia (Rēzekne), Belarus (Daugavpils), and Tallinn (EE);
- (2) Rostock – Priestewitz / Dresden via Berlin (DE);

- (3) Praha Libeň – Kolín (CZ);
- (4) Katowice – Medyka (PL).

Figure 3-2 – Corridor alignment of the RFC NS-B with planned and proposed extension



Source: Tplan Consulting elaboration

For the planned extension (1) from Kaunas to Riga and Tallinn, the Corridor alignment refers to the proposed preliminary 1,520mm lines in the Baltic States.

Since the start of the study the RFC NS-B has also received requests for further extensions to the North Sea Ports Ghent/Terneuzen and to Zeebrugge. These extensions are however not shown in Figure 3-2 and they are not described in detail in this section as they are not foreseen to be subject of this study in the Terms of Reference. Due to the location of these ports in the RFC NS-B catchment area, traffic with O/Ds at these ports has in any case been taken into consideration in the analysis.

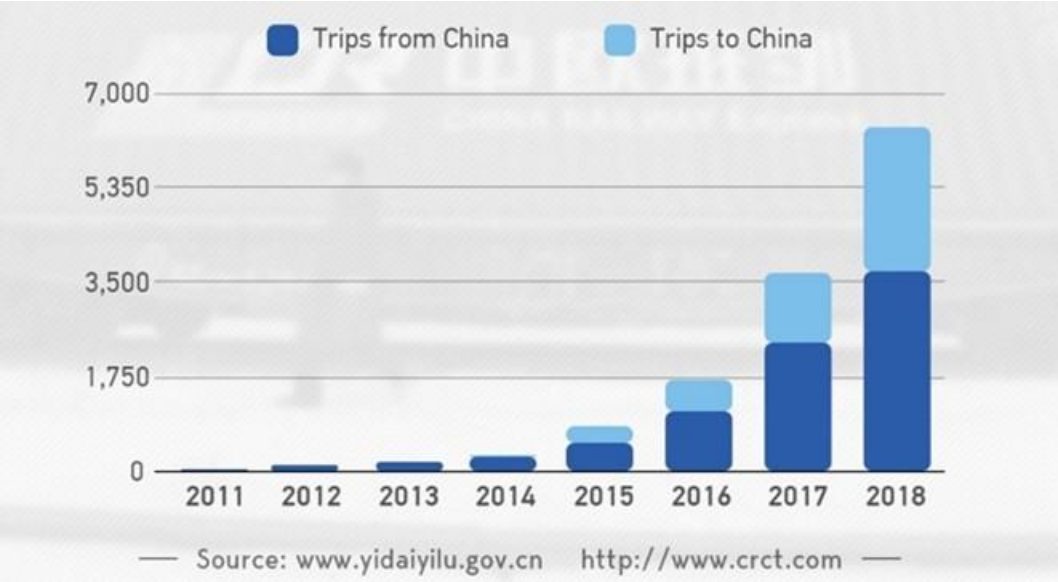
3.4 General socioeconomic development on the Corridor

An updated Political, Economic, Social and Technological (PEST) analysis has been performed aimed at identifying and summarising the main conditions and improvements that may affect the performance of the Corridor under the market point of view. Considering that the scope of the market study refers to the short-term period (2017-2022), the analysis has been tailored to this time frame, not considering factors more likely to affect the long-term outlook of freight transport.

The main **political** aspects affecting the development of the Corridor have been identified in the further consolidation of the operation of the RFCs, associated with the development of the corresponding TEN-T Core Network Corridors. In this respect it is worth to mention the European Green Deal political agenda, which is reasonably expected to further strengthen the role of the RFCs and CNCs development and implementation policies in promoting railway transport towards a greener and more sustainable transport system. Potentially relevant for the very long-distance rail traffic is also the expected further development of the Eurasia Land Bridge, linking the EU to the Far East via rail. Finally, economic incentives to reduce *Track Access Charges* and consequently the cost of services to users such as the subsidies recently introduced by the German and Dutch Governments in their markets might also have a positive impact on the development of rail freight operations.

Regarding the Eurasia Land Bridge under development as part of the One Belt One Road (OBOR) initiative by the Chinese Government, it is noticeable that whereas its routing is still to be fully defined, the RFC NS-B seems currently representing the main access itinerary for the traffic between the EU and China, as well as between the EU, Belarus, Ukraine, Russia and the countries located in Central Asia. The volume of freight trains between the EU and destinations in these areas has significantly grown over the past years. Figure 3-3 represents the trend of freight trains operated between European geographical destinations (including the European Union, as well as Belarus, Ukraine and Russia) and China, between 2011 and 2018. While “China-Europe” freight train operations registered only 17 trips in 2011, a total of 6,363 trips were recorded in 2018, which is almost equal to the total number of trips in the previous seven years. Although not directly impacting on the rail traffic growth between the RFC NS-B Member States, the development of the Eurasia Land Bridge may contribute to the increase of the overall traffic of international trains crossing the borders of one or more EU Member States along the RFC NS-B due to an increase in the transport flows by railway to/from China and the countries located in Central Asia.

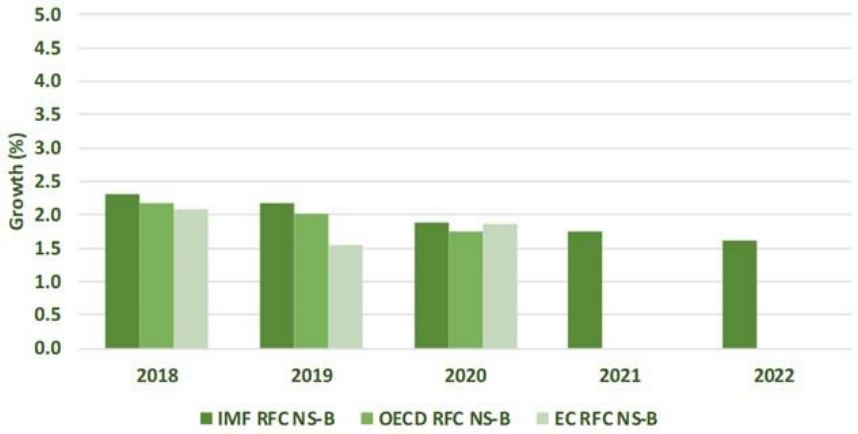
Figure 3-3 – Development of freight trains between European geographical destinations (including the European Union as well as Belarus, Ukraine, Russia…) and China 2011-2018



Source: https://news.cgtn.com/news/3d3d514e776b544f33457a6333566d54/index.html

The main **socioeconomic element** considered in the study refers to Gross Domestic Product (GDP), which has been analysed with reference to traffic trends by mode and the territories crossed by the RFC NS-B, in order to identify possible specificities and sensitivities.

Figure 3-4 – RFC NS-B GDP short-term forecasts



Source: IMF, OECD and EC

Figure 3-4 above summarises GDP forecasts published by the International Monetary Fund (IMF), the Organisation for Economic Cooperation and Development (OECD) and the European Commission (EC). Both OECD and EC provide short-term GDP projections until 2020. Data are displayed for the RFC NS-B current and future Member States.

The outlook is overall positive with a resulting CAGR for the RFC NS-B Member States forecasted to be 1.7% (EC) over the TMS prognosis period.

With reference to the **technological** dimension of the PEST analysis, the critical issues of the existing network as well as the major infrastructure investments planned in the short-term period have been identified as part of the TMS. A number of projects are currently under implementation along the RFC NS-B that will improve and achieve several parameters affecting freight transport by railway particularly in Eastern European countries (i.e. ERTMS, maximum speed, axle load, train length and electrification). This is also expected to contribute to the gradual improvement of the market performance of the Corridor in the short-term period.

3.5 Analysis of the current transport market on the Corridor

3.5.1. Rail freight transport between RFC NS-B Member States

Table 3-1Table 3-1 below provides the RFC NS-B matrix for the 2017 rail freight transport, in terms of tonnes moved yearly.

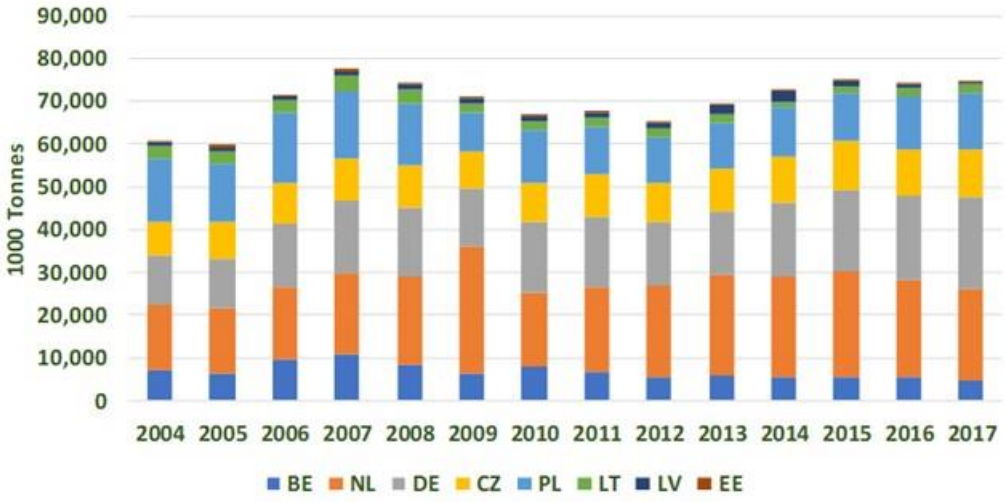
Table 3-1 – 2017 Rail freight O/D matrix ('000 tonnes)

		Unloading Country								
		BE	**NL**	**DE**	**CZ**	**PL**	**LT**	**LV**	**EE**	**TOT**
Loading Country	**BE**	-	867	3,824	117	75	-	-	-	**4,883**
	NL	677	-	18,495	1,298	596	-	-	-	**21,066**
	DE	2,826	4,903	-	9,432	4,343	10	-	-	**21,514**
	CZ	71	958	7,772	-	2,515	1	-	-	**11,317**
	PL	86	609	6,506	5,686	-	55	5	1	**12,948**
	LT	-	-	6	4	418	-	1,056	734	**2,218**
	LV	-	-	-	-	20	141	-	95	**256**
	EE	-	-	-	-	-	26	192	-	**218**
	TOT	**3,660**	**7,337**	**36,603**	**16,537**	**7,967**	**233**	**1,253**	**830**	**74,420**

Source: Eurostat. Note: Figures relate to total traffic at country level (NUTS 0)

Substantial freight traffic by rail was registered between the Netherlands and Germany in 2017, when more than 23 million tonnes of goods were transported in total. Other important rail trade relations in terms of inbound and outbound traffic can be identified between the Czech Republic and Germany (about 17 million tonnes) as well as between Poland and Germany, though to a lower extent (i.e. almost 11 million tonnes).

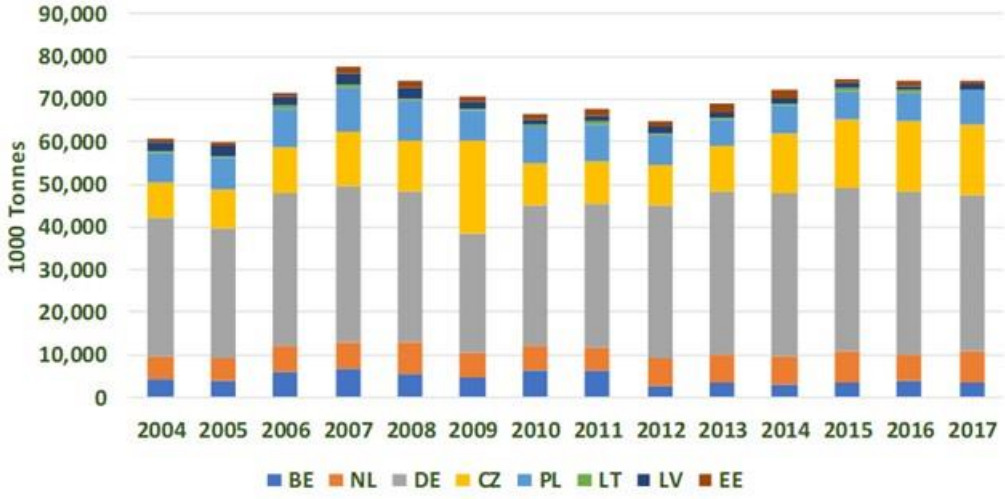
Figure 3-5 – Outbound rail freight transport – historical trend



Source: Eurostat; Note: Figures relate to total traffic at country level (NUTS 0)

Although the total tonnage of outbound flows is comparable between Germany and the Netherlands, it is worth noticing that 88% of the latter's total Corridor export was absorbed by Germany in 2017 as shown on Figure 3-5.

Figure 3-6 – Inbound rail freight transport – historical trend



Source: Eurostat. Note: Figures relate to total traffic at country level (NUTS 0)

Regarding inbound flows, Germany was largely the prevalent attractor among the RFC NS-B Member States over the 2004-2017 period, as clearly displayed in Figure 3-6.

3.5.2. Historical trends by trade lane

In order to gain a better understanding of the RFC NS-B transport pattern, historical trends by trade lane for rail transport were have been analysed as part of the TMS. More specifically, data for the years 2004 and 2012 have been analysed in addition to data for the year 2017, already presented in the previous section. Further to the O/D matrices showing the volumes of transported tonnes, growth rates have been also calculated for the periods 2004-2017 and 2012-2017, which are reported in the following tables.

Table 3-2 – 2004 Rail freight O/D matrix ('000 tonnes)

Loading Country \ Unloading Country	BE	NL	DE	CZ	PL	LT	LV	EE	TOT
BE	-	2,222	4,699	43	138	-	-	-	**7,102**
NL	1,265	-	13,484	316	212	-	-	-	**15,277**
DE	2,716	2,990	-	3,292	2,507	74	-	-	**11,579**
CZ	86	229	4,453	-	2,908	3	-	-	**7,679**
PL	153	106	9,676	4,752	-	106	8	19	**14,820**
LT	-	-	43	17	790	-	1,370	684	**2,904**
LV	-	-	-	1	342	249	-	248	**840**
EE	-	-	-	-	-	164	482	-	**646**
TOT	**4,220**	**5,547**	**32,355**	**8,421**	**6,897**	**596**	**1,860**	**951**	**60,847**

Source: Eurostat. Note: Figures relate to total transport at country level (NUTS 0)

The volume of transported tonnes to/from most of the Eastern countries of the Corridor appears to be decreasing with reference to both periods of analysis (2004 and 2012), as well as regarding the short and the medium/long distances. Accordingly, many of these countries registered a decrease in the total rail transport flows to/from other RFC NS-B Member States.

Table 3-3 – 2012 Rail freight O/D matrix ('000 tonnes)

Loading Country \ Unloading Country	BE	NL	DE	CZ	PL	LT	LV	EE	TOT
BE	-	880	4,465	67	49	-	-	-	**5,461**
NL	605	-	19,982	688	104	-	-	-	**21,379**
DE	1,951	4,810	-	4,645	3,364	2	-	-	**14,772**
CZ	72	793	5,294	-	3,154	1	-	-	**9,314**
PL	124	70	5,850	4,298	-	187	-	3	**10,532**
LT	-	-	23	61	203	-	1,266	551	**2,104**
LV	-	-	-	-	1	244	-	857	**1,102**
EE	-	-	-	-	-	33	228	-	**261**
TOT	**2,752**	**6,553**	**35,614**	**9,759**	**6,875**	**467**	**1,494**	**1,411**	**64,925**

Source: Eurostat. Note: Figures relate to total transport at country level (NUTS 0)

Such decreasing trend is especially evident in the 2004-2017 growth rate matrix, which, based on a more extended set of data (i.e. 14 years) results to be more meaningful to capture the transport trends.

Table 3-4 – 2004-2017 Rail freight growth rates by O/D

Loading Country \ Unloading Country	BE	NL	DE	CZ	PL	LT	LV	EE	TOT
BE	-	-7.0%	-1.6%	**8.0%**	-4.6%	-	-	-	**-2.8%**
NL	-4.7%	-	**2.5%**	**11.5%**	**8.3%**	-	-	-	**2.5%**
DE	**0.3%**	**3.9%**	-	**8.4%**	**4.3%**	-14.3%	-	-	**4.9%**
CZ	-1.5%	**11.6%**	**4.4%**	-	-1.1%	-8.1%	-	-	**3.0%**
PL	-4.3%	**14.4%**	-3.0%	**1.4%**	-	-4.9%	-3.6%	-20.3%	**-1.0%**
LT	-	-	-14.1%	-10.5%	-4.8%	-	-2.0%	**0.5%**	**-2.1%**
LV	-	-	-	-	-19.6%	-4.3%	-	-7.1%	**-8.7%**
EE	-	-	-	-	-	-13.2%	-6.8%	-	**-8.0%**
TOT	**-1.1%**	**2.2%**	**1.0%**	**5.3%**	**1.1%**	**-7.0%**	**-3.0%**	**-1.0%**	**1.6%**

Source: Eurostat. Note: Figures relate to total transport at country level (NUTS 0); Figures in bold green present higher values compared to 2004 data, figures in red indicate lower values compared to 2004 data

In particular, the Member States that are mostly affected by declines in growth rates are Poland and the Baltic States. Growing trends result on the Western O/Ds, with the only exception of Belgium, which based on available statistics appears to be affected by decreasing rates on most of the trade lanes.

Table 3-5 – 2012-2017 Rail freight growth rates by O/D

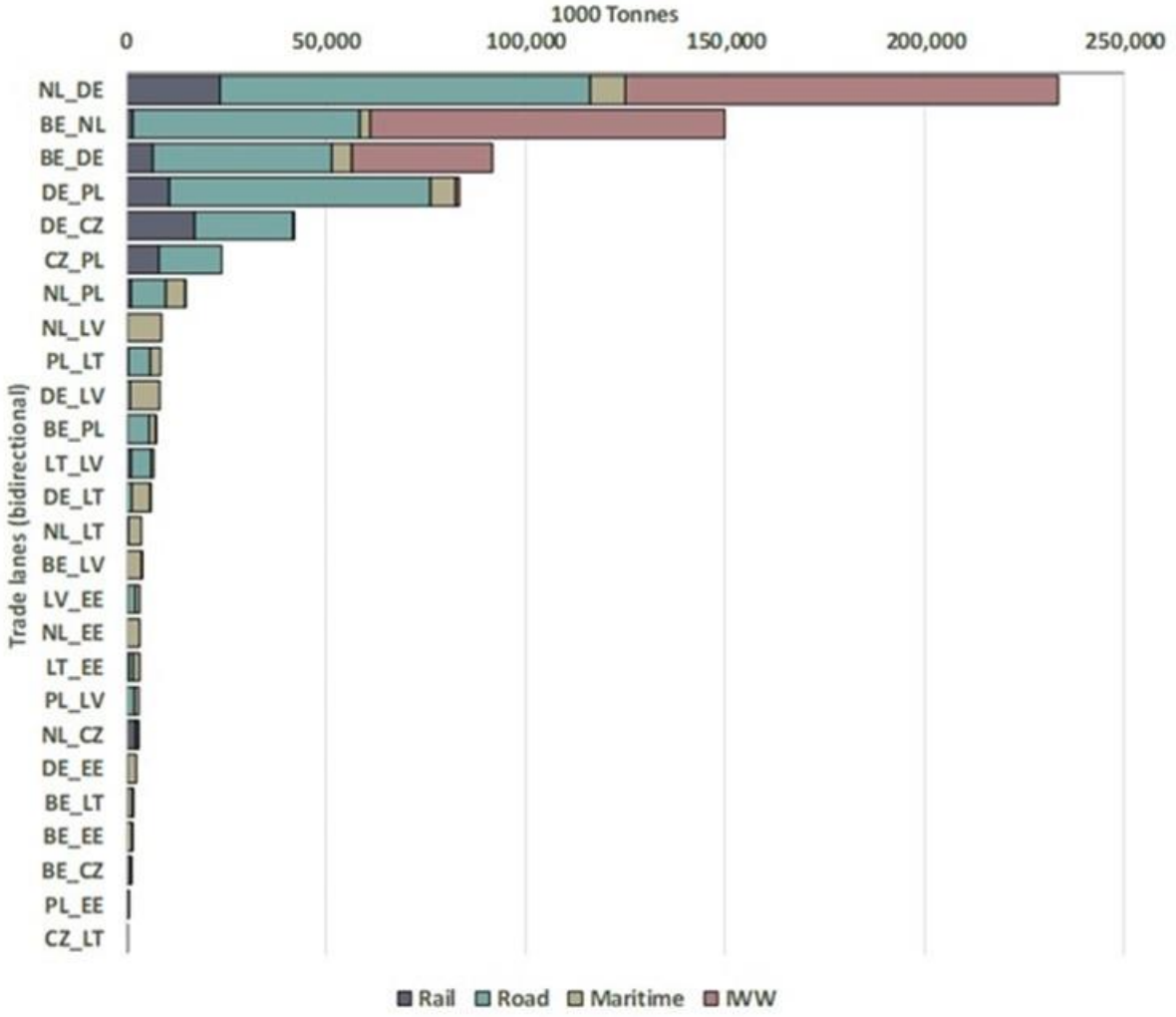
Loading Country \ Unloading Country	BE	NL	DE	CZ	PL	LT	LV	EE	TOT
BE	-	-0.3%	-3.1%	**11.8%**	**8.9%**	-	-	-	**-2.2%**
NL	**2.3%**	-	-1.5%	**13.5%**	**41.8%**	-	-	-	**-0.3%**
DE	**7.7%**	**0.4%**	-	**15.2%**	**5.2%**	**38.0%**	-	-	**7.8%**
CZ	-0.3%	**3.9%**	**8.0%**	-	-4.4%	0.0%	-	-	**4.0%**
PL	-7.1%	**54.1%**	**2.1%**	**5.8%**	-	-21.7%	-	-19.7%	**4.2%**
LT	-	-	-23.6%	-42.0%	**15.5%**	-	-3.6%	**5.9%**	**1.1%**
LV	-	-	-	-	**82.1%**	-10.4%	-	-35.6%	**-25.3%**
EE	-	-	-	-	-	-4.7%	-3.4%	-	**-3.5%**
TOT	**5.9%**	**2.3%**	**0.5%**	**11.1%**	**3.0%**	**-13.0%**	**-3.5%**	**-10.1%**	**2.8%**

Source: Eurostat. Note: Figures relate to total transport at country level (NUTS 0); Figures in bold green present higher values compared to 2012 data, figures in red indicate lower values compared to 2012 data

3.5.3. Modal Split on the trade lanes between the RFC NS-B Member States

The graphs in the figures below represent the modal split expressed in thousand tonnes (Figure 3-7) and percentage (Figure 3-8) on the trade lanes involving the RFC NS-B Member States in 2017.

Figure 3-7 – Modal split ('000 tonnes) of the bidirectional freight transport between RFC NS-B Member States in 2017



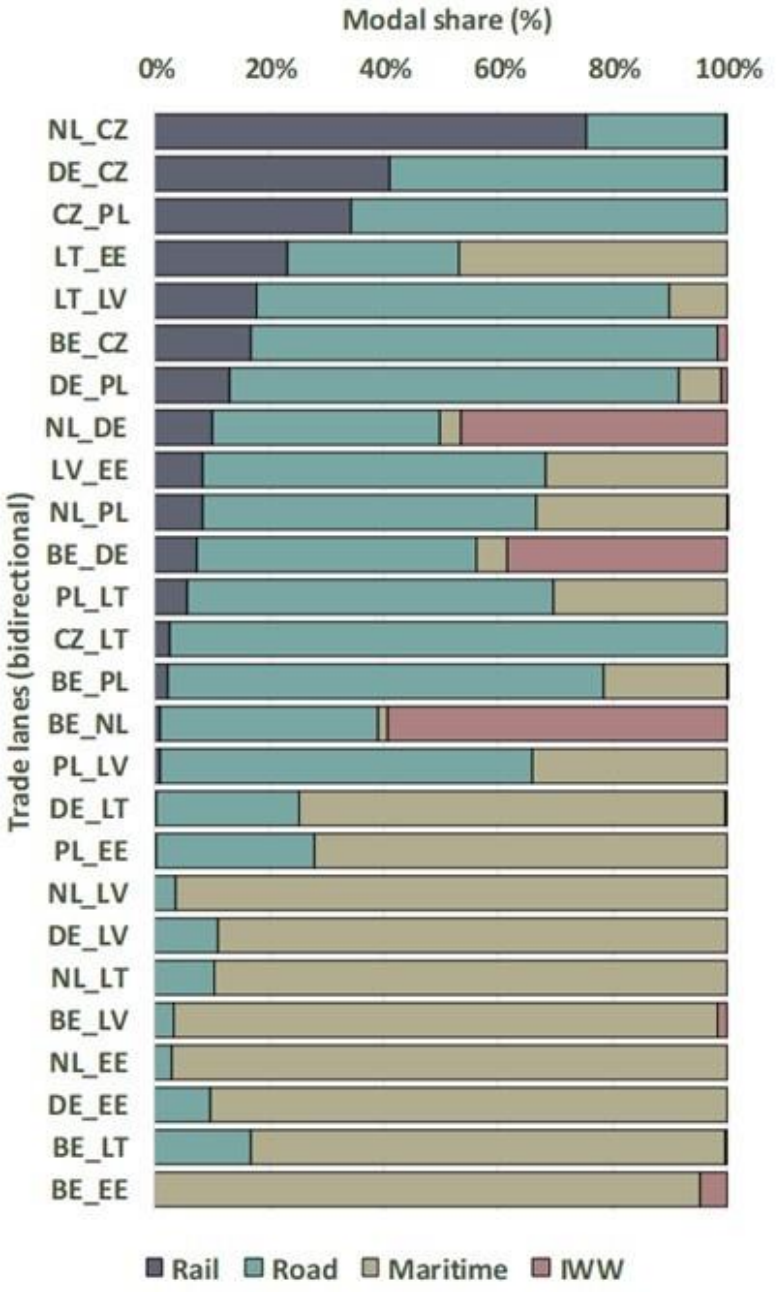
Source: Eurostat. Note: Figures relate to total transport at country level (NUTS 0)

Overall, only 10% of the total freight flows between the RFC NS-B Member States was moved by rail. Rail freight transport was particularly significant for O/D relations involving the Czech Republic. Instead, for the O/D relations to/from Lithuania, Latvia and Estonia, rail transport share was minor or absent. Road transport played a significant role for most of the trade lanes among the RFC NS-B Member States, accounting for 47% of the total throughput. IWW transport was absent for many O/D relations, although it represented 33% of the total freight moved along the Corridor. This result was mainly due to three trade relations, namely

between the Netherlands and Germany, Belgium and the Netherlands and Belgium and Germany.

Maritime transport accounted for 10% of the total goods moved along the Corridor and it was dominant especially on the trade relations involving Lithuania, Latvia and Estonia. In this respect it is noticed that the increase in competitiveness of the rail transport mode in these RFC NS-B Member States thanks to the completion of the ongoing works on the existing lines and the realisation of the Rail Baltica Global Project may result in a partial shift of transport flows to the rail mode.

Figure 3-8 – Modal share (%) of the bidirectional freight transport between RFC NS-B Member States in 2017



Source: Eurostat. Note: Figures relate to total transport at country level (NUTS 0)

3.5.4. Corridor train flows at BCPs

Further to the analysis of the transport flows along the RFC NS-B Member States an analysis of the traffic along the Corridor expressed in number of trains was also performed as part of the study. Train data were requested and made available for this TMS by the RFC NS-B concerned IMs, for the year 2017, assumed as reference/base year of the TMS. The 2017 train dataset of the TMS generally refers to commercial trains, excluding working trains, maintenance trains, locomotives, etc.

RFC NS-B trains analysed as part of the TMS consist of those trains crossing at least one border crossing point (BCP) between the RFC NS-B Member States, and/or arriving/departing from one of the ports in the RFC NS-B catchment area[3]. Due to limitations in the datasets available to national IMs, no data were provided that could allow for the consistent identification of the full paths of international trains, therefore, the analysis is limited to the national segments of the paths of international trains.

In order to provide a consistent analysis of the train data along the RFC NS-B, traffic volumes expressed in number of trains at the BCPs between the RFC NS-B Member States as made available by each reporting IM were compared and checked, with the aim to understand and possibly eliminate differences.

For the border stations at the Corridor BCPs, a pair of values was eventually identified for the two crossing directions in each Member State. Such values shown in Table 3-6 were used in the analysis and presentation of the results of the study:

- As a general approach the average value (rounded to the nearest 10) was adopted;
- For the border crossing sections between Germany and the Netherlands, Germany and the Czech Republic and Germany and Poland, figures provided by the reporting IMs of the Netherlands, the Czech Republic and Poland were used;
- Values for Germany and Belgium were very similar. Therefore, the average values were used in line with the general approach.

Table 3-6 – Cross-border train traffic by direction per border pair

Border pair	Direction	Value retained in the study*
Essen (BE) – Roosendaal (NL)	Netherlands Belgium	4,050 4,080
Botzelaer (BE) – Aachen West (DE)	Germany Belgium	11,680 11,780
Zevenaar (NL) – Emmerich (DE)	Germany Netherlands	12,250 12,250
Oldenzaal (NL) – Bad Bentheim (DE)	Germany Netherlands	2,930 2,930
Bad Schandau (DE) – Děčín (CZ)	Czech Republic Germany	14,290 14,160
Frankfurt (Oder) (DE) – Rzepin (PL)	Poland Germany	7,470 7,170

[3] Train data availability for traffic departing or arriving at ports was eventually subject to the following limitations: no data were made available for national port traffic in the Netherlands; no data were provided for port traffic in Lithuania and Estonia, exept for those trains crossing a corridor BCP.

Border pair	Direction	Value retained in the study*
Horka (DE) – Węgliniec (PL)	Poland	900
	Germany	860
Trakiszki (PL) – Mockava (LT)	Lithuania	220
	Poland	220
Joniškis (LT) – Meitene (LV)	Latvia	680
	Lithuania	560
Lugaži (LV) – Valga (EE)	Estonia	730
	Latvia	610

*Source: Own elaboration on 2017 data provided by the Infrastructure Managers; Note: *rounded figures*

Table 3-6 above includes the list of the Corridor BCPs agreed to be considered for traffic analysis purposes in the TMS. Accordingly, it excludes the cross-border section Hamont - Budel between Belgium and the Netherlands and Venlo – Kaldenkirchen between the Netherlands and Germany along the Iron Rhine line. These BCPs have not been considered in the analysis due to the partial operation of the line at present.

Finally, in addition to the Corridor BCPs between the RFC NS-B Member States, the Rēzekne (LV), Daugavpils (LV), Kuźnica (PL), Terespol (PL) and Medyka (PL) border crossing stations along the itineraries between the European Union and Belarus, Russia and Ukraine have been considered in the TMS for the analysis of either the transport flows or trains (depending on available data) along the Eurasia Land Bridge. It is however worth specifying that these BCPs have not been considered in the study at the same level of detail of the RFC NS-B BCPs listed in Table 3-6 above. Interconnecting the European Union railway network with the one of the neighbouring countries, at least one side of these BCPs is located outside the RFC NS-B under the organisational/governance and infrastructure stand points. They are furthermore not subject to the legislation of the European Union including the relevant regulations applicable to the RFC NS-B. Accordingly they have been distinguished from the BCPs interconnecting the RFC NS-B Member States and less details for these border crossing points are provided in this study compared to the ones interconnecting the links of the RFC NS-B within the Single European Railway Area. In this respect it is worth noticing that a detailed level of train data as for the BCPs listed in Table 3-6 was also not possible to be collected.

Traffic at the Rēzekne (LV), Daugavpils (LV), Kuźnica (PL), Terespol (PL) and Medyka (PL) border crossing stations was not analysed in detail in the study as these are currently primarily used for East-West traffic between Belarus and Russia and the Ports in the Baltic States. For the Kuźnica (PL), Terespol (PL) and Medyka (PL) border crossing stations some train data are available on the Polish side. These are reported in Table 3-7 for the year 2017.

Table 3-7 – Bidirectional annual train flows at the Kuźnica (PL), Terespol (PL) and Medyka (PL) border crossing stations on the Polish side (2017)

Border station	Bidirectional trains in 2017*
Kuźnica	3,120
Terespol	11,570
Medyka	2,260

*Source: Own elaboration on 2017 data provided by the Infrastructure Managers; Notes:*rounded figures*

The plot in

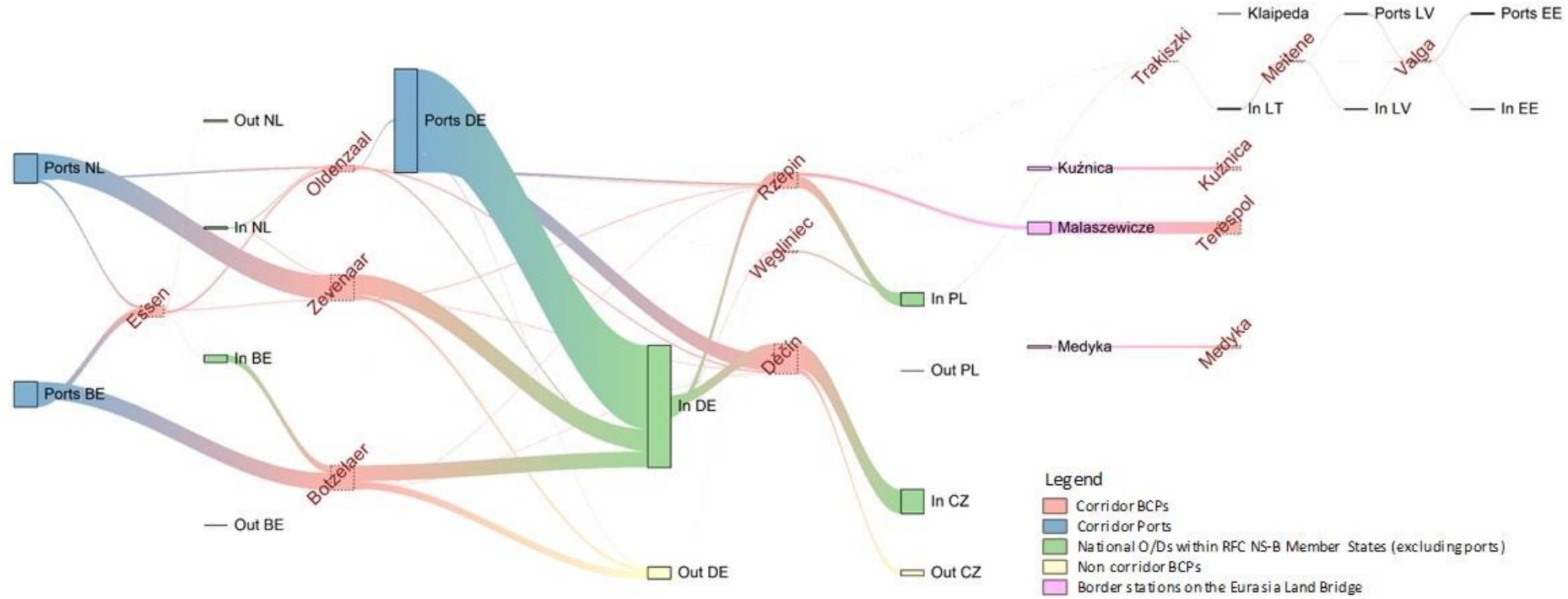
Figure 3-9 represents the O/D distribution of the bidirectional train flows crossing the RFC NS-B BCPs estimated on the basis of the data provided by the IMs. The plot also includes the distribution of the total traffic with O/Ds from the German ports due to their relevance for the rail traffic along the RFC NS-B. In order to make the plot clearer and more readable, various levels of aggregation were applied. In particular, the ports were aggregated at the Member State level and the national O/Ds inside and outside the RFC NS-B catchment area were also aggregated. Details by Member State are provided in the following section where data by RFC Member State are illustrated.

The alignment of the RFC NS-B overlaps with the one of several other RFCs (i.e. Baltic-Adriatic, North Sea-Mediterranean, Orient-East Med, Rhine-Alpine, Scandinavian-Mediterranean). Traffic flows along the RFC NS-B are thus also common to other RFCs. In this respect,
Figure 3-10 represents the three RFCs having at least one BCP in common with the RFC NS-B (i.e. the RFCs North Sea-Mediterranean, Rhine-Alpine and Orient-East Med), and therefore common flows. The main RFC NS-B flows that do not overlap with these two RFCs concern the following relations:

- Traffic between the ports of the Netherlands and Belgium and the national destinations in Germany, mainly located within the RFC NS-B catchment area;
- Traffic between ports and national destinations in Germany as well as between Germany and national destinations in Poland within the RFC NS-B catchment area;
- Traffic between two main BCP to BCP/border flows Małaszewicze-Rzepin and Oldenzaal-Děčín.

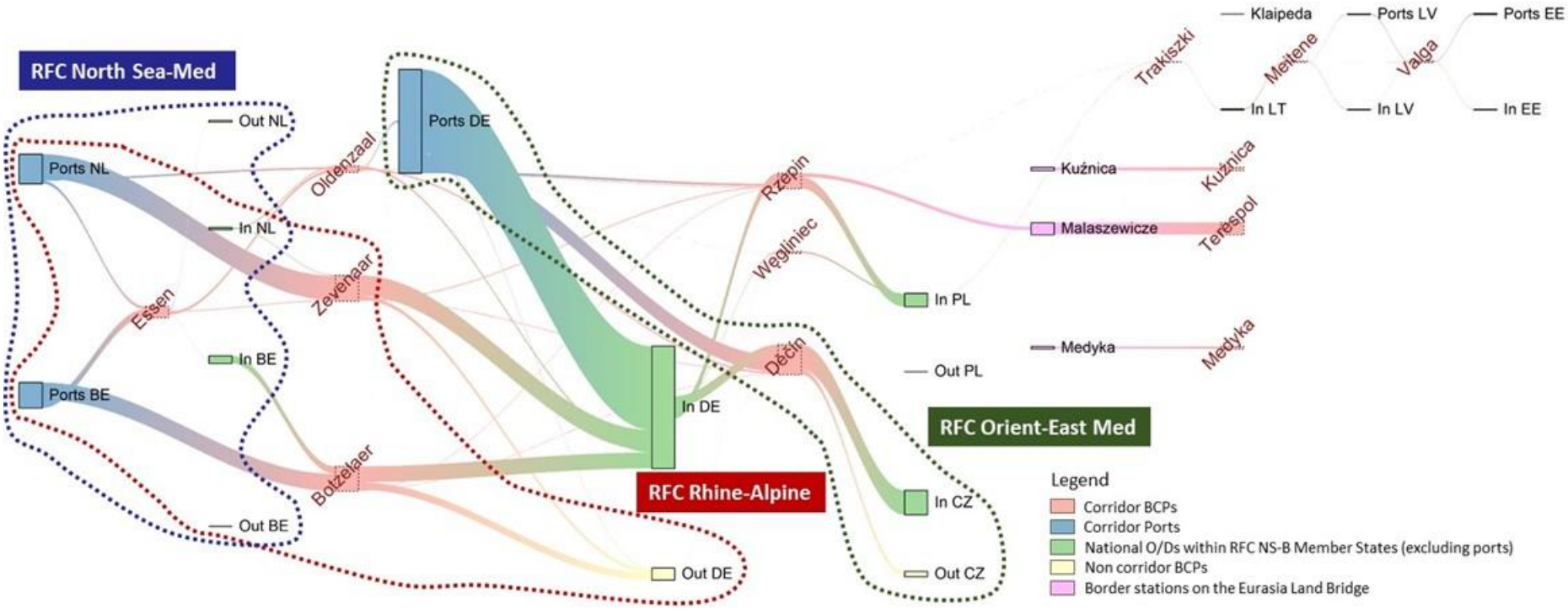
Finally an additional map has been elaborated concerning the flows of international trains along the RFC NS-B (Figure 3-11). This is aimed at representing the trains crossing the Corridor BCPs between the RFC NS-B Member States. Compared to the other maps, this plot presents an additional level of aggregation at the national scale as all national O/Ds have been grouped into one national cluster, thus also including port related traffic. This plot represents the basis for the graphical illustration of the future traffic estimate presented at Section 0 of the TMS below.

Figure 3-9 – 2017 Train flows along the RFC NS-B crossing a Corridor BCP including national traffic with O/D at German Ports



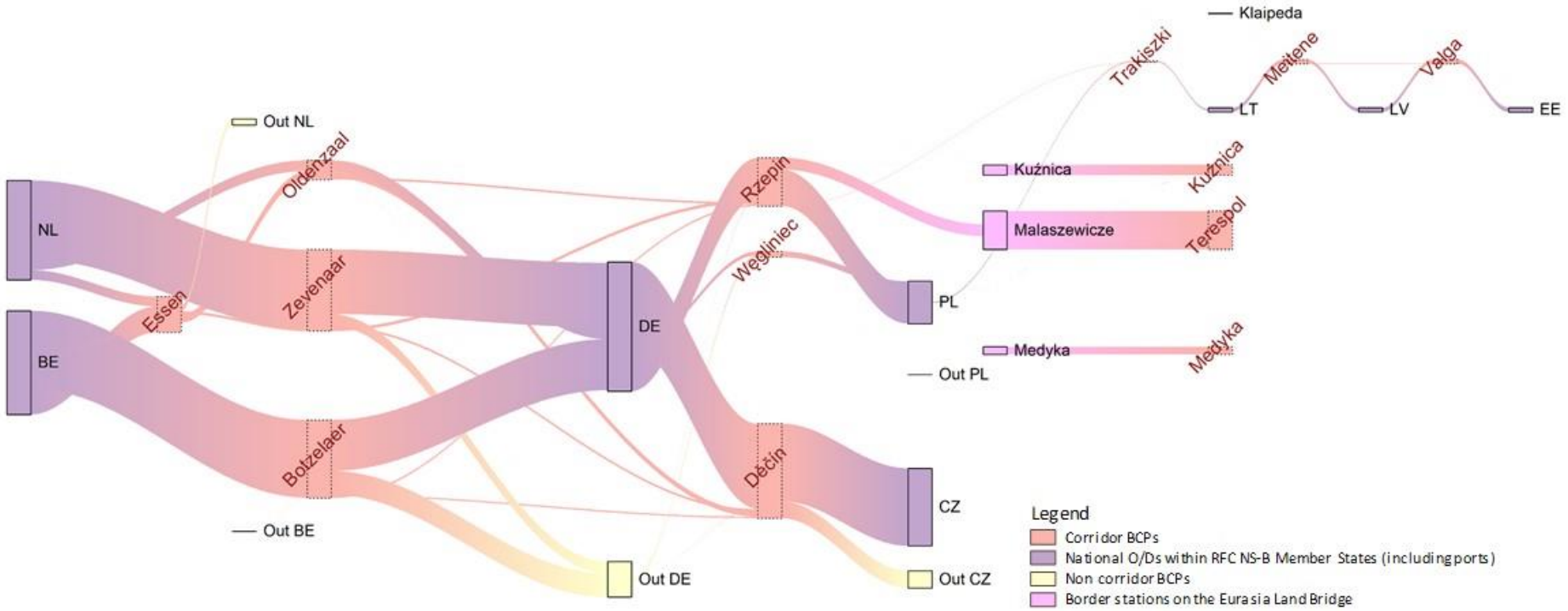
Source: Own elaboration on 2017 data provided by the IMs. Note: relations with a train frequency lower than 100 trains per year are not plotted; Train data for the Kuźnica Małaszewicze and Medyka border stations were provided only between these stations and the border crossing points with Belarus and Ukraine. Train data between the Kuźnica Małaszewicze and Medyka border stations and the Polish Corridor BCPs of Frankfurt (Oder) (DE) – Rzepin (PL) and Horka (DE) – Węgliniec (PL) were available from the dataset related to these BCPs. According to O/D data at these BCPs, no traffic appears to exist in 2017 between them and the border crossing stations of Kuźnica and Medyka

Figure 3-10 – 2017 Train flows also running on the alignment of other RFCs



Source: Own elaboration on 2017 data provided by the IMs. Note: relations with a train frequency lower than 100 trains per year are not plotted; Train data for the Kuźnica Małaszewicze and Medyka border stations were provided only between these stations and the border crossing points with Belarus and Ukraine. Train data between the Kuźnica Małaszewicze and Medyka border stations and the Polish Corridor BCPs of Frankfurt (Oder) (DE) – Rzepin (PL) and Horka (DE) – Węgliniec (PL) were available from the dataset related to these BCPs. According to O/D data at these BCPs, no traffic appears to exist in 2017 between them and the border crossing stations of Kuźnica and Medyka

Figure 3-11 – 2017 Country-to-country train flows along the RFC NS-B crossing a Corridor BCP



Source: Own elaboration on 2017 data provided by the IMs. Note: relations with a train frequency lower than 100 trains per year are not plotted; Train data for the Kuźnica Małaszewicze and Medyka border stations were provided only between these stations and the border crossing points with Belarus and Ukraine. Train data between the Kuźnica Małaszewicze and Medyka border stations and the Polish Corridor BCPs of Frankfurt (Oder) (DE) – Rzepin (PL) and Horka (DE) – Węgliniec (PL) were available from the dataset related to these BCPs. According to O/D data at these BCPs, no traffic appears to exist in 2017 between them and the border crossing stations of Kuźnica and Medyka

3.5.5. Corridor train flows by Member State

The following plots, selected to provide an example of the obtained results, display all the O/D rail relations and the related bidirectional train traffic identified on the basis of the analysis of the 2017 train data. Only those relations that involve at least either a Corridor BCP or a port in the RFC NS-B catchment area as O/D were selected and therefore plotted.

The nodes that are subject of analysis, either the Corridor BCPs or the ports located in the RFC NS-B catchment area, are positioned on the left side of each plot. The corresponding O/Ds are represented on the right side of the plots, listed from the top to the bottom of the scheme according to the following sequence:

- Corridor BCPs;
- Ports located in the RFC NS-B catchment area;
- National O/Ds within the RFC NS-B catchment area;
- National O/Ds outside the RFC NS-B catchment area;
- Non Corridor BCPs.

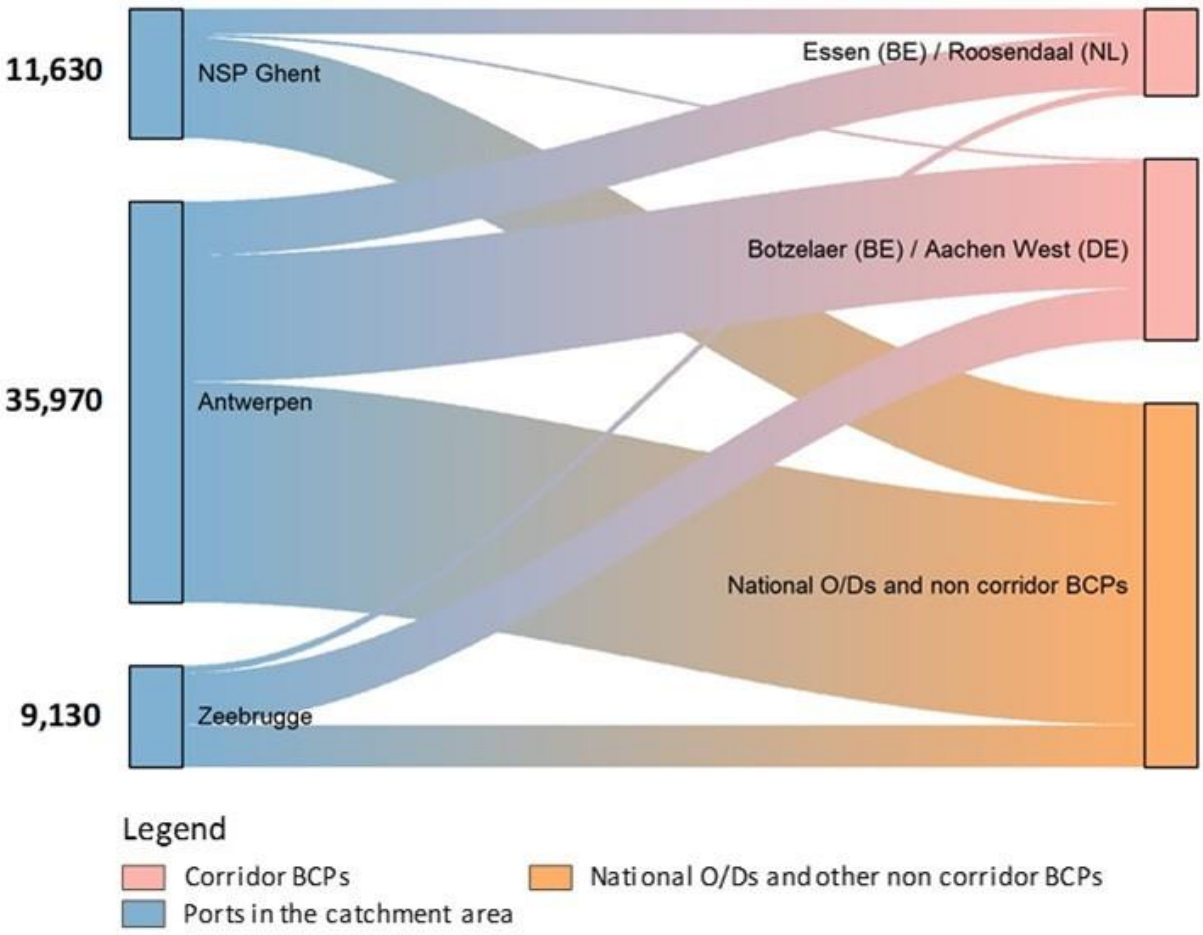
This sequence reflects the relevance of the O/D under the Corridor analysis perspective. In each plot, the total value of the involved traffic volume is provided, together with the related distribution among the various train relations. Again, values of the bidirectional rail traffic crossing each Corridor BCP or departing/arriving at each port in the RFC NS-B catchment area are given. In general terms the national O/Ds within the RFC NS-B catchment area have been associated with NUTS 2 in Belgium, the Netherlands, Germany, the Czech Republic and Poland; and with NUTS 3 in Latvia and Estonia. Some adjustments have been made in order to reflect specificities on the basis of the information on the number of trains included in the datasets provided by the RFC NS-B IMs. Concerning Lithuania, national O/Ds coincide with the Radviliškis station. The train dataset available for Belgium and Latvia did however not allow distinguishing national from international destinations for trains having origin and destination in the RFC NS-B ports in these countries.

In order to facilitate the reading and review of the results of the analysis, the plots representing the train data along the RFC NS-B have been grouped by RFC NS-B Member State. In the following paragraphs of this executive summary a limited number of plots is represented and described following the West-East alignment of the RFC NS-B, from the ports in Belgium and the Netherlands towards Germany, as well as from the German ports towards the Czech Republic and Poland, and then between Poland and Lithuania and finally between the Baltic States. The full set of plots is provided in the main body of the TMS study report.

Belgium

The total amount of bidirectional rail freight traffic departing from/arriving at the Belgian ports of the RFC NS-B is equal to 56,730 trains.

Figure 3-12 – Bidirectional train traffic at the Ports of Belgium in the catchment area



Source: Own elaboration on 2017 data provided by the Infrastructure Managers. Notes: all numbers are rounded to the nearest ten; relations with a train frequency lower than 100 trains per year were not plotted; The available data did not allow to analyse port traffic to/from national and international destinations separately

The traffic share among the ports in the Corridor catchment area is the following[4]:

- 11,630 trains (20.5%) to/from the North Sea Port (Ghent);
- 35,970 trains (63.4%) to/from the Port of Antwerpen;
- 9,130 trains (16.1%) to/from the Port of Zeebrugge.

The total port traffic volume is distributed as follows:

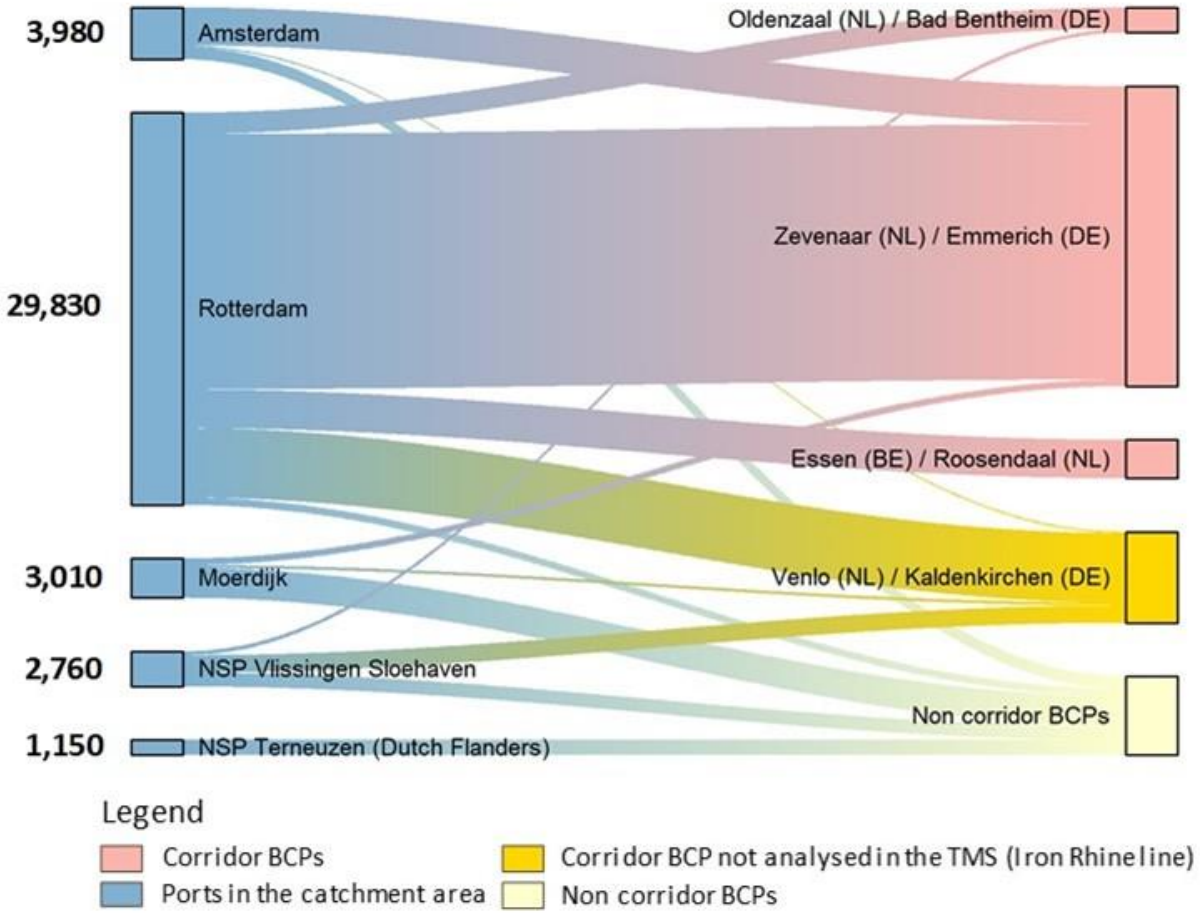
- 24,050 trains (42.4%) to/from the Corridor BCPs;
- 32,670 trains (28.7%) to/from national and international O/Ds crossing non Corridor BCPs.

[4] Figures are rounded to the nearest ten. The sum of the individual train relations might hence differ from the related total value shown in the text and in the picture.

The Netherlands

The total amount of bidirectional rail freight traffic departing from/arriving to the Dutch ports of the RFC NS-B is equal to 40,730 trains.

Figure 3-13 – Bidirectional train traffic at the Ports of the Netherlands in the catchment area



Source: Own elaboration on 2017 data provided by the Infrastructure Managers. Notes: all numbers are rounded to the nearest ten; relations with a train frequency lower than 100 trains per year were not plotted; Venlo (NL) – Kaldenkirchen (DE) was not considered for analysis in this TMS due to the partial operation of the Iron Rhine line at present

The traffic share among the Ports in the catchment area is the following[5]:

- 3,980 trains (9.8%) to/from the Port of Amsterdam;
- 29,830 trains (73.2%) to/from the Port of Rotterdam;
- 3,010 trains (7.4%) to/from the Port of Moerdijk;
- 2,760 trains (6.8%) to/from the North Sea Port Vlissingen Sloehaven;
- 1,150 trains (2.83%) to/from the North Sea Port Terneuzen (Dutch Flanders).

[5] Figures are rounded to the nearest ten. The sum of the individual train relations might hence differ from the related total value shown in the text and in the picture.

The traffic volume is distributed as follows:

- 27,800 trains (68.3%) to/from Corridor BCPs;
- 6,930 trains (17.0%) to/from Venlo (NL) - Kaldenkirchen (DE);
- 6,000 trains (14.7%) to/from international O/Ds crossing non Corridor BCPs (non Corridor BCPs were not specified in the documentation available from the Infrastructure Managers).

Germany

The total amount of bidirectional rail freight traffic crossing one of the Western BCPs in Germany is equal to 53,820 trains. Details are represented in

Figure 3-14 overleaf.

The Corridor traffic share among the Western BCPs is the following[6]:

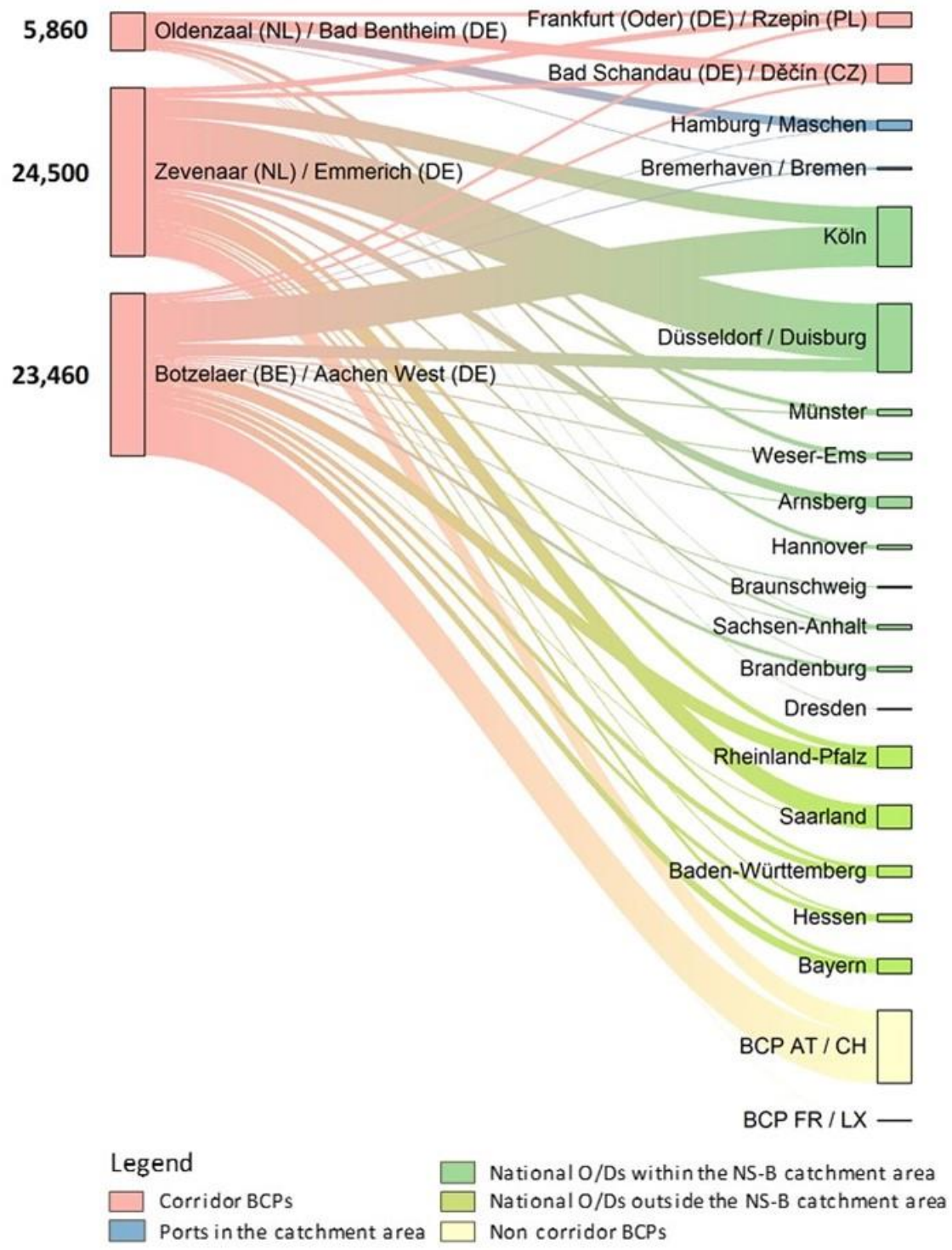
- 5,860 trains (10.9%) to/from the Oldenzaal (NL) - Bad Bentheim (DE);
- 24,500 trains (45.5%) to/from the Zevenaar (NL) - Emmerich (DE) BCP;
- 23,460 trains (43.6%) to/from the Botzelaer (BE) - Aachen West (DE) BCP.

The traffic volume is distributed as follows:

- 4,880 trains (9.1%) to/from Corridor BCPs;
- 1,910 trains (3.5%) to/from Ports in the Corridor catchment area;
- 24,820 trains (46.1%) to/from national O/Ds within the Corridor catchment area;
- 11,520 trains (21.4%) to/from national O/Ds outside the Corridor catchment area;
- 10,700 trains (19.9%) to/from international O/Ds crossing non Corridor BCPs.

[6] Figures are rounded to the nearest ten. The sum of the individual train relations might hence differ from the related total value shown in the text and in the picture.

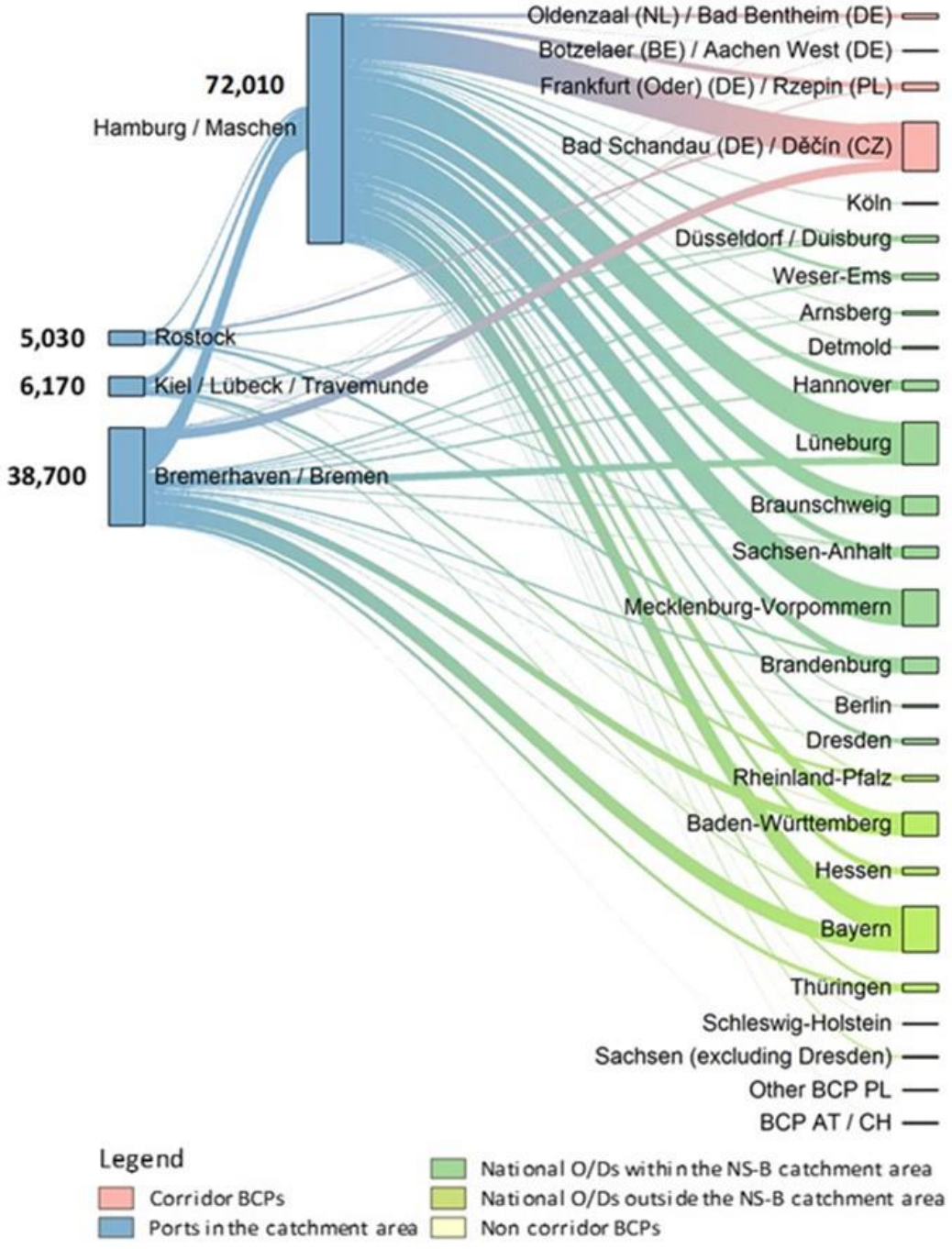
Figure 3-14 – Bidirectional train traffic at the Botzelaer (BE) - Aachen (DE), Zevenaar (NL) - Emmerich (DE) and Oldenzaal (NL) - Bad Bentheim (DE) BCPs – Germany side



Source: Own elaboration on 2017 data provided by the Infrastructure Managers. Notes: all numbers are rounded to the nearest ten; relations with a train frequency lower than 100 trains per year were not plotted

The total amount of bidirectional rail freight traffic departing from/arriving to the German ports of the RFC NS-B is equal to 121,920 trains, including 13,740 trains operating between the German ports in the catchment area and the marshalling yard of the port of Hamburg/Maschen.

Figure 3-15 – Bidirectional train traffic at the Ports of Germany in the catchment area



Source: Own elaboration on 2017 data provided by the Infrastructure Managers. Notes: all numbers are rounded to the nearest ten; relations with a train frequency lower than 100 trains per year were not plotted

The traffic share among the ports in the Corridor catchment area is the following[7]:

- 72,010 trains (59.1%) to/from the Port of Hamburg/Maschen;
- 5,030 trains (4.1%) to/from the Port of Rostock;
- 6,170 trains (5.1%) to/from Ports of Kiel/Lübeck/Travemunde;
- 38,700 trains (31.7%) to/from the Ports of Bremerhaven/Bremen, of which:
  - 30,400 (78.6%) to/from Bremerhaven;
  - 8,300 (21.4%) from Bremen.

The traffic volume is distributed as follows:

- 19,680 trains (18.2%) to/from Corridor BCPs;
- 55,760 trains (51.6%) to/from national O/Ds within the Corridor catchment area;
- 31,660 trains (29.3%) to/from national O/Ds outside the Corridor catchment area;
- 1,060 trains (1.0%) to/from international O/Ds crossing non Corridor BCPs.

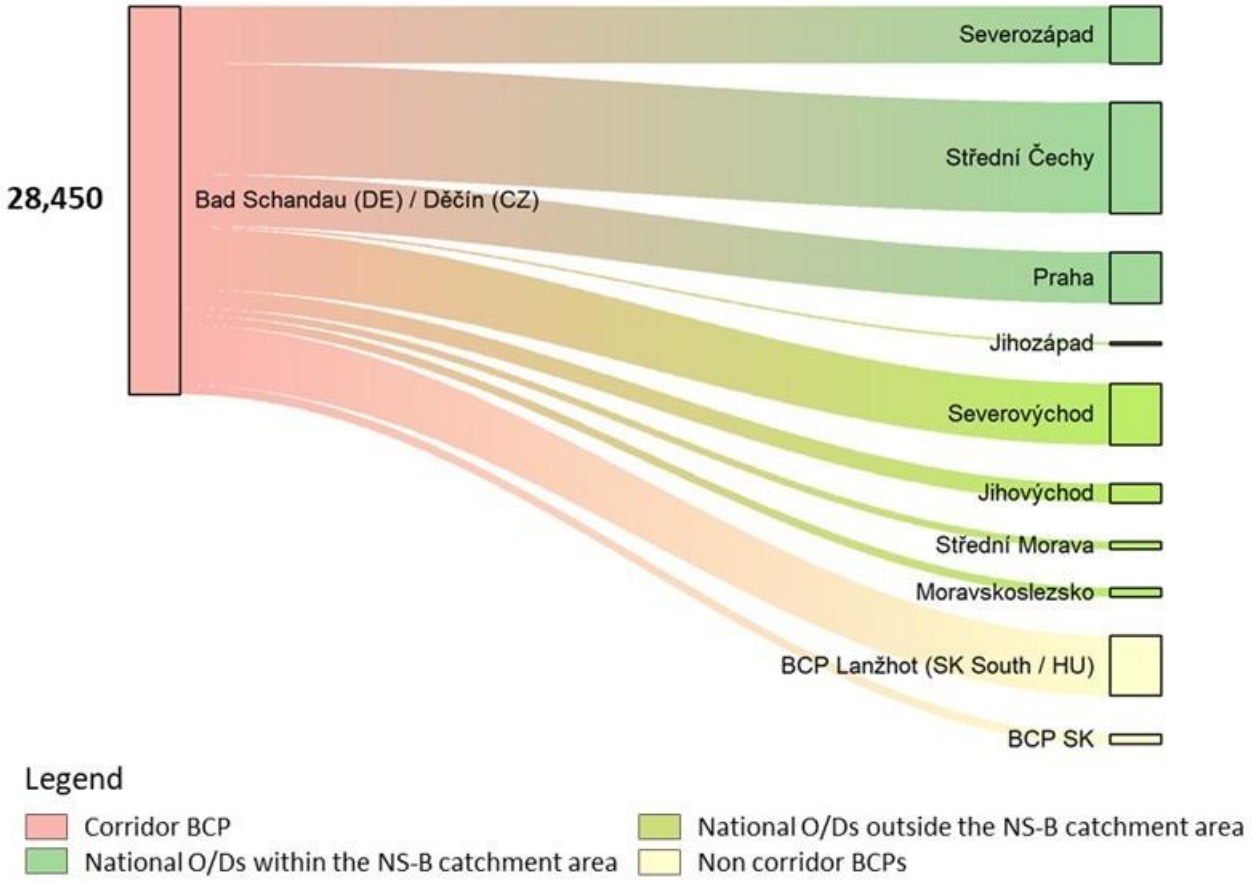
Train traffic flows in Germany were also analysed for the Corridor extension Rostock – Priestewitz / Dresden via Berlin. This North-South Corridor extension, running from Rostock to Priestewitz through Berlin, crosses the current West-East alignment of the RFC NS-B, eventually connecting Rostock to the BCP of Bad Schandau (DE) - Děčín (CZ). The potential market of rail demand was hence quantified by calculating the total bidirectional train traffic between the Bad Schandau (DE) - Děčín (CZ) BCP and the stations located within the NUTS 2 regions that are concerned by such Corridor extension, i.e. Brandenburg, Berlin and Mecklenburg-Vorpommern. The resulting total traffic is equal to 4,260 trains, which corresponds to 15.0% of the total traffic to/from the Bad Schandau (DE) - Děčín (CZ) BCP.

[7] Figures are rounded to the nearest ten. The sum of the individual train relations might hence differ from the related total value shown in the text and in the picture.

The Czech Republic

The total amount of bidirectional rail freight traffic crossing the Bad Schandau (DE) - Děčín (CZ) BCP in the Czech Republic is equal to 28,450 trains.

Figure 3-16 – Bidirectional train traffic at the Bad Schandau (DE) - Děčín (CZ) BCP – Czech side



Source: Own elaboration on 2017 data provided by the Infrastructure Managers. Notes: all numbers are rounded to the nearest ten; relations with a train frequency lower than 50 trains per year were not plotted

The traffic volume is distributed as follows[8]:

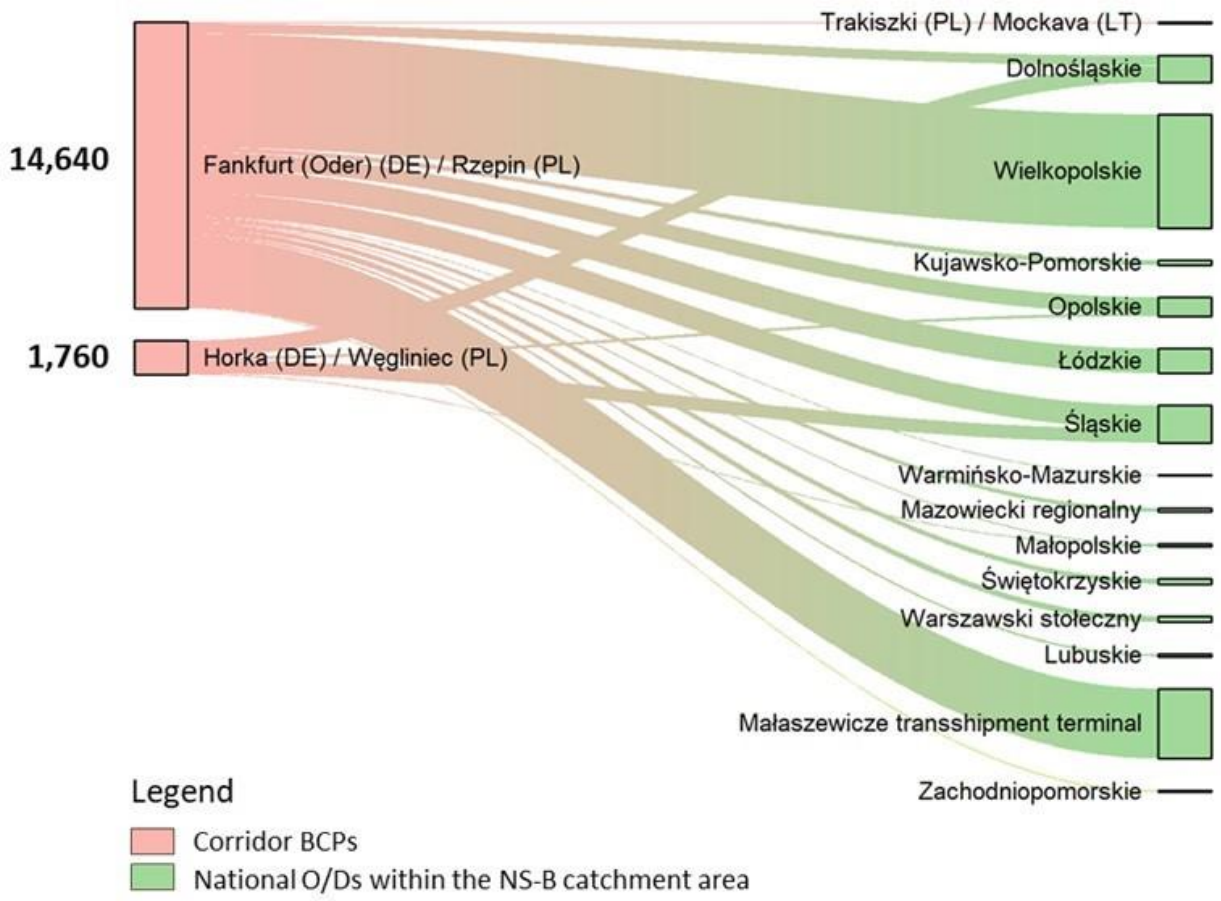
- 16,040 trains (56.4%) to/from national O/Ds within the Corridor catchment area;
- 7,260 trains (25.5%) to/from national O/Ds outside the Corridor catchment area;
- 5,150 trains (18.1%) to/from international O/Ds crossing non Corridor BCPs.

[8] Figures are rounded to the nearest ten. The sum of the individual train relations might hence differ from the related total value shown in the text and in the picture.

Poland

The total amount of bidirectional rail freight traffic crossing the Western BCPs in Poland is equal to 16,400 trains.

Figure 3-17 – Bidirectional train traffic at the Frankfurt (Oder) (DE) - Rzepin (PL) and Horka (DE) - Węgliniec (PL) BCPs – Poland side



Source: Own elaboration on 2017 data provided by the Infrastructure Managers. Notes: all numbers are rounded to the nearest ten; relations with a train frequency lower than 50 trains per year were not plotted

The Corridor traffic share among the Western BCPs is the following[9]:

- 14,640 trains (89.3%) to/from the Frankfurt (Oder) (DE) - Rzepin (PL) BCP;
- 1,760 trains (10.7%) to/from the Horka (DE) - Węgliniec (PL).

The traffic volume is distributed as follows:

- 16,190 trains (98.7%) to/from national O/Ds within the Corridor catchment area;
- 90 trains (0.6%) to/from Corridor BCPs;

[9] Figures are rounded to the nearest ten. The sum of the individual train relations might hence differ from the related total value shown in the text and in the picture.

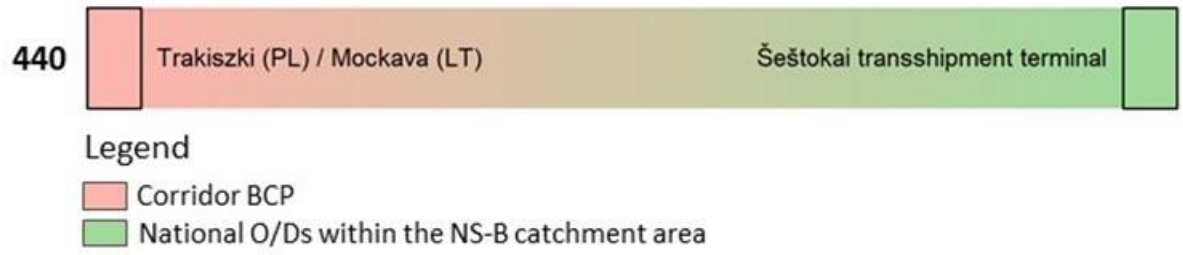
- 80 trains (0.5%) to/from national O/Ds outside the Corridor catchment area (not shown in the plot);
- 50 trains (0.3%) to/from international O/Ds crossing non Corridor BCPs (not shown in the plot).

Lithuania

The total amount of bidirectional rail freight traffic crossing the Trakiszki (PL) - Mockava (LT) BCP is equal to 440 trains. The totality of this traffic volume is originated/directed to Šeštokai, i.e. a national O/D within the RFC NS-B catchment area.

This result depends on the fact that the railway station of Šeštokai is currently the only terminal that allows the transhipment from the 1,435 mm gauge infrastructure to the 1,520 mm one.

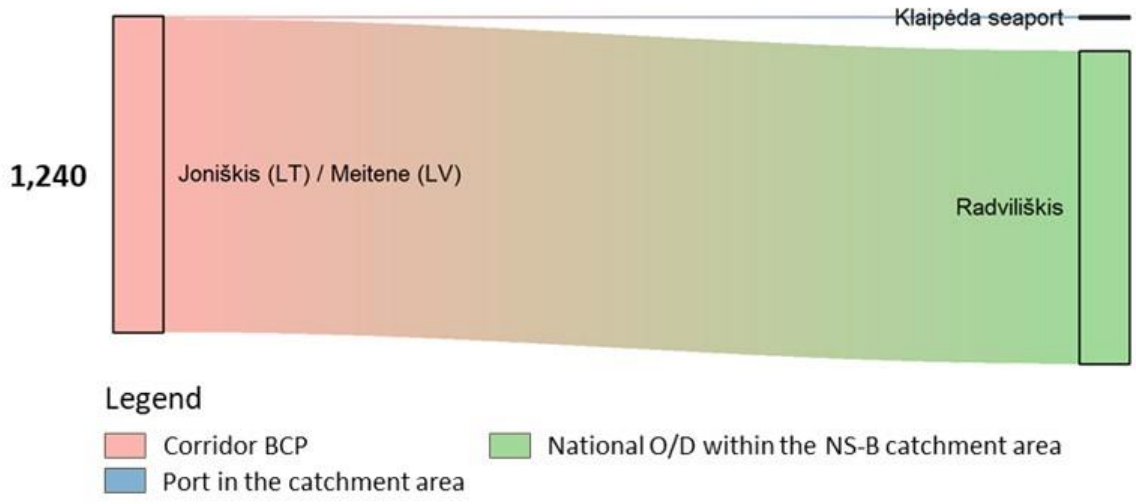
Figure 3-18 – Bidirectional train traffic at the Trakiszki BCP – Lithuania side



Source: Own elaboration on 2017 data provided by the Infrastructure Managers. Notes: all numbers are rounded to the nearest ten

The total amount of bidirectional rail freight traffic crossing the Joniškis (LT) - Meitene (LV) BCP is equal to 1,240 trains.

Figure 3-19 – Bidirectional train traffic at the Joniškis (LT) - Meitene (LV) BCP – Lithuania side



Source: Own elaboration on 2017 data provided by the Infrastructure Managers. Notes: all numbers are rounded to the nearest ten

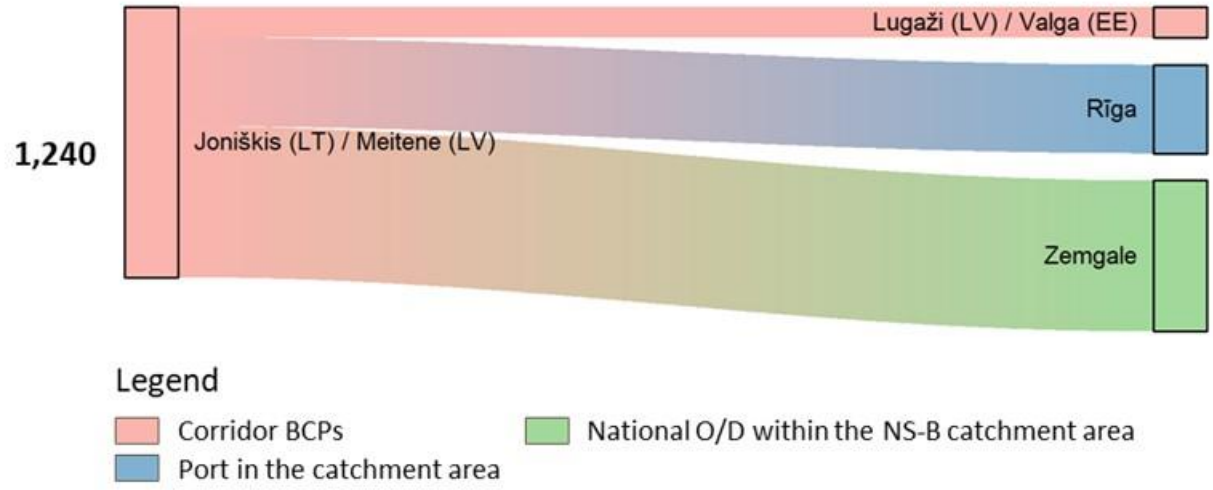
This traffic volume is distributed as follows[10]:

- 1,230 trains (99.1%) to/from Radviliškis, a national O/D within the Corridor catchment area;
- 10 trains (0.9%) to/from the Port of Klaipeda (no trains are present in the database with O/Ds in other ports).

Latvia

The total amount of bidirectional rail freight traffic crossing the Joniškis (LT) - Meitene (LV) BCP is equal to 1,240 trains.

Figure 3-20 – Bidirectional train traffic at the Joniškis (LT) - Meitene (LV) BCP – Latvia side



Source: Own elaboration on 2017 data provided by the Infrastructure Managers. Notes: all numbers are rounded to the nearest ten

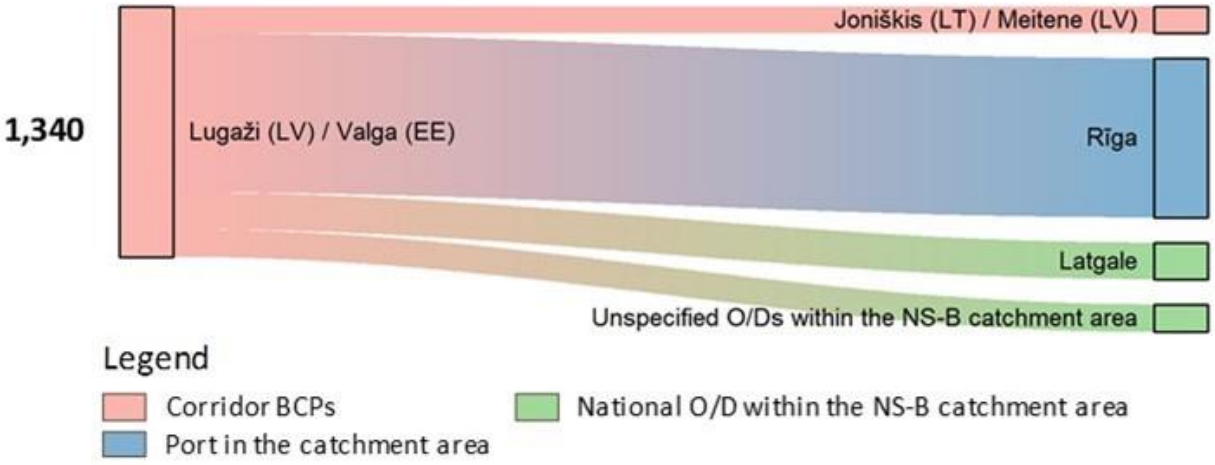
This traffic volume is distributed as follows:

- 140 trains (11.3%) to/from the Corridor BCP of Lugaži (LV) - Valga (EE);
- 410 trains (32.7%) to/from the Port of Riga;
- 690 trains (56.0%) to/from the region of Zemgale, a national destination within Latvia.

[10] Figures are rounded to the nearest ten. The sum of the individual train relations might hence differ from the related total value shown in the text and in the picture.

The total amount of bidirectional rail freight traffic crossing the Lugaži (LV) - Valga (EE) BCP is equal to 1,340 trains.

Figure 3-21 – Bidirectional train traffic at the Lugaži (LV) - Valga (EE) BCP – Latvia side



Source: Own elaboration on 2017 data provided by the Infrastructure Managers. Notes: all numbers are rounded to the nearest ten

This traffic volume is distributed as follow[11]:

- 140 trains (10.5%) to/from the Corridor BCP of Joniškis (LT) - Meitene (LV);
- 860 trains (63.9%) to/from the Port of Riga (840) and Ventspils (20);
- 350 trains (25.6%) to/from national O/Ds within the Corridor catchment area.

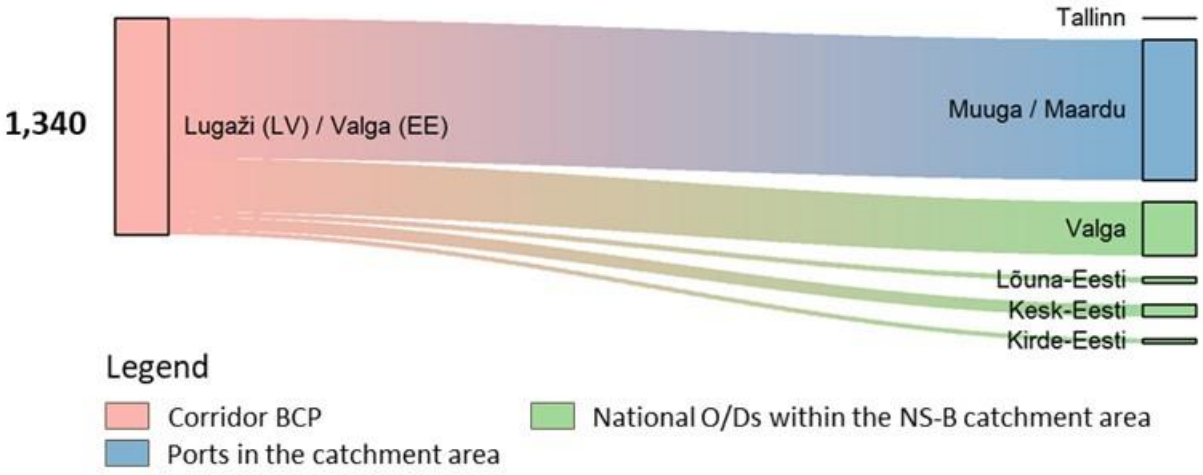
The total amount of bidirectional rail freight traffic departing from/arriving to the Latvian ports in the catchment area is equal to 25,540 trains.

[11] Figures are rounded to the nearest ten. The sum of the individual train relations might hence differ from the related total value shown in the text and in the picture.

Estonia

The total amount of bidirectional rail freight traffic crossing the Lugaži (LV) - Valga (EE) BCP is equal to 1,340 trains.

Figure 3-22 Bidirectional train traffic at the Lugaži (LV) - Valga (EE) BCP – Estonia side



Source: Own elaboration on 2017 data provided by the Infrastructure Managers. Notes: all numbers are rounded to the nearest ten; relations with a train frequency lower than 100 trains per year were not plotted

This traffic volume is distributed as follows:

- 870 trains (64.8%) to/from ports in the Corridor catchment area (mostly Muuga/Maardu);
- 470 trains (35.2%) to/from O/Ds within the Corridor catchment area.

3.6 Analysis of the future transport market on the Corridor

3.6.1. Forecasted land freight transport between RFC NS-B Member States

The RFC NS-B matrix for the total volume of freight transport (road + rail, in terms of tonnes moved yearly) for the years 2017 and 2022 and the 2017-2022 compound annual growth rates are shown in the following tables.

Table 3-8 – 2017 Land freight O/D matrix ('000 tonnes)

		Unloading Country								
		BE	**NL**	**DE**	**CZ**	**PL**	**LT**	**LV**	**EE**	**TOT**
Loading Country	**BE**	0	28,261	26,538	740	3,456	146	52	0	**59,193**
	NL	30,137	0	63,414	1,706	4,974	223	170	46	**100,670**
	DE	24,940	52,892	0	19,050	35,296	685	332	69	**133,264**
	CZ	365	1,280	22,847	0	9,396	75	0	0	**33,963**
	PL	2,330	4,855	40,974	14,519	0	2,878	963	159	**66,678**
	LT	109	173	785	111	3,026	0	3,324	1,244	**8,772**
	LV	75	142	569	0	1,065	2,791	0	1,245	**5,887**
	EE	0	51	155	0	55	492	1,092	0	**1,845**
	TOT	**57,956**	**87,654**	**155,282**	**36,126**	**57,268**	**7,290**	**5,933**	**2,763**	**410,272**

Source: Eurostat. Note: Figures relate to total traffic at country level (NUTS 0)

By comparing the two matrices at 2017 and 2022 the overall land freight transport volume is expected to grow from around 410 million tonnes/year to approximately 484 million tonnes/year, with a CAGR of 3.3%, which is higher than the expected combined GDP growth rate estimated by the IMF (1.9%): the average trade elasticity to GDP is 1.7, which is in line with the observed past trend (2004-2017).

Table 3-9 – 2022 Land freight O/D matrix ('000 tonnes)

		Unloading Country								
		BE	**NL**	**DE**	**CZ**	**PL**	**LT**	**LV**	**EE**	**TOT**
Loading Country	**BE**	-	32,230	29,740	880	4,240	170	60	-	**67,320**
	NL	34,600	-	72,240	2,060	6,210	270	210	60	**115,650**
	DE	27,980	60,220	-	22,530	43,180	820	400	80	**155,210**
	CZ	430	1,540	27,020	-	12,170	90	-	-	**41,250**
	PL	2,860	6,060	50,130	18,810	-	3,740	1,280	210	**83,090**
	LT	130	210	930	140	3,930	-	4,300	1,590	**11,230**
	LV	90	180	690	-	1,420	3,610	-	1,630	**7,620**
	EE	-	60	190	-	70	630	1,430	-	**2,380**
	TOT	**66,090**	**100,500**	**180,940**	**44,420**	**71,220**	**9,330**	**7,680**	**3,570**	**483,750**

Source: Own elaboration on Eurostat data. Notes: Figures (rounded to the nearest 10) relate to total traffic at country level (NUTS 0)

The largest bi-directional trade lane on the Corridor in 2022 is expected to be between the Netherlands and Germany, which is also the most meaningful one in 2017: the total volume

on this trade lane is expected to grow from 116 to 132 million tonnes per year, with a CAGR of 2.6%, slightly lower than the Corridor average (i.e. 3.3%). In the 2022 matrix, the fastest growing O/Ds relate to the Eastern part of the RFC NS-B, and especially concern Poland and the three Baltic States; high growth is also expected between the Czech Republic and Poland, whereas growth rates, albeit positive, are lower for O/Ds between the Western Member States. No trade lane is expected to decrease, in line with the positive economic outlook for all Member States along the RFC NS-B.

Table 3-10 – 2017-2022 Land freight growth rates by O/D

Loading Country \ Unloading Country	BE	NL	DE	CZ	PL	LT	LV	EE	TOT
BE	-	**2.7%**	**2.3%**	**3.5%**	**4.2%**	**3.1%**	**2.9%**	-	**2.6%**
NL	**2.8%**	-	**2.6%**	**3.8%**	**4.5%**	**3.9%**	**4.3%**	**5.5%**	**2.8%**
DE	**2.3%**	**2.6%**	-	**3.4%**	**4.1%**	**3.7%**	**3.8%**	**3.0%**	**3.1%**
CZ	**3.3%**	**3.8%**	**3.4%**	-	**5.3%**	**3.7%**	-	-	**4.0%**
PL	**4.2%**	**4.5%**	**4.1%**	**5.3%**	-	**5.4%**	**5.9%**	**5.7%**	**4.5%**
LT	**3.6%**	**4.0%**	**3.4%**	**4.8%**	**5.4%**	-	**5.3%**	**5.0%**	**5.1%**
LV	**3.7%**	**4.9%**	**3.9%**	-	**5.9%**	**5.3%**	-	**5.5%**	**5.3%**
EE	-	**3.3%**	**4.2%**	-	**4.9%**	**5.1%**	**5.5%**	-	**5.2%**
TOT	**2.7%**	**2.8%**	**3.1%**	**4.2%**	**4.5%**	**5.1%**	**5.3%**	**5.3%**	**3.3%**

Source: Own elaboration on Eurostat data. Notes: Figures relate to total traffic at country level (NUTS 0); Figures in bold green present higher values compared to 2017 data

3.6.2. Forecasted rail freight transport between RFC NS-B Member States

The NS-B matrix for rail freight transport is provided below for 2022, in terms of tonnes moved yearly, together with the compound annual growth rates for the period 2017-2022. The transport volume by rail is expected to grow from around 74 million tonnes/year (see Table 3-1) to about 85 million tonnes/year, with a CAGR of 2.8%.

Table 3-11 – 2022 Rail freight O/D matrix ('000 tonnes)

Loading Country \ Unloading Country	BE	NL	DE	CZ	PL	LT	LV	EE	TOT
BE	-	760	3,930	170	60	-	-	-	**4,920**
NL	690	-	21,200	1,680	830	-	-	-	**24,400**
DE	3,160	5,830	-	12,190	5,480	40	-	-	**26,700**
CZ	90	1,250	9,330	-	2,420	-	-	-	**13,090**
PL	80	810	6,920	5,810	-	70	-	-	**13,690**
LT	-	-	-	-	580	-	970	690	**2,240**
LV	-	-	-	-	-	90	-	40	**130**
EE	-	-	-	-	-	20	140	-	**160**
TOT	**4,020**	**8,650**	**41,380**	**19,850**	**9,370**	**220**	**1,110**	**730**	**85,330**

Source: Tplan Consulting elaboration on Eurostat data; Note: Figures (rounded to the nearest 10) relate to total traffic at country level (NUTS 0)

Overall, the rail share is expected to slightly decrease from 18.1% in 2017 to 17.6% in 2022. The largest bi-directional trade lane on the Corridor in 2022 is expected to be between the Netherlands and Germany, which is also the most significant trade lane in 2017: the total volume on this O/D is expected to grow from 23 million tonnes to 27 million tonnes per year, with a CAGR of 2.9%, higher than the Corridor average (i.e. 2.8%) and also slightly higher than the growth in road transport on the same trade lane.

Table 3-12 – 2017-2022 Rail freight growth rates by O/D

Loading Country \ Unloading Country	BE	NL	DE	CZ	PL	LT	LV	EE	TOT
BE	-	-2.6%	**0.5%**	**7.8%**	-4.4%	-	-	-	**0.2%**
NL	**0.4%**	-	**2.8%**	**5.3%**	**6.8%**	-	-	-	**3.0%**
DE	**2.3%**	**3.5%**	-	**5.3%**	**4.8%**	**32.0%**	-	-	**4.4%**
CZ	**4.9%**	**5.5%**	**3.7%**	-	-0.8%	-	-	-	**3.0%**
PL	-1.4%	**5.9%**	**1.2%**	**0.4%**	-	**4.9%**	-	-	**1.1%**
LT	-	-	-	-	**6.8%**	-	-1.7%	-1.2%	**0.2%**
LV	-	-	-	-	-	-8.6%	-	-15.9%	-12.7%
EE	-	-	-	-	-	-5.1%	-6.1%	-	-6.0%
TOT	**1.9%**	**3.3%**	**2.5%**	**3.7%**	**3.3%**	-1.1%	-2.4%	-2.5%	**2.8%**

Source: Own elaboration on Eurostat data; Note: Figures relate to total traffic at country level (NUTS 0); Figures in bold green present higher values compared to 2017 data, figures in red indicate lower values compared to 2017 data

In the 2017-2022 period, the fastest-growing O/Ds are between the Netherlands, Germany and the Czech Republic, Poland and Lithuania. Rail volumes are instead expected to decline between the Baltic States, which at least up until the completion of the ongoing modernisation works on the existing lines expected by 2022/2023 and the subsequent realisation of the Rail Baltica Global Project may suffer from competition with other transport modes. The expected outlook for railway transport could be higher than described in the previous paragraphs above if looking at combined rail transport alone, for which the growth expectations are higher. The data available, however, do not allow developing separate forecast for this segment.

3.6.3. RFC NS-B future train flows at BCPs

Further to an estimation of transport flows along the Corridor, train flows at BCPs have been also estimated by 2022. The results are reported in Table 3-13 below.

Table 3-13 – 2017-2022 Comparison of train flows at BCPs

Border pair	2017(*)	2022	DIFF.	DIFF. %
Essen (BE) – Roosendaal (NL)	8,130	8,190	60	0.7%
Botzelaer (BE) – Aachen West (DE)	23,460	25,870	2,410	10.3%
Zevenaar (NL) – Emmerich (DE)	24,500	29,250	4,750	19.4%
Oldenzaal (NL) – Bad Bentheim (DE)	5,860	6,580	720	12.3%
Bad Schandau (DE) – Děčín (CZ)	28,450	34,990	6,540	23.0%
Frankfurt (Oder) (DE) – Rzepin (PL)	14,640	16,890	2,250	15.4%
Horka (DE) – Węgliniec (PL)	1,760	4,220	2,460	139.8%
Trakiszki (PL) – Mockava (LT)	440	870	430	97.7%
Joniškis (LT) – Meitene (LV)	1,240	1,010	-230	-18.5%
Lugaži (LV) – Valga (EE)	1,340	800	-540	-40.3%
TOTAL	**109,820**	**128,670**	**18,850**	**17.2%**

*Source: Own elaboration on 2017 data provided by the Infrastructure Managers. Note: *rounded figures*

The analysis shows that:

- The total traffic growth at BCPs is expected to be around 17%;
- Traffic is expected to remain relatively stable at the Essen (BE) - Roosendaal (NL) BCP;
- Traffic at the Zevenaar (NL) – Emmerich (DE) BCP is expected to grow by 19.4% specified that the forecasts do not take into consideration the potential disruptions due to the construction works of the 3rd track between Emmerich and Oberhausen, planned to be completed by 2022, which may reduce capacity and hence traffic at the border crossing section during the construction period;
- Traffic is expected to grow on all the other BCPs between Belgium, the Netherlands, Germany, the Czech Republic, Poland and Lithuania. The fastest growing BCPs are expected to be Horka (DE) – Węgliniec (PL), where the completion of the modernisation works are expected to support traffic growth, and Trakiszki (PL) – Mockava (LT);
- Traffic crossing the BCP Frankfurt (DE) – Rzepin (PL) is expected to increase by 15.4%, particularly due to the positive contribution of the long-distance traffic from Germany or other Western countries and Central Asia and Asia along the Eurasia Land Bridge, through the Małaszewicze – Terespol transhipment terminal. Traffic along this route and between the trade relation Germany-Poland is expected to be shared between the Frankfurt (DE) – Rzepin (PL) BCP (80%) and the Horka (DE) – Węgliniec (PL) one (20%);

- Traffic is expected to register a decline at the Corridor BCPs between the Baltic States.

Further to the train traffic forecasts at the RFC NS-B BCPs related to the flows between the Corridor Member States, the table below provides the expected trains at the Terespol border station, which is currently the RFC NS-B most relevant crossing point between the European Union and neighbouring countries along the Eurasia Land Bridge.

Table 3-14 – 2017-2022 Comparison of train flows at Terespol

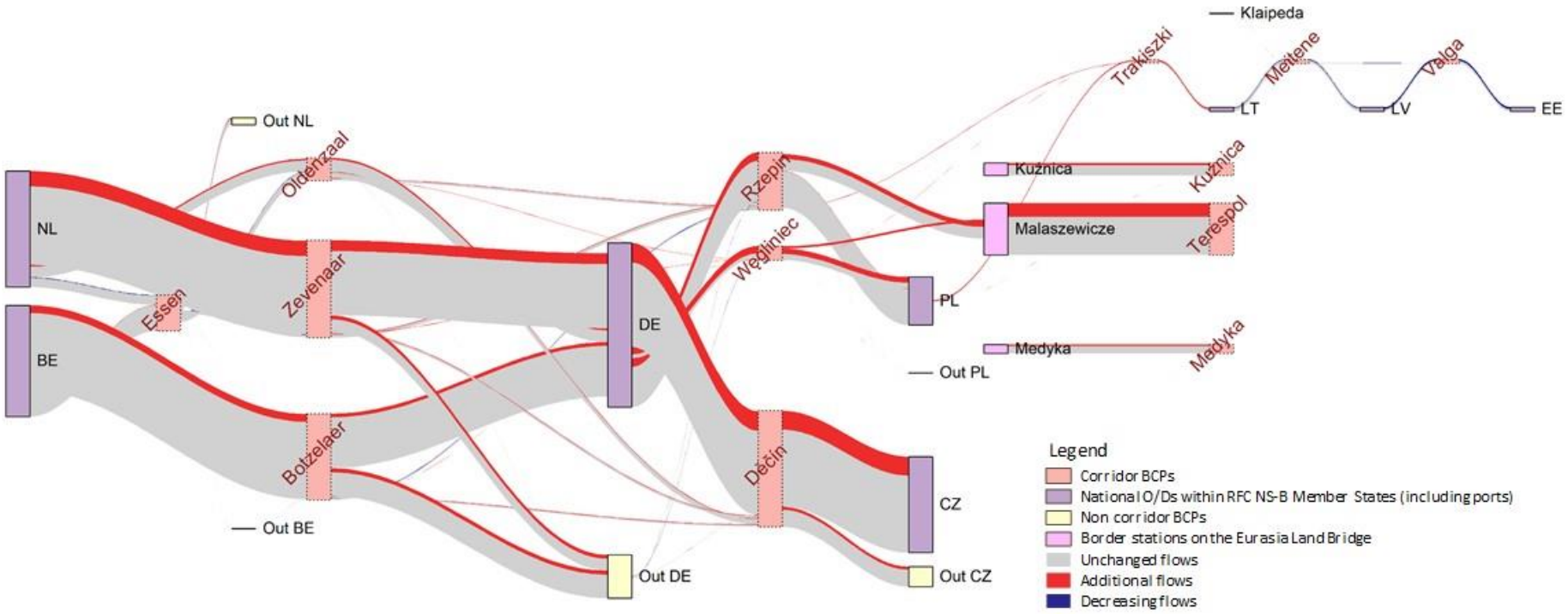
Border station	2017(*)	2022	DIFF.	DIFF. %
Terespol	11,570	15,720	4,150	21.7%

*Source: Own elaboration on 2017 data provided by the Infrastructure Managers. Note: *rounded figures*

With reference to the Corridor flow chart in

Figure 3-11, the graph in Figure 3-23 below represents all the train relations along the whole RFC NS-B involving a Corridor BCP between the RFC NS-B Member States, highlighting the volume of trains expected to be operated in 2022, also showing differences in comparison to 2017 train traffic flows. The grey parts of each relation represent indeed the component of the 2022 traffic flow that already existed in 2017; the red parts quantify the additional component due to traffic growth compared to 2017, whilst the blue ones represent the amount of decreased traffic. As also represented in Table 3-13, most O/Ds will experience growth, especially at the Western BCPs and towards the Czech Republic, Poland and Lithuania. Traffic growth at Rzepin is also related to the increase of traffic along the Eurasia Land Bridge. Train traffic is expected to slightly reduce between the Baltic States by 2022, which is however likely to grow after this period as an effect of the completion of the ongoing works on the existing 1,520 mm track gauge lines and subsequent realisation of the 1,435 mm track gauge Rail Baltica Global Project. Whereas the works on the existing lines are foreseen to be completed by 2022/2023, the Rail Baltica Global Project is currently foreseen to become operational by 2026. Based on the available data, forecasts specific to the traffic with O/Ds from the RFC NS-B ports were not possible to be elaborated.

Figure 3-23 – 2017-2022 Comparison of train flows along the Corridor



Source: Own elaboration on 2017 data provided by the IMs. Note: relations with a train frequency lower than 100 trains per year are not plotted; Train data for the Kuźnica Małaszewicze and Medyka border stations were provided only between these stations and the border crossing points with Belarus and Ukraine. Train data between the Kuźnica Małaszewicze and Medyka border stations and the Polish Corridor BCPs of Frankfurt (Oder) (DE) – Rzepin (PL) and Horka (DE) – Węgliniec (PL) were available from the dataset related to these BCPs. According to O/D data at these BCPs, no traffic appears to exist in 2017 between them and the border crossing stations of Kuźnica and Medyka. In absence of O/D data for 2017, also 2022 O/Ds were not possible to be represented in the plot for these two border crossing stations

3.7 Summary of the Rail Baltica Global Project

The Trans-European Rail Baltica Global Project is aimed at linking the Baltic States with the existing European rail network. This new rail infrastructure will connect Finland, the Baltic States of Lithuania, Latvia and Estonia, and Poland, while improving and upgrading the route in Western Europe.

Figure 3-24 – Rail Baltica connection

Technical parameters	
Total line length (Baltic States)	**870 km**
Design speed	**249 km/h for passenger trains**
	120 km/h for freight trains
Double-track electrified	**2x25kVAC**
Axle load	**25 tonnes**
Traffic management	**ERTMS Level 2**
Maximum length of freight trains	**1,050m**

Source: Rail Baltica

Rail Baltica shall unify the European railway transport system by linking the Baltic States 1,520mm gauge track to the 1,435mm European standard gauge. The total length of the lines in the Baltic States amounts to 870km: 392km in Lithuania, 265km in Latvia and 213km in Estonia. According to official sources, the Baltic route should be completed by 2025 and be operational by 2026; the link to Warsaw should be finished by 2030.

In the context of this report, transport forecasts included in the "Rail Baltica Global Project Cost-Benefit Analysis" finalised by Ernst and Young (EY) in 2017 are summarised, which have been made available by the RFC NS-B IMs for their inclusion in the TMS.

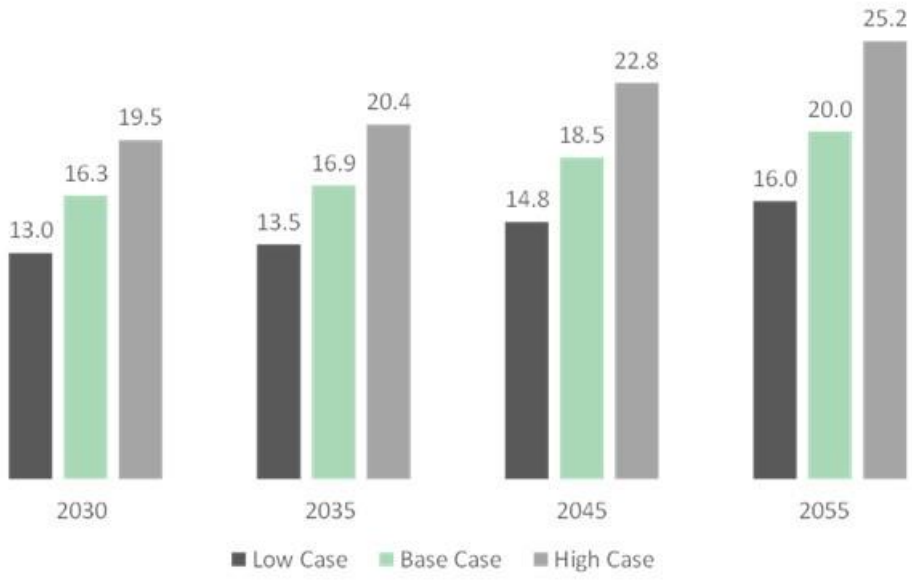
Freight traffic forecasts are based on the combination of future market growth assumptions (i.e., what is the size of the overall market in a particular year), as well as future modal assignment and modal choice assumptions (i.e., what modes are expected to be chosen for freight shipments). Different assumptions have been adopted concerning the modes expected to be chosen for freight shipments. Different assumptions have been also considered to elaborate three forecasting scenarios: base, low and high case.

The growth rate and the dynamics of the potential flows for Rail Baltica replicate the expected development of the GDP of the countries within the scope of the CBA, with relatively fast development in the next 10 years (1.9-2.0% CAGR) with eventual slowdown further in the future as the Baltic States economic growth converges to the slower growth rates of the Western and Central European countries.

In addition to the overall market growth, the share of potential flows for Rail Baltica in the total market is also expected to increase gradually (due to the expected general strengthening of the position of Rail Baltica in the market).

The following Figures present the forecasted freight flows for the three scenarios considering the timeframes 2030, 2035, 2045 and 2055.

Figure 3-25 – Rail Baltica Freight Market Forecast (million tonnes)

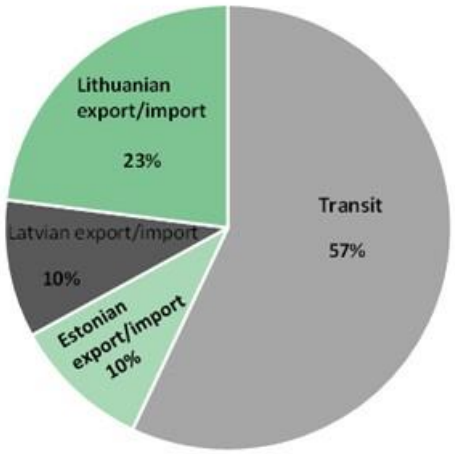


Source: Rail Baltica Global Project Cost-Benefit Analysis Final Report, 30 April 2017

The freight forecast expects 57% of the total traffic along the Rail Baltica infrastructure will be related to transit flows associated with the trade lanes between Finland, the Commonwealth of Independent States (CIS) and the rest of Europe.

The leading Baltic country for international freight flows is Lithuania with 23% of the share, followed by Estonia and Latvia with 10% of the share each. This derives from the observation that overall trade ties with selected trade partner countries are stronger for Lithuania.

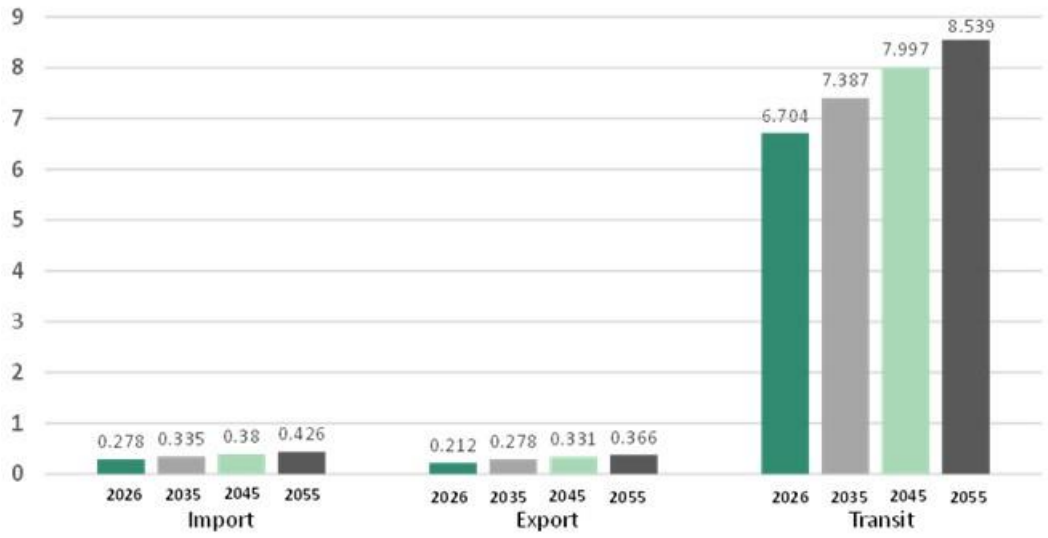
Figure 3-26 – Structure of freight transport



Source: Rail Baltica Global Project Cost-Benefit Analysis Presentation, 24 April 2017

As mentioned above a significant part of the freight operated via the Rail Baltica consists of transit between the countries with 1,520mm railway gauge system (CIS) and the EU. The volumes of freight serviced by Rail Baltica that relate to the 1,520mm railway gauge system are presented in Figure 3-27. According to forecast modelling, the annual transit flows will grow from approx. 6.7 million tonnes to 8.5 million tonnes during the forecast period, and are complemented by a minor volume of trade originating or ending in the Baltic States of almost 0.8 million tonnes in 2055 (such cargoes would occur in the case that Rail Baltica is used as part of the shipment, for example, Estonia's exports to Belarus would partially use Rail Baltica until intermodal terminals in Latvia or Lithuania where they would be trans-loaded onto the 1,520mm railway gauge system).

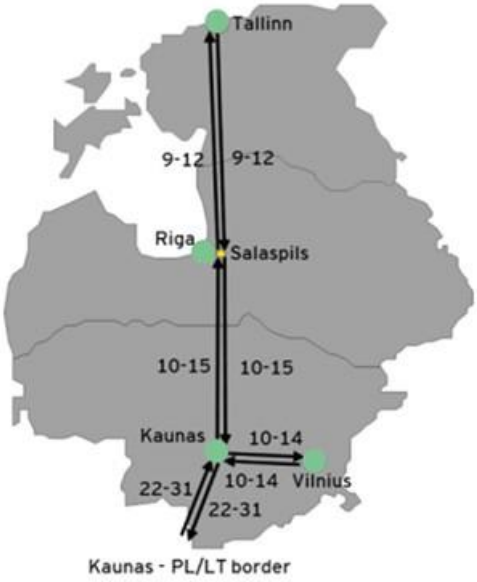
Figure 3-27 – Transit between the countries with 1,520mm railway system (CIS) and the EU (Base case) (million tonnes)



Source: Rail Baltica Global Project Cost-Benefit Analysis Final Report, 30 April 2017

Figure 3-28 below visualises these train movements on a map for the base case scenario considering the development from 2030 to 2050.

Figure 3-28 – Daily freight trains per section (Base case, 2030 – 2050)



Source: Rail Baltica Global Project Cost-Benefit Analysis Final Report, 30 April 2017. Note: 2026 data not available

3.8 Concluding remarks

The purpose of this TMS consisted in the updating of the analysis performed in the first RFC NS-B TMS of 2014, with reference to the existing Corridor lines as established in November 2015, to be expanded to include the planned extensions from Kaunas to Riga and Tallinn as foreseen by Annex II of Regulation (EU) 1316/2013 (CEF Regulation) that amended the Annex to Regulation (EU) 913/2010 (with the initial rail freight Corridors), as well as the proposed extensions Rostock – Priestewitz / Dresden via Berlin, Praha-Libeň – Kolín and Katowice – Medyka. In fulfilment of the above objectives, the current study provides an updated view on the potential traffic trends on the RFC NS-B and on the planned and proposed extensions.

Eurostat freight transport statistics and train data provided by the RFC NS-B IMs have been collected and processed which allowed identifying the major trade lanes and traffic flows along the RFC NS-B. The largest O/D in terms of transport volumes is represented by the trade lane between the Netherlands and Germany, registering in 2017 more than 23 million tonnes of goods. Other important rail trade relations in terms of inbound and outbound traffic can be identified between the Czech Republic and Germany (about 17 million tonnes in 2017) as well as between Poland and Germany, though to a lower extent (i.e. almost 11 million tonnes in 2017). Overall, rail freight volumes and traffic are higher in the Western part of the RFC NS-B (Belgium, the Netherlands, Germany, the Czech Republic and partly Poland and Lithuania) and lower in the Baltic States.

Looking at the transport trends since 2004, the Corridor shows heterogeneous patterns with reference to the rail share of freight transport: data seem confirming a dualism, with the market share for rail growing or stabilising in the Western part of the RFC NS-B (in particular in the Netherlands, Germany, Czech Republic, while Belgium partially shows a downward trend) and a generally declining share for rail in the Eastern part of the RFC NS-B (with relatively stronger decline in the Baltic States). This can be partly explained by the need to modernise the infrastructure in the Eastern part of the RFC NS-B and by the interoperability gap affecting the Baltic States network that further to Kaunas is not at European standard gauge. Several projects are however ongoing and planned for the modernisation of the existing RFC NS-B lines in Poland as well as in the Baltic States that are expected to be completed by 2022/2023, which may contrast the decline in transport and traffic flows along the RFC NS-B in the Baltic States after 2022 and help capturing traffic from the maritime sector. These initiatives, many of them co-financed by the Connecting Europe Facility (CEF), are also expected to attract and generate traffic along the Eurasia Land Bridge trade lanes in these countries. Rail transport and traffic along the RFC NS-B particularly in the Baltic States is moreover expected to be further enhanced by the completion of the Rail Baltica Global Project, currently foreseen by 2026. The above mentioned heterogeneous pattern since 2004 seems also reflecting a fragility of the rail sector that generally suffers from the competition of road transport and requires governmental regulation to keep and increase its attractiveness. In this respect it is worth mentioning the introduction of subsidies on Track Access Charges (TAC) to be reflected in the price of rail transport to shippers by the German and Dutch Governments in 2018 and 2019, which is clearly aimed at supporting the competitiveness of this transport mode.

As part of the TMS a PEST analysis was undertaken in order to identify key political, socioeconomic and technological factors that might impact on the development of rail flows on the Corridor. This analysis highlighted a number of elements that can contribute to the development of rail freight traffic on the RFC NS-B in the period 2017-2022. These include socioeconomic development (GDP), as well as the further development and consolidation of the activities for the implementation of the RFC NS-B and the corresponding CNC NS-B and the above mentioned government incentives to increase attractiveness of rail transport services. The development of the Eurasia Land Bridge clearly represents an opportunity for growth for the RFC NS-B, specified that uncertainties exist at present in terms of all itineraries and routings that will be part of the wider One Belt One Road (OBOR) initiative, and concerning the overall traffic throughput between Europe and Central Asia and Asia, along the different possible itineraries. The continuous improvement of the Corridor infrastructure and of the parameters supporting interoperability and intermodality across the RFC NS-B Member States is finally worth mentioning that represents another condition to sustain rail freight transport and traffic along the Corridor.

Supported by economic growth and by the perspective of further development of trade, including between the EU, Central Asia and Asia, land transport by road and rail in the study

area are expected to grow over the period 2017-2022. More specifically land transport flows between the RFC NS-B Member States are expected to increase from 410 to 484 million tonnes/year, with a CAGR of 3.3%, which is higher than the expected combined GDP growth rate estimated by the IMF for the study area (1.9%). The rail transport volume of the RFC NS-B is also expected to grow from around 74 million tonnes/year to around 85 million tonnes/year, with a CAGR of 2.8% over the 2017-2022 period. Due to the expected higher growth in road transport, that will increase from 336 to 398 million tons/year over the same period, compared to the total flows of road and rail transport, the rail share is expected to slightly decrease from 18.1% of the total land transport in 2017 to 17.6% in 2022. As already specified in previous sections above the expected outlook for railway transport could however be higher if looking at combined rail transport alone, for which the growth expectations are higher. The data available, however, do not allow developing separate forecasts for this segment.

The following key outcomes are worth mentioning with reference to the planned and proposed Corridor extensions:

- With respect to the planned extension in the Baltic States (Kaunas – Riga – Tallinn), the analysis of the existing flows in 2017 shows low traffic levels, that as mentioned above, can be also explained by the lack of interoperability between the network in these countries and the one in the other RFC NS-B Member States, due to the different track gauge. Rail transport and accordingly rail traffic between the Baltic States across the planned extension between Kaunas, Riga and Tallinn are also expected to decline in the short-term. On the other hand the Rail Baltica Global Project is expected to capture relevant traffic volumes, especially traffic transiting these countries along the Eurasia Land Bridge: the annual transit flows will grow from approx. 6.7 million tonnes to 8.5 million tonnes between 2026 and 2055, that will also be complemented by a minor volume of trade originating or ending in the Baltic States of about 0.8 million tonnes by 2055. It is on the basis of these considerations that Latvia has proposed to include in the alignment of the RFC NS-B also the lines interconnecting the Corridor with Belarus via Daugavpils, and with Russia via Rēzekne. Before the opening for traffic of the Rail Baltica Global Project, the works currently ongoing on the existing lines in the Baltic States, expected to be completed by 2022/2023, may also contribute to the improvement of the RFC NS-B traffic performance in this area of the RFC NS-B.
- Concerning the proposed extensions Rostock – Priestewitz / Dresden via Berlin, Praha-Libeň – Kolín and Katowice – Medyka, whereas transport is expected to grow on all of them over the 2017-2022 period, the analysis of the existing traffic shows that:
    - The Corridor extension Rostock – Priestewitz / Dresden via Berlin is expected to serve a relevant share of traffic to/from the border between Germany and the Czech Republic, which is estimated at the base year (2017) to be equal to

4,260 trains, corresponding to 15.0% of the traffic to/from the Bad Schandau (DE) - Děčín (CZ) BCP;

- The Corridor extension Praha-Libeň – Kolín allows widening the catchment area of the RFC NS-B in the Czech Republic. It is also potentially serving traffic to/from the border between Germany and the Czech Republic, for an estimated volume of about 500 trains in 2017, corresponding to 1.8% of the total traffic to/from the Bad Schandau (DE) - Děčín (CZ) BCP;
- The Corridor extension Katowice – Medyka, connects Katowice with Medyka, thus creating a continuous Corridor branch from the BCP of Horka (DE) - Węgliniec (PL) to Medyka. This section will serve train traffic running between the Horka (DE) - Węgliniec (PL) BCP and the NUTS 2 regions involved by the extension of the Corridor, i.e. Śląskie, Małopolskie and Podkarpackie. The total value, equal to 760 trains, represents 43.2% of the total traffic to/from the Horka (DE) - Węgliniec (PL) BCP.

In line with the above considerations, the TMS suggests that the proposed extensions should allow increasing the RFC NS-B catchment area, contributing to strengthening the role of the RFC NS-B as a tool to provide services to the rail operators and appear therefore to be justified under the market point of view.

4. List of measures

All measures listed below (4.1 – 4.8) were implemented at the start of RFC NS-B in November 2015. Some measures were extended and updated to the new Corridor countries or will be in future, but the basic implementation principles did not change. The state of play and further developments regarding concrete measures and procedures are included in Book 4 of the Corridor Information Document TT2021.

4.1 Coordination of planned temporary capacity restrictions

All information on the coordination of planned temporary capacity restrictions can be found in Book 4, chapter 4 of the CID TT2021.

4.2 Corridor One Stop Shop

All information on the Corridor One Stop Shop can be found in Book 4, chapter 2 of the CID TT2021.

4.3 Capacity Allocation Principles

All information on capacity allocation can be found in Book 4, chapter 3 of the CID TT2021.

4.4 Applicants

All information on applicants can be found in Book 4, chapter 3.2 of the CID TT2021.

4.5 Traffic management

All information on traffic management can be found in Book 4, chapter 5 of the CID TT2021.

4.6 Traffic management in the Event of Disturbance

All information on traffic management in the event of disturbance can be found in Book 4, chapter 5.3 of the CID TT2021, including the International Contingency Management.

4.7 Quality Evaluation

4.7.1 Performance Monitoring Report

RFC NS-B publishes an annual Performance Report on its website in the first half of the following year. The figures are presented to the different stakeholders, such as during RAG and TAG meetings. The report is based on the RNE Guidelines on Key Performance Indicators of the Rail Freight Corridors:

http://rne.eu/wp-content/uploads/RNE_Guidelines_KPIs_of_RFCs.pdf.

More information on KPI and objectives can be found in Chapter 5 of this Implementation Plan TT2021.

4.7.2 User Satisfaction Survey

RFC NS-B conducts a satisfaction survey of the users of the Corridor once a year and publishes the results on its website under the link: http://rfc8.eu/customer/customer-satisfaction-survey/.

4.8 Corridor Information Document

The Corridor Information Document (CID), which consists of 5 books is published in English every year in January together with the publication of the PaP catalogue. For TT2021, an update is published for Book 2 and Book 4 in October 2020, other updates from TT 2022 will follow as usual in January. Further simplification and digitalisation of CID is ongoing.

All books can be found on the website of RFC NS-B and in CIP.

5. Objectives and performance of the Corridor

5.1 Punctuality

Punctuality of a train is measured on the basis of the comparison between the time planned in the timetable of a train identified by its train number and the actual running time at certain measuring points. A measuring point is a specific location on the route where the train running data is captured. One can choose to measure the departure, arrival or run through time. The comparison should always be done against an internationally agreed timetable for the whole train run.

Punctuality is measured by setting a threshold up to which a train is considered as punctual. This threshold is defined at 30 minutes.

Furthermore, RFC NS-B also publishes monthly punctuality reports on the Corridor website. Corridor users can be invited to a bilateral WG to discuss improving the punctuality.

All information concerning the Train Performance Management can be found in CID Book 4, chapter 6.

5.2 Capacity

Pre-arranged Paths (PaPs) for the annual timetable are provided by the IMs/AB to the C-OSS. PaPs are coordinated among the IMs/AB at the borders so to enable for attractive running times. The PaP catalogue is published by the C-OSS in mid-January of each year for the next timetable period. Reserve capacity on the Corridor is available in October of each year, to allow for ad-hoc path applications.

RFC NS-B has defined the following objectives concerning the published PaPs:

- improvement of quality and quantity of the Corridor's offer;
- increasing the efficiency and reliability of rail freight traffic;
- harmonisation of train paths;
- increase of share of requests for international freight paths via the C-OSS.

5.3 KPIs

The following KPIs published by RFC NS-B 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 General Assembly:

- Capacity Management:
  - Volume of offered capacity (PaPs);
  - Volume of requested capacity (PaPs);
  - Volume of requests (PaPs);
  - Number of conflicts (PaPs);
  - Volume of pre-booked capacity (PaPs);
  - Volume of offered, requested Reserve Capacity (RC), volume RC requests
  - Average planned speed of PaPs.

- Operations:
  - Punctuality at origin;
  - Punctuality at destination;
  - Overall number of trains on the RFC.

- Market Development:
  - Overall number of trains per border;
  - Ratio of the capacity allocated by the C-OSS and the total allocated capacity.

Information on KPIs is published in the Performance Monitoring Report and some are also part of the Annual Report. Both documents are available on the RFC NS-B website:

Annual Report

Performance Monitoring Report

6. Investment Plan

The indicative Investment Plan is without prejudice to the competence of the Member States regarding infrastructure planning and financing. Also, this is without prejudice to any financial commitment of a Member State.

6.1 Capacity Management Plan

The Capacity Management Plan (Chapter 6.1) including the bottlenecks will be elaborated in the next Implementation Plan update.

6.2 List of projects.

The WG Infrastructure elaborated an indicative investment plan (Figure 6-2), which is based on the national investment plans. It covers the period until 2030. While delivering this input, projects in relation to the needs of capacity enhancement, development of terminals that belong to the RFC NS-B IMs, removal of identified bottlenecks and technical parameters enhancement such as increasing train length, loading gauge or axle load are taken into account. The indicative investment plan is presented in the form of a table providing basic information about the projects.
For each column explanations are given below:

- **Section:** part of the line on the Corridor;
- **Name:** name of the project;
- **Description:** short description of the scope of the Project;
- **Benefits for the Corridor:**

Category	Meaning
Capacity	Capacity increase (bottleneck removal, new line/ creation of sidings, passing tracks, extra tracks, renewal of tracks, etc.)
Train length	Increase of the track length (upgrade for 600 m, 650 m, 740 m, etc.)
Interoperability	ERTMS or/and GSM-R deployment
Safety	Level crossings elimination, renewal/ enhancement of national signalling system (interlocking upgrade, block distance, headway), etc.
Environment	Electrification, noise barriers, vibration reduction measures, etc.

- **End date:** year when the project ends;
- **Project status:**

Category	Meaning
Initial Plan Study	Looking for alternative ways to solve the recognised bottleneck and an estimate of the costs.
Plan study	Elaboration of possible variants to realise the preferred alternative and a more accurate estimate of the costs.
Plan study/design	Elaboration of possible variants to realise the preferred alternative and a more accurate estimate of the costs, incl. approval process until building license is reached
Design/Realisation	This includes all the work to be done before going live: preparation, building license, construction, safety tests etc.
Realisation	Award procedure; physical execution of work, safety tests etc. etc.
In exploitation	Project can be used in exploitation.

- **Funding status:**

Category	Meaning
Open	Funding which is not yet part of any formal funding plan
Reserved	Funds in middle term budget (generally not approved)
Approved	Funds approved and released

- **Cost:** indicative costs of the project in EUR
- **Financial sources:**

Category	Meaning
EU	The EU provides *funding*
Public	Public funding
IM	The IM provides funding
Other	Other funding sources
Negotiation ongoing	Negotiations on funding source

Rail Freight Corridor
North Sea – Baltic

Indicative Investment Plan

Nr	Country	Section	Name	Description	Benefits for Corridor	End date	Project status	Funding status	Cost (mio EUR)	Financial sources	Comments
1	NL	Utrecht Centraal - Meteren Betuweroute aansluiting Noord	Redesign Geldermalsen (PHS) and 3rd track Geldermalsen - Geldermalsen aansl	sidetracks at Geldermalsen for 740m freight trains and separate 3rd track Geldermalsen - Geldermalsen aansl. (for the MerwedeLingelijn Dordrecht - Geldermalsen)	Capacity	2021	Realisation	Approved	n.a.	Public	
2		Europoort - Botlek	Elevated railwaytrack along the Theemsweg (Harbourline)	Construction of an elevated railwayline along the Theemsweg, (to bypass the Calandbridge)	Capacity	2021	Realisation	reserved	n.a.	Public/EU/Other	
3		Botlek - Pernis	Botlekbrug, Harbourline - Oude Maas river crossing	Adjusting railway bridge to improve connection to Botlek freight Yard and upgrading tunnel capacity	Capacity	2021	realisation	Approved	n.a.	Public	
4		Pernis - Waalhaven Zuid	Waalhaven - Zuid	redesign freight yard for containers	Capacity/ Train length	2025	Plan study	Reserved/open	Reserved 60 mio total cost is 200 mio	Public	
5		Maasvlakte - Europoort	SY Maasvlakte Zuid + C2 bocht fase 1	Construction of the first bundle of tracks on the new yard Maasvlakte Zuid + adjustment C2 bocht (commissioned by Port of Rotterdam	Capacity	2026	Plan study	open	100	Public/EU/Other	
6		Vught aansl. - 's-Hertogenbosch Diezebrug aansl.	4 tracks 's Hertogenbosch - Vught aansl. and dive-under Vught	Adding a fourth track between 's Hertogenbosch and Vught aansluiting	Capacity	2027	Design/ Realisation	reserved	n.a.	Public	

				Construction of a Dive-under at Vught aansluiting							
7		Amsterdam Harbour - Amsterdam Bijlmer	Dive-under at Amsterdam Dijksgracht	Construction of a dive-under in order to improve the entrance to Amsterdam Westhaven	Capacity	2028	Plan study	Reserved	n.a.	Public	
8		Kijfhoek – Roosendaal Grens	ERTMS Kijfhoek - Roosendaal grens	Implementing ERTMS between Kijfhoek and Roosendaal border. Go live 2026-2028	Interoperability	2028	Plan study	Reserved	n.a.	Public	
9		Meteren - Eindhoven	ERTMS Meteren - Eindhoven	Implementing ERTMS between Meteren and Eindhoven. (Go live 2029-2031)	Interoperability	2031	Plan study	Reserved	n.a.	Public	
10		Roosendaal – Vught aansluiting	ERTMS Roosendaal - Den Bosch	Implementing ERTMS between Roosendaal and 's Hertogenbosch. Go live 2028-2030.	Interoperability	2030	Plan study	Reserved	n.a.	Public	
11		Utrecht Centraal - Meteren Betuweroute aansluiting Noord	ERTMS Utrecht - Meteren	Implementing ERTMS between Utrecht Centraal and Betuweroute Meteren. Go live 2028-2029	Interoperability	2029	Plan study	Reserved	n.a.	Public	
12		Kijfhoek aansluiting noord - Betuwe Route Papendrecht	Increasing the capacity of the Sophiatunnel	investigating capacity and recommend measures to increase the capacity of the Sophiatunnel from 6 trains/hour to 10 trains/hour.	Capacity	n.a.	Initial plan study	open	n.a.	n.a.	Plan study starts in 2020
13		Border BE/NL - border NL/DE	IRON Rhine	upgrading route	Capacity	n.a.	Plan study	open	n.a.	n.a.	On hold
14		Barendrecht asl - Kijfhoek asl Zuid	raillconnection Harbourline - Betuweline 25 kV	change catenary supply 1,5 kV --> 25 kV	Environment	n.a.	Initial plan study	Open	n.a.	Public	On hold
1	BE	Belgian part of RFC NS-B8	ETCS	Equipment of the Belgian part of RFC NS-B with ETCS	Interoperability	2025	Design/realisation	Approved	n.a.	Public/EU	

2		Antwerp	Junction Oude Landen	Construction of junction at Oude Landen (L27A) to provide a better access to the port of Antwerp	Capacity	2027	Plan study	Approved	80,1	Public	All amounts in € 2017
3		Antwerp	Second Access to the Port of Antwerp	Study on construction of new line between Antwerp North and Lier to provide a better access to the Port of Antwerp	Capacity	2023	Plan study	Approved	3,8	Public	
4		Mol-Hamont Border	Iron Rhine	Electrification of line 19 between Mol and the Dutch border	Capacity	2021	Design/realisation	Approved	46,3	Public/ EU	
5		Antwerp	Antwerp: Left bank	Extension and renewal works on left bank of port	Capacity	2025	Plan study	Approved	1,37	Public	
6		Antwerp	Antwerp: Right bank	Extension and renewal works on right bank of port	Capacity	2023	Plan study	Approved	5,7	Public	
7		Antwerp	Antwerp: Right bank	Signalling of several regularly used fan of sidings on right bank of the port of Antwerp	Capacity	2022	Design/ realisation	Approved	16,99	Public	
8		Neerpelt-Balen Werkplaats	Iron Rhine	Second track Neerpelt - Balen werkplaats	Capacity	2025	Design/ realisation/ plan study	Approved	43,8	Public/ EU	
9		Kinkempois	Kinkempois formation	Kinkempois: extension of fan of sidings	Capacity	2020	Design/realisation	Approved	19,96	Public	
1	DE	Emmerich - Oberhausen	Upgrade Emmerich - Oberhausen	Structural upgrade of capacity; 3-track upgrade; elimination of level crossings; ERTMS	Capacity	Open	Design/ realisation	Approved	2,012	EU; public; IM	
2		Uelzen - Stendal	Upgrade Uelzen - Stendal	Upgrade to a double track line with electrification	Capacity	Open	Design/ realisation	Approved	272	Public; IM	
3		Oldenburg - Wilhelmshaven	Upgrade Oldenburg – Wilhelmshaven	Upgrade to a double track line with electrification	Capacity	Open	Design/ realisation	Approved	690	EU; Public; IM	
4		New Terminal in Lehrte nearby Hannover	MegaHub Lehrte	Upgrade the capacity by building a new terminal	Capacity	Open	Plan study	Planned	136	Public; IM	

5		Viersen – Kaldenkirchen Border NL	IRON Rhine	Upgrade to a double track line	Capacity	After 2025	Plan study	plannd	n.a.	Public; IM	
6		Dresden - Border DE/CZ (- Prag)	New line Dresden - Prag	New HSL for freight and passenger trains with a new long tunnel	Capacity	After 2025	Plan study	open	n.a.	EU; Public; IM	
1	CZ	Lysá nad Labem – Děčín Pr. Žleb	Upgrading of line Kolín – Všetaty – Děčín	Line upgrading	Capacity	after 2020	Plan study	Open	n.a.	EU, public	-
2		Praha Libeň - Lovosice - Děčín - st.border Germany	ETCS 1st national Corridor Kolín – Praha Libeň – Dolní Žleb – state border Germany	ETCS deployment	Interoperability	2023	Plan study	Open	30,15	EU, public	-
3		Lysá nad Labem – Všetaty – Děčín východ	ETCS in section Kolín – Nymburk – Mělník – Děčín východ	ETCS deployment	Interoperability	After 2023	n.a.	Open	23,85	EU, public	-
4		Kralupy n/Vltavou - Nelahozeves	Modernization of railway station Kralupy nad Vltavou and upgrading of 3 Nelahozeves tunnels	Fulfilment of TSI PRM in station Kralupy n/V and meeting of code P/C 80/410 for combined transport (actual code 47/360)	Capacity	2027	Plan study	Open	n.a.	EU, public	-
5		Praha Libeň – Praha Vysočany - Lysá nad Labem	ETSC Praha – Lysá nad Labem	ETCS deployment	Interoperability	After 2023	Plan study	Open	4,55	EU, public	-
6		Praha Libeň – Praha Malešice	Modernization of railway line Praha Libeň – Praha Malešice (1. Phase)	Line upgrading	Capacity	2026	Plan study	Open	51,0	EU, public	-
7		Ústí nad Labem	Ralway station	Capacity improving	Capacity	2024	Plan Study	Open	n.a.	n.a.	
1	PL	selected line sections	ERTMS / ETCS installation on the TEN-T core network lines	It is a project of developing the ETCS system on selected sections of the network.	Interoperability, Safety	2023	Realisation	Approved	218,4	Public EU	

2		Whole country	Construction of ERTMS / GSM-R system infrastructure on PKP Polskie Linie Kolejowe S.A. railway lines as part of NPW ERTMS	The aim of the project is to complete GSM-R coverage of lines that are included in the TEN-T core network	Interoperability	2023	Realisation	Approved	533,9	Public EU	
3		Kraków - Rzeszów	Modernization of the E 30 / C-E 30 railway line, section Kraków - Rzeszów, stage III - Phase II	This is a project for the comprehensive modernization of the Kraków - Rzeszów section.	Capacity, Train length, Safety	2020	Realisation	Approved	136,2	Public EU	
4		Kraków - Katowice	Modernization of the E 30 railway line, section Zabrze - Katowice - Kraków, stage Iib	It is a project of comprehensive modernization of the Krakow - Katowice section.	Capacity, Train length, Safety	2021	Realisation	Approved	425	Public EU	
5		Warszawa - Łódź	Modernization of the railway line Warszawa - Łódź, stage II, Lot A - section Warszawa Zachodnia - Miedniewice (Skierniewice), Phase II	It is a project of comprehensive modernization of the Warsaw - Łódź section.	Capacity, Train length, Safety	2021	Realisation	Approved	27,3	Public EU	
6			Modernization of the Warszawa-Łódź railway line, stage II, Lot C - other works, Phase II		Capacity, Train length, Safety	2021	Realisation	Approved	43,8	Public EU	
7		Warszawa – Sadowne	Modernization of the E 75 Rail Baltica Warszawa - Białystok - border with Lithuania, stage I, section Warszawa Rembertów - Zielonka - Tłuszcz (Sadowne) Phase II	The first stage of works on the line no. 6, which is part of the Rail Baltica. Comprehensive modernisation. Construction of additional pair of tracks for agglomeration traffic on the section Zielonka – Wołomin Słoneczna (access to Warsaw Node).	Capacity, Train length, Safety	2021	Realisation	Approved	123,1	Public EU	

8		Sadowne – Białystok	Works on line E 75, section Sadowne – Czyżew and remaining works on section Warszawa Rembertów – Sadowne	The second part of the work on the line 6, which is part of the Rail Baltica. It is a comprehensive modernization aimed at: The second stage of works on the line no. 6, which is part of the Rail Baltica. Comprehensive modernisation, including construction of double-track bridge over the Bug river.	Capacity, Train length, Safety	2021	Realisation	Approved	246,3	Public EU	
9			Works on railway line E 75, section Czyżew - Bialystok		Capacity, Train length, Safety	2023	Realisation	Approved	917,8	Public EU	
10		Katowice	Works on railway lines No. 132, 147, 161, 180, 188, 654, 655, 657, 658, on the sections Gliwice - Bytom, Chorzów Stary - Mysłowice and Dorota - Mysłowice Brzezinka	It is a project of technical parameters on important freight lines in the Katowice junction.	Capacity, Train length, Safety	2022	Realisation	Approved	90,1	Public EU	
11		Kraków	Works on the E 30 railway line on the Kraków Główny Towarowy - Rudzice section along with the extension of the agglomeration line	It is a project to modernize the main line in the Krakow node.	Capacity, Safety	2021	Realisation	Approved	244,4	Public EU	
12		Warszawa – Błonie	Improving the capacity of the E 20 railway line on the Warszawa - Kutno section, stage I: Works on railway line No. 3 on the section Warszawa - border of LCS Łowicz	Improvement of agglomeration traffic organisation between Warszawa and Błonie.	Capacity, Safety	2021	Realisation	Approved	24,6	Public EU	

13		Warszawa	Improving the capacity of the E 20 railway line on the Warszawa - Mińsk Mazowiecki section, stage I	The project includes work on stations Warsaw Rembertów, Sulejówek Miłosna and Minsk Mazowiecki, in order to improve capacity on access to the Warsaw Node.	Capacity, Safety	2020	Realisation	Approved	33	Public EU	
14			Works on the by-pass line in Warszawa (section Warszawa Gołąbki / Warszawa Zachodnia - Warszawa Gdańska)	Works on the northern by-pass line in Warsaw	Capacity, Train length, Safety	2020	Realisation	Approved	55,2	Public EU	
15		Zduńska Wola – Łódz Kaliska	Works on railway lines No. 14, 811 on the section Łódź Kaliska - Zduńska Wola - Ostrów Wlkp., Stage I: Łódź Kaliska - Zduńska Wola	The first phase of works on the line no. 14, section Łódź Kaliska - Zduńska Wola.	Capacity, Train length, Safety	2020	Realisation	Approved	78,6	Public EU	
16		Swarzędz - Sochaczew	Works on the E 20 railway line, Warszawa – Poznan section - remaining works on sub-section Sochaczew-Swarzedz	The project is a continuation of previous works on the line no. 3 Warsaw Zachodnia - Kunowice. It includes in particular works on railway stations. The aim is to increase the speed up to 160 km/h on the entire section Warsaw – Poznań	Capacity, Train length, Safety	2021	Realisation	Approved	511,6	Public EU	
17		Białystok – Kuźnica Białostocka (State border)	Works on the railway line No. 6 on the section Białystok - Sokółka - Kuźnica Białostocka (state border)	Upgrade of connection to/from Belarus through the border crossing at Kuźnica Białostocka.	Capacity, Train length, Safety	-	Plan study/design	Approved	20	Public EU	
18		Warszawa - Grodzisk Maz.	Works on the Warszawa Włochy - Grodzisk Mazowiecki railway line (line no. 447)	It is a line modernization project to improve line capacity.	Capacity, Safety	2020	Realisation	Approved	72,2	Public EU	

19		Ełk - Korsze	Works on the railway line No. 38 on the Ełk - Korsze section with electrification	It is a project modernize the line with electrification.	Capacity, Train length, Safety, Environment	2023	Realisation	Approved	147,2	Public EU	
20		Łuków - Terespol	Works on the E 20 railway line, section Siedlce-Terespol, stage III - LCS Terespol	The third stage of works on the line E 20 section Warszawa - BY border. It is a comprehensive modernization of the line on the area of the Local Control Center in Terespol.	Capacity, Train length, Safety	2022	Realisation	Approved	155,1	Public EU	
21		Białystok - Ełk	Works on the E 75 railway line, Białystok – Suwałki – Trakiszki (state border) section, Stage I Białystok - Ełk section, phase I	The scond stage of works on the Rail Baltica line.	Capacity, Train length, Safety	2022	Design/Realisation	Approved	172,4	Public EU	
22			Works on the E-75 railway line, section Białystok - Suwałki - Trakiszki (state border), stage I, section Białystok - Ełk, phase II		Capacity, Train length, Safety	-	Realisation	Open	300,7	Public EU	
23		Poznań	Works on the Poznań bypass	Upgrade of the freight by-pass of Poznań Railway Node, to improve transit of freight traffic through the agglomeration	Capacity, Train length, Safety	-	Design/Realisation	Open	211	Public EU	
24		Białystok – Trakiszki (Polish/Lithuanian border)	Works on the E 75 railway line, section Białystok - Suwałki - Trakiszki (state border), stage II section Ełk - Trakiszki (state border) - project documentation	The third stage of works on the Rail Baltica line. It is a comprehensive modernization and construction of new line section between Ełk and Trakiszki	-	-	Plan study/design	Open	43,1	Public EU	

25			Works on the E 75 railway line, section Białystok - Suwałki - Trakiszki (state border), stage II section Ełk - Trakiszki (state border)		Capacity, Train length, Safety, Interoperability, Environment	-	Realisation	Open	1070,1	Public EU	
26		Wrocław – Opole	Works on the C-E 30 railway line on the section Opole Groszowice - Jelcz - Wrocław Brochów	Work on the freight line 277 Wroclaw – Opole, freight connection between these two cities.	Capacity, Train length, Safety	-	Realisation	Open	131,2	Public EU	
27		Skierniewice – Łukow	Works on the railway line No. 12 Skierniewice - Łuków (C-E 20)	Upgrade of the southern by-pass of Warsaw railway node for freight.	Capacity, Train length, Safety	-	Realisation	Open	234	Public EU	
1	LT	Kaunas - Palemonas	Construction of the 1435 mm railway track and modernization of signalling equipment from Kaunas to Palemonas	Building of the new 1435 mm railway track plus signalling equipment modernization.	Capacity, 1435 mm infrastructure	2020/2021	Realisation (design and construction works)	Approved	61,8	EU; Public	
2		Rokai-Palemonas	Railway line reconstruction on section Rokai-Palemonas by building a new 1435 mm gauge double track	Building of the new 1435 mm railway track	Capacity, 1435 mm infrastructure	2020-2026	Plan Study	n.a.	n.a.	Public	Activity removed from CEF funding[12].

[12] Current approach: territorial planning (2020-2022), land acquisition and design (2022-2023), construction, CCS and ENE deployment (2024-2026) for an upgraded or new line (1435 mm double track).

3		Poland/Lithuania border-Kaunas	Territorial planning and EIA for an upgraded or new 1435 mm double track railway line	Pre-design stage to define land plot for acquisition, perform strategic (SEA) and environmental assessments (EIA)	Capacity, double 1435 mm track	2022	Tender	Approved (CEF)	n.a.	EU (CEF), Public	To be followed by land acquisition and design (2022-2023), construction, CCS and ENE deployment (2024-2026).
4		Lithuanian/Poland state border-Kaunas	European-standard railway line from Poland/Lithuania border to Kaunas infrastructure development plan	Study to upgrade European-standard railway line from Poland/ Lithuania border to Kaunas	Capacity	2024	Plan study	Approved	n.a.	EU;	
1.	LV	Part of Rail Baltica line	Construction of the 1435 mm railway track	Building of the new 1435 mm railway track	Capacity, 1435 mm infrastructure	2020-2026	n.a.	n.a.	n.a.	EU; Public	
1.	EE	Valga - Tartu	Reconstruction Valga-Tartu line	Constuction works	Capacity	2024	Planning phase		16,0	n.a.	
2.		Valga - Tartu	Railway Control Command and Signalling (CCS) system modernization	Precondition for ERTMS	Interoperability	2024	Public tender		n.a.	n.a.	

3.		Valga - Tartu	Construction of Catenary and traction stations	Equipment of line with 25kV AC catenary	Environment	2028	Planning phase		n.a.	n.a.	
4.		Tartu - Tapa	Reconstruction Tartu - Tapa line	Constuction works	Capacity	2022	ongoing		12,1	Public	
5.		Tartu - Tapa	Railway Control Command and Signalling (CCS) system modernization	Precondition for ERTMS	Interoperability	2024	Public tender		n.a.	n.a.	
6.		Tartu - Tapa	Construction of Catenary and traction stations	25kV/AC	Environment	2024	Planning phase		n.a.	n.a.	
7.		Tapa - Tallinn	Reconstruction Tapa - Tallinn line	Constuction works	Capacity	2024	Planning phase		20,3	n.a.	
8.		Tapa - Tallinn	Railway Control Command and Signalling (CCS) system modernization	Precondition for ERTMS	Interoperability	2024	Public tender		n.a.	n.a.	
9.		Tapa - Tallinn	Construction of Catenary and traction stations	25kV/AC	Environment	2024	Planning phase		n.a.	n.a.	

10.		Tallinn - Muuga	Railway Control Command and Signalling (CCS) system modernization	Precondition for ERTMS	Capacity and interoperability	2024	Public tender		n.a.	n.a.	
11.		Tallinn - Muuga	Construction of Catenary and traction stations	25kV/AC	Environment	2028	Planning phase		n.a.	n.a.	

Figure 6-2: Indicative Investment Plan

6.3 Deployment Plan regarding interoperable systems

6.3.1. ETCS Deployment Plan

The following text describes the national implementation strategies of the IMs along the Corridor.

6.3.1.1. The Netherlands

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 have been added. 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 decided by the Parliament (May 2019). The Dutch strategy includes the immediate removal of the class B-system on lines equipped with ERTMS. The national ERTMS roll-out plan includes early On-board Unit (OBU) transition to ERTMS B3 enabling ERTMS only roll-out on the infrastructure. Therefore, ERTMS OBU roll-out is prepared in a separate programme. The Dutch ERTMS Programme will implement ERTMS on the 7 Corridors within the scope of the programme. The Amsterdam – Oldenzaal border section of RFC North Sea – Balticwill not be equipped with ERTMS before 2030, so ERTMS only operations for international locos will not be possible before 2030.

6.3.1.2. Belgium

In Belgium, the outlined ERTMS implementation of the Corridor lines is part of a country-wide migration program by 2025, with the aim to improve the safety level on the whole network.

All vehicles in Belgium have to be operable with ERTMS in the near future, whereby ETCS L1 and L2 FS B2 tracks shall be equipped with System Version 1.x to allow B2 and B3 locos. On the other hand, ETCS L1 LS B3 tracks shall be equipped with B3 System Version 2.x in order to allow the operation 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 (certainly until end of 2025).

Since December 2016, the class B system Memor/Crocodile is put out of service on the lines equipped with ETCS level 1 FS version 2.3.0d, allowing only trains equipped with ETCS Level 1 (minimum Baseline 2) or under certain exceptions TBL1+ to run on these tracks. Nevertheless, a Royal Decree published on 16 October 2018 provides the progressive decommissioning of he Memor/Crocodile class B system on the main tracks equipped with any level of by

14.12.2025 On the same date, TBL1+ will be decommissioned on all main tracks and, Belgium will become an ETCS only network.

6.3.1.3. Germany

A study commissioned by the German Federal Ministry of Transport and Digital Infrastructure has concluded that the rail network in Germany should be digitalized. Digitalization could raise capacity for rail passenger and rail freight transport by up to 20%, laying the foundation necessary to handle growing traffic volumes in Germany. With the Digital Rail for Germany program, the entire German rail sector aims to equip every one of the 33000 km in the German rail network with the European Train Control System (ETCS) and digital signaling technology.

According to the study, digital rail would have a positive impact on the German economy. Specifically, it would:

- **Make the rail system more reliable** by offering new technology and systems to foster high service quality and punctuality
- **Raise rail capacity,** enabling the network to handle growing traffic volumes and to absorb more traffic from the roads
- **Raise energy efficiency and lower carbon emissions** by making energy efficient network management possible and by shifting traffic to rail
- **Lower operating costs** for maintenance and operations
- **Equip the industry to handle demographic change** by giving employers tools to deal with lower operational staffing numbers resulting from retirement and employee turnover
- **Foster seamless international rail traffic** by ensuring that European systems are interoperable

Projects proposed for 2020 to 2025 would have a major impact

For the initial phase from 2020 to 2025, the study recommends three specific projects that would have a rapid impact on infrastructure capacity and service quality:

- **Equipping the Scandinavian-Mediterranean Corridor** from the North and Baltic Seas through central Germany and Bavaria to the northern access route to the Brenner Base tunnel

- **Equipping core routes in the German rail network:** specifically, the Cologne–Rhine/Main and Dortmund–Bielefeld–Hanover high-speed lines and the Magdeburg–Knappenrode line
- **Digitalizing urban rail:** digitalizing the S-Bahn network in Stuttgart

  According to the authors of the study, these projects would involve infrastructure investments of some EUR 1.7 billion between now and 2025.

The German government will now review and assess the proposals. All the parties involved agree that digitalization will play a decisive role in making rail fit for the future.

6.3.1.4. Czech Republic

Most of main lines of the conventional network in Czech Republic are equipped with the national system LS. It is a system using the continuous transmission of the aspects by means of coded track circuits. In case of transmission of restrictive or prohibitive aspects, it controls the specified reaction of a person driving the rail vehicle. According to TSI CCS CR it is national train protective equipment of the Class B and according to Czech law is used for maximum speed up to 160 km/h.

As is mentioned in the currently valid new National Implementation Plan for ERTMS (approved by Czech ministry of transport in 2017) the main goal is to achieve full interoperability of the selected national railway network (TEN-T lines, RFC network and ERTMS Corridor E). In this new plan is expected deployment of ETCS L2 baseline 3 in relationship to the RFC North Sea – Baltic railway lines (mainly Praha - Lovosice - Děčín hl.n. - Prostřední Žleb - Shöna DB) with expected realization 2019 -2023. All RFC North Sea – Balticlines are already equipped with GSM-R system.

Migration strategy in the ETCS system is based on use of dual equipment on the track enabling concurrent operation of the vehicles equipped with ETCS and the vehicles equipped with national LS system only where the national LS system may have the important role as a backup system for cases of ETCS system outage and no later than the end of the LS system technical life cycle. Implementation strategy is based on the fact that the ETCS system will be implemented markedly slower than the GSM-R system. The implementation rate is limited first of all by the accessible volume of financial means, not only in the track part area, but above all in the area of vehicles equipment with the mobile part of the system. Since 1 January 2025 we suppose only ETCS system on line Praha - Lovosice - Děčín hl.n. - Prostřední Žleb - state Border Germany (Shöna).

6.3.1.5. Poland

Currently in Poland almost the entire railway network is equipped with CCS class B systems – train control system called SHP – Samoczynne Hamowanie Pociągu (eng. Automatic Train Braking) and analog radio communication system using 150 MHz band for voice transmission. There are no plans to decommission national SHP system. The Polish NIP assumes that SHP will be operational at least for the next 20 years, while 150 MHz radio communication system will be turned off after equipment over 15000 km of railway lines with the GSM-R system.

Implementation strategy of ETCS in Poland by 2050 is specified by NIP. The timetable covers the requirements of both the TEN-T network (core and comprehensive) and Regulation No 913/2010 (freight Corridors).

The SRS 2.3.0d specification (which corresponds to the system version 1.0) is used during the 2014-2020 financial perspective for trackside ETCS implementation projects. For later projects will be used higher version of SRS (at least 3.4.0), while both the SRS version and the system version are to be decided.

6.3.1.6. Lithuania

Current situation on Rail gauge of 1520 mm from Lithuanian station Kaunas to station Mockava is equipped with local older generation “PAB-GTSS” railway signalling system (only signals), current situation on Rail gauge of 1435 mm from Lithuanian station Kaunas to station Šeštokai no signalling systems, from station Šeštokai to station Mockava is equipped with local older generation “PAB-GTSS” railway signalling system (only signals), and from station Mockava to Polish border railway is integrated with „PAB-EAP” system on the track (only signals). Current situation on Rail gauge 1520 from Kaunas to station Kena and from Kaunas to LT LV border is equipped with ALSN. From Vilnius to LT LV border equipped with local older generation “PAB-GTSS” railway signalling system (only signals). In Lithuania up to 2025 is expected to include level 2 ERTMS system between Polish and Lithuanian border on new rail gauge of 1435 mm where the speed is expected to be up to 249 km/h for passenger trains and up to 120km/h for freight trains. Further information about the project path and routes will be provided when “Rail Baltica” will complete the feasibility study.

The ERTMS system at existing rail gauge of 1520 mm is not foreseen.

6.3.1.7. Latvia

All the main lines of the conventional network in the Republic of Latvia are equipped with the class “B” national control command and signalling system ALSN. It is a system using the continuous transmission of the aspects by means of coded track circuits and according to law is used for maximum speed up to 120 km/h.

As is mentioned in the currently valid new National Implementation Plan for ERTMS (notified to European Commission by Latvian ministry of transport in 2017) the main goal is to maintain full interoperability with the neighbouring countries in Russia, Belarus, Lithuania and Estonia of 1,520mm railways track gauge network. In this new plan is expected deployment of GSM-R not earlier than 2028 and no expectations to deployment of ETCS in 1,520mm track network until the maximum speed of line remains up to 120 km/h.

The foreseen building of the new Rail Baltica line with a 1,435mm gauge European standard is a project to integrate the Republic of Latvia into the European rail network. Deployment of the signalling system throughout the entire length of the line will be starting in 2022 (indicative data). The project's basic design guidelines foresee the deployment of the Level 2 baseline 3 ETCS system. Decision regarding the mobile radio communications system will be taken at a later stage of project.

6.3.1.8. Estonia

In Estonia, there are two IMs in the public 1,520mm railway network: Estonian Railways Ltd (company is in charge of railway administration) and Edelaraudtee Infrastruktuuri AS (a private IM).

Main lines of the conventional network are equipped with Class B train protection system ALSN as mentioned in ERA/TD/2011-11, v3.0. Maximum speed is 120km/h (passenger trains) and there are ongoing preparations for rising passenger trains the speed until 135 km/h. According to estimations, this is maximum speed what is possible to allow by using national Class B train protection system.

Estonian Railways Ltd's aim is to make railway transport more attractive to users and to offer competitive and safe alternative to road transportation. In order to achieve this goal, it is essential to increase the speed, and this requires an upgrade of CCS systems. During the period from 2020 to 2024, the entire rail network of Estonian Railways Ltd is going to be upgraded to a modern CCS system and a TMS (Traffic Management System) system will be introduced. The planning of train timetables will be taken to an automated level.

In 2019 a market research was carried out in order to analyse of suitable ETCS technologies for Estonian infrastructure. At the result of the study it was decided that in the upper mentioned modernization period there will be made preconditions for introduction of ETCS L1 technologies. Interoperability inside Baltic States and between Russia stays unchanged because Class B systems will remain as a alternative train protection system for cross border sections.

The decommissioning of Class B systems on the public network will be carried out gradually. This means that in parallel with introduction of ETCS systems for passenger trains also remain unchanged old Class B systems for freight trains. The implementation of ETCS L1 technologies is planned to carry out in the period from 2025 - 2027.

Estonian second infrastructure manager Edelaraudtee Infrastruktuuri AS has so far planned to continue to use the Class B train protection systems and for that reasons there will be double on board equipment needed to achieve interoperability between two infrastructures in near future.

Information regarding to 1,435mm infrastructure development is available on the Rail Baltica official website and technologically there is foreseen the Level 2 baseline 3 ETCS system. In Estonia there will be 1,520mm and 1,435mm infrastructure that will run partly very close to each other and will have a different technical parameters (beside standing catenary 3000VDC / 25 000VAC 50Hz, Class B train protection).

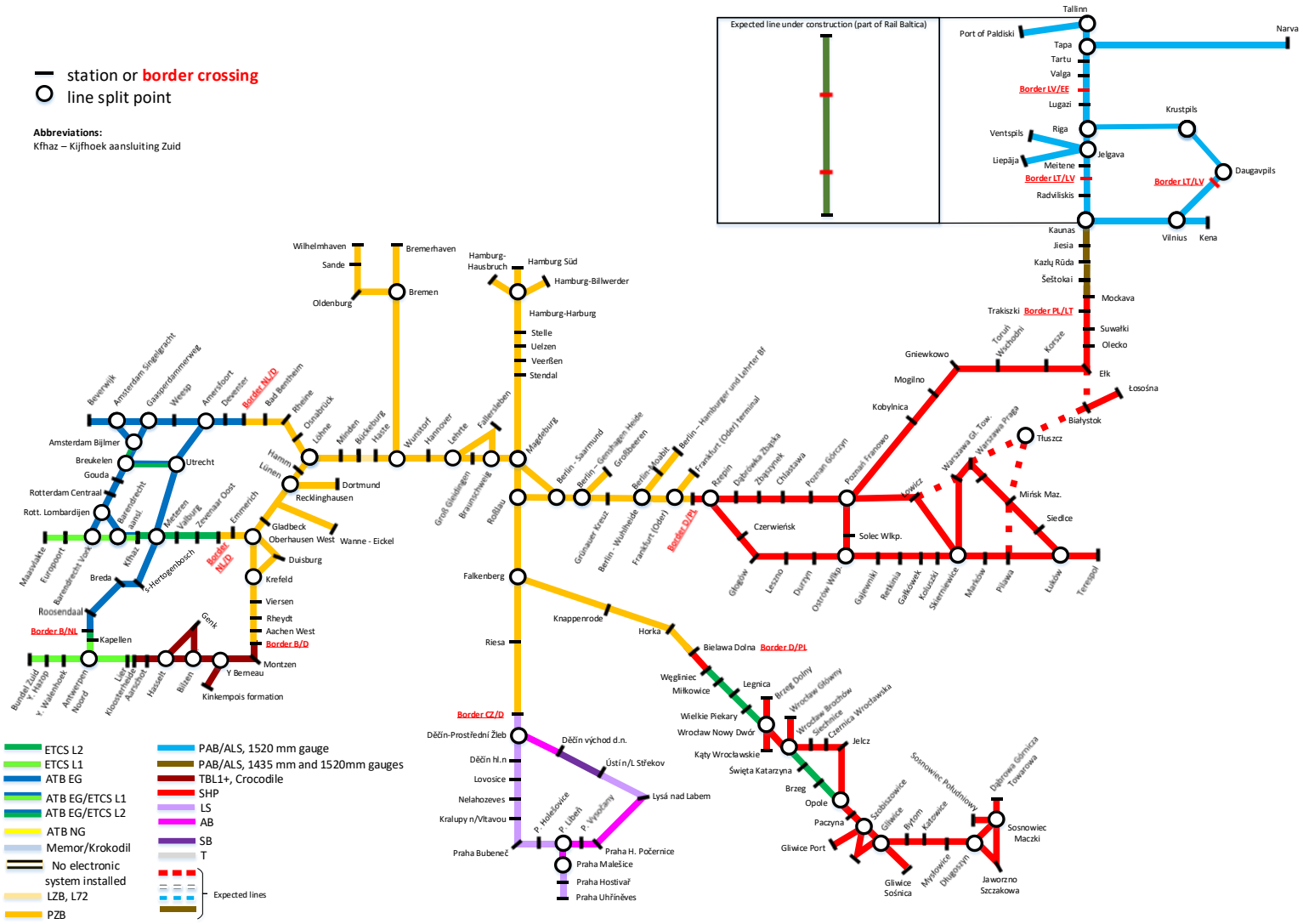
6.3.1.9. Overview of Corridor deployment

On the following pages, a visual summary of the state of play regarding the deployment of interoperable systems on the Corridor can be found.

The information is provided in the form of 8 different Figures:

- ERTMS deployment :
    - Actual situation (Figure 6-3-1)
    - 2023 (Figure 6-3-2)
    - 2030 (Figure 6-3-3)
- Baseline:
    - Actual situation (Figure 6-3-4)
    - 2030 (Figure 6-3-5)
- System version:
    - Actual situation (Figure 6-3-6)
    - 2030 (Figure 6-3-7)
- Overview of the Class A/Class B systems in 2030 (Figure 6-3-8)

Figure 6-3-1: ERTMS Deployment actual situation



Rail Freight Corridor
North Sea – Baltic

Figure 6-3-2: ERTMS Deployment – situation 2023

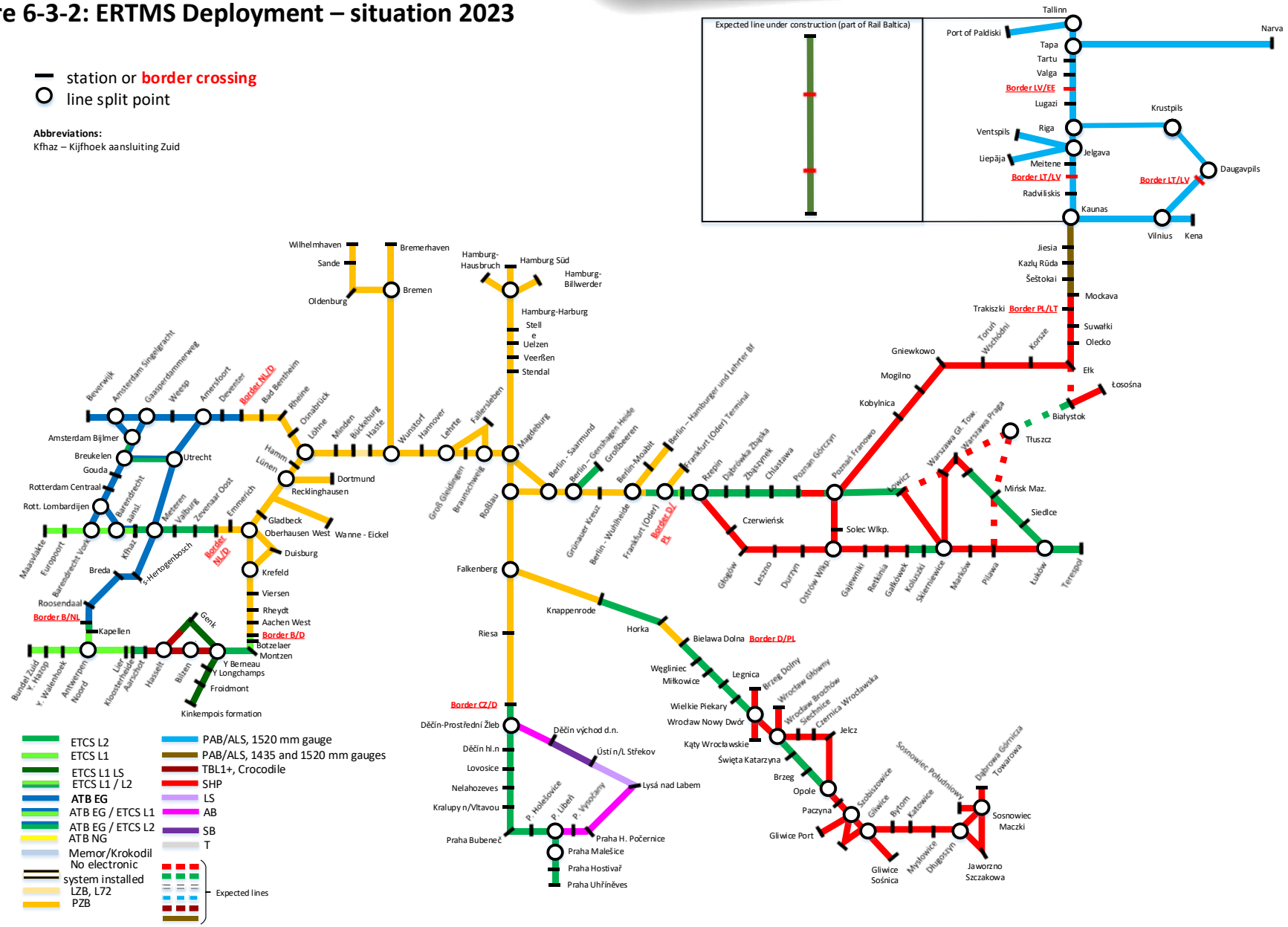
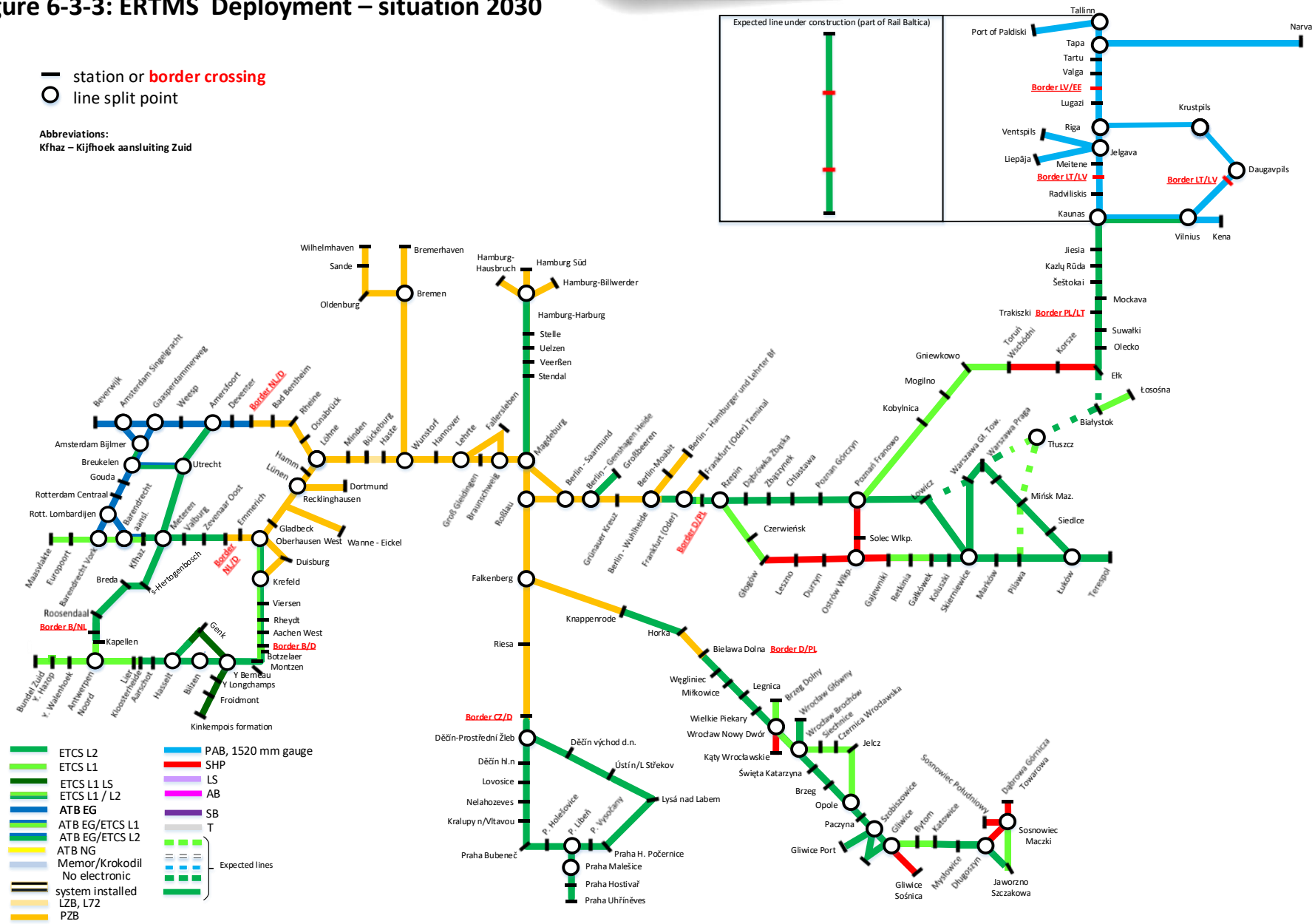


Figure 6-3-3: ERTMS Deployment – situation 2030

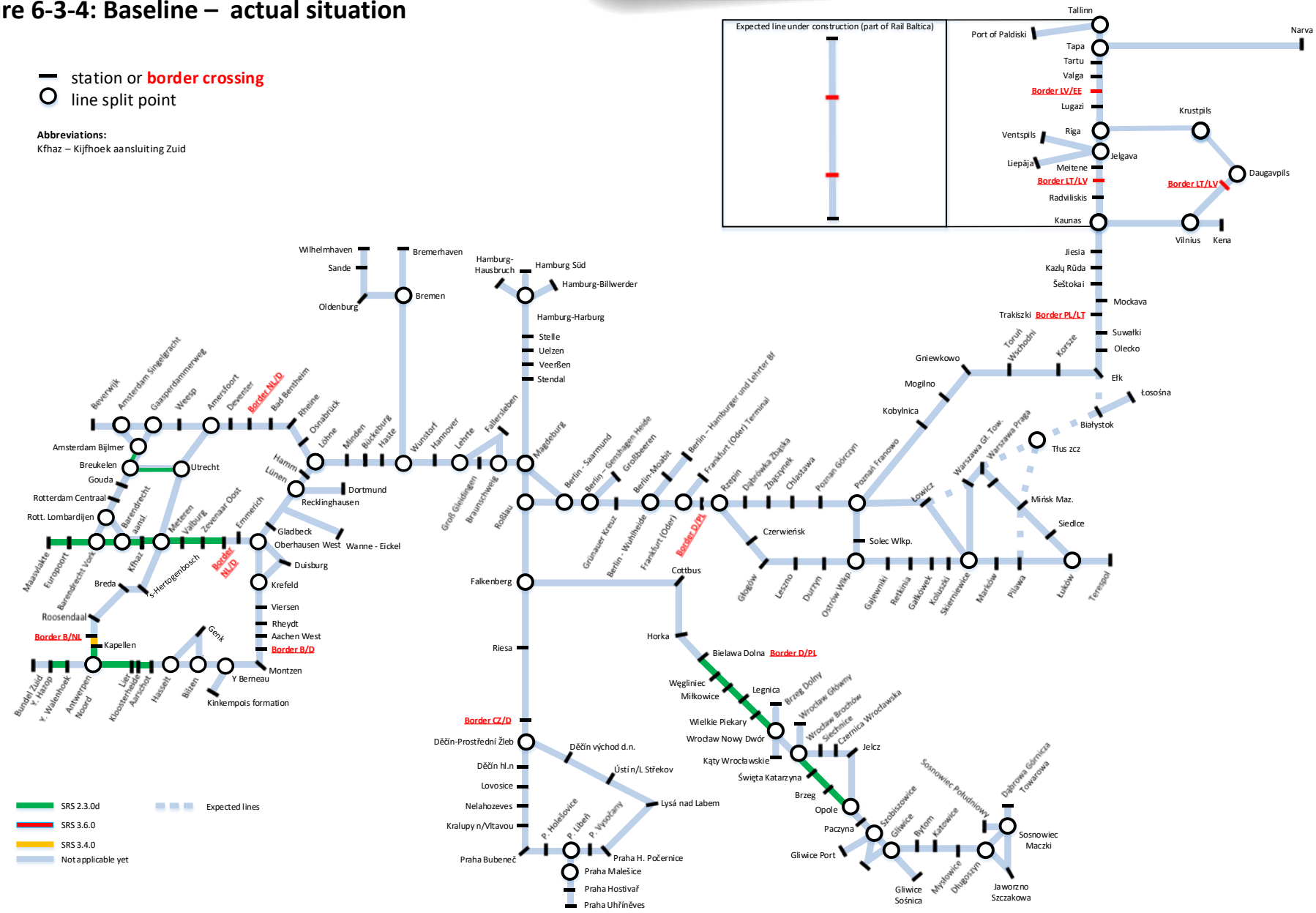


Rail Freight Corridor
North Sea – Baltic

Figure 6-3-4: Baseline – actual situation

station or **border crossing**
line split point

Abbreviations:
Kfhaz – Kijfhoek aansluiting Zuid



Rail Freight Corridor
North Sea – Baltic

Figure 6-3-5: Baseline - situation 2030

station or **border crossing**
line split point

Abbreviations:
Kfhaz – Kijfhoek aansluiting Zuid

Expected line under construction (part of Rail Baltica)

Tallinn
Port of Paldiski
Narva
Tapa
Tartu
Valga
Border LV/EE
Lugazi
Krustpils
Ventspils
Riga
Jelgava
Liepāja
Meitene
Border LT/LV
Daugavpils
Radviliskis
Kaunas
Vilnius
Kena
Jiesia
Kazlų Rūda
Šeštokai
Mockava
Trakiszki
Border PL/LT
Suwałki
Olecko
Ełk
Łososna
Białystok
Tłus zcz
Gniewkowo
Mogilno
Kobylnica
Toruń Wschodni
Korsze
Poznań Franowo
Poznań Górczyn
Chlastawa
Zbąszynek
Dąbrówka Zbąska
Rzepin
Frankfurt (Oder) Terminal
Berlin – Hamburger und Lehrter Bf
Berlin-Moabit
Berlin – Gesundbrunnen Heide
Berlin - Saarmund
Großbeeren
Grünauer Kreuz
Berlin - Wuhlheide
Frankfurt (Oder)
Border D/PL
Czerwieńsk
Solec Wlkp.
Łowicz
Warszawa Gł. Tow.
Warszawa Praga
Mińsk Maz.
Siedlce
Łuków
Terespol
Głogów
Leszno
Durzyn
Ostrów Wlkp
Gołuchów
Rokietnica
Gałkówek
Kołuszki
Skierniewice
Mańków
Pilawa
Wilhelmhaven
Sande
Oldenburg
Bremerhaven
Bremen
Hamburg-Hausbruch
Hamburg Süd
Hamburg-Billwerder
Hamburg-Harburg
Stelle
Uelzen
Veerßen
Stendal
Magdeburg
Fallersleben
Lehrte
Hannover
Wunstorf
Haste
Bückeburg
Minden
Löhne
Osnabrück
Rheine
Bad Bentheim
Border NL/D
Deventer
Amersfoort
Weesp
Gaasperdammerweg
Amsterdam Singelgracht
Beverwijk
Amsterdam Bijlmer
Breukelen
Utrecht
Gouda
Rotterdam Centraal
Rott. Lombardijen
Barendrecht
Barendrecht Vork
Europoort
Maasvlakte
Meteren
Valburg
Zevenaar Oost
Emmerich
Kfhaz
Breda
Roosendaal
Border B/NL
Kapellen
Antwerpen Noord
Klooosterheide
Aanschot
Hasselt
Genk
Bilzen
Y Berneau
Y Longchamps
Froidmont
Kinkempois formation
Hamm
Lünen
Dortmund
Recklinghausen
Gladbeck
Oberhausen West
Wanne - Eickel
Duisburg
Krefeld
Viersen
Rheydt
Aachen West
Border B/D
Botzelaer
Montzen
Groß Gleidingen
Braunschweig
Roßlau
Falkenberg
Riesa
Knappenrode
Horka
Bielawa Dolna
Border D/PL
Węgliniec
Mitkowice
Legnica
Brzeg Dolny
Wrocław Główny
Wrocław Brochów
Siechnice
Czernica Wrocławska
Jelcz
Wielkie Piekary
Wrocław Nowy Dwór
Kąty Wrocławskie
Święta Katarzyna
Brzeg
Opole
Paczyna
Gliwice Port
Szobiszowice
Gliwice
Bytom
Katowice
Sosnowiec Południowy
Dąbrowa Górnicza Towarowa
Sosnowiec Maczki
Jaworzno Szczakowa
Mysłowice
Długoszyn
Gliwice Sośnica
Border CZ/D
Děčín-Prostřední Žleb
Děčín hl.n
Lovosice
Nelahozeves
Kralupy n/Vltavou
Praha Bubeneč
Děčín východ d.n.
Ústí n/L Střekov
Lysá nad Labem
P. Holešovice
P. Libeň
P. Vysočany
Praha H. Počernice
Praha Malešice
Praha Hostivař
Praha Uhříněves

SRS 2.3.0d
SRS 3.6.0
SRS 3.4.0
Not applicable
SRS 3.4.0 on expected lines
SRS 2.3.0 on expected lines
Not yet known / to be determined
Not yet known / to be determined

Rail Freight Corridor
North Sea – Baltic

Figure 6-3-6: System version – actual situation

station or **border crossing**
line split point

Abbreviations:
Kfhaz – Kijfhoek aansluiting Zuid

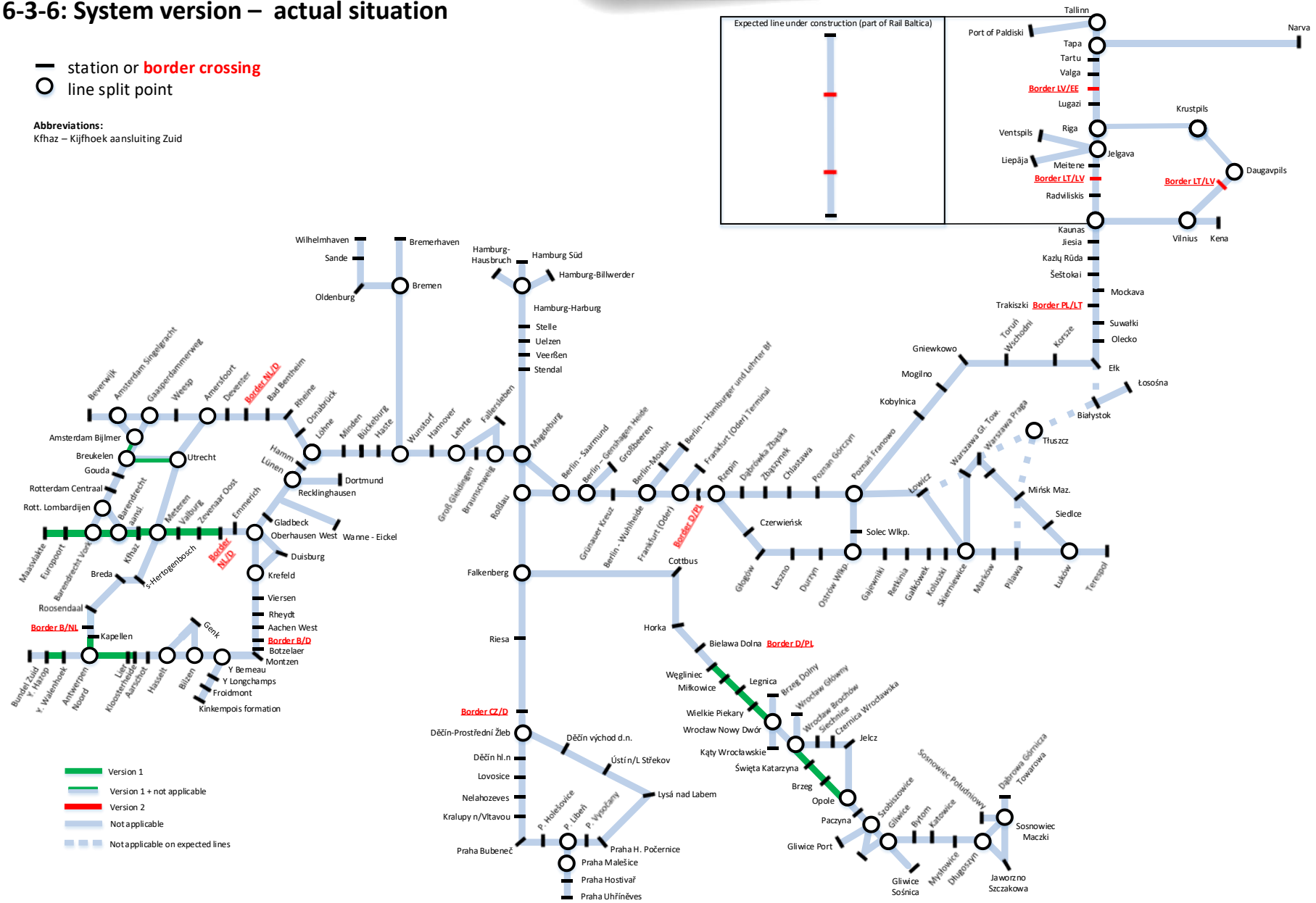
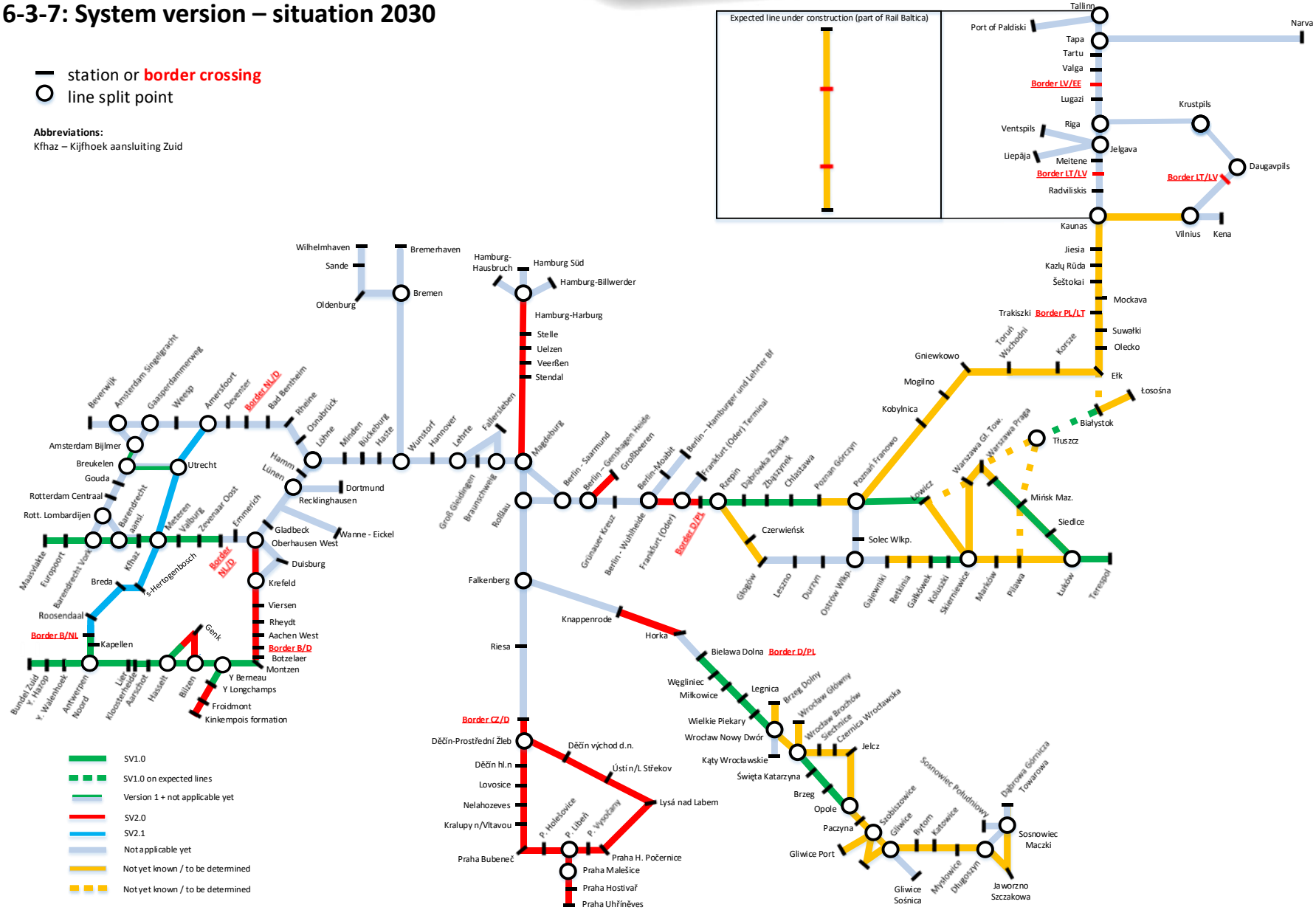


Figure 6-3-7: System version – situation 2030

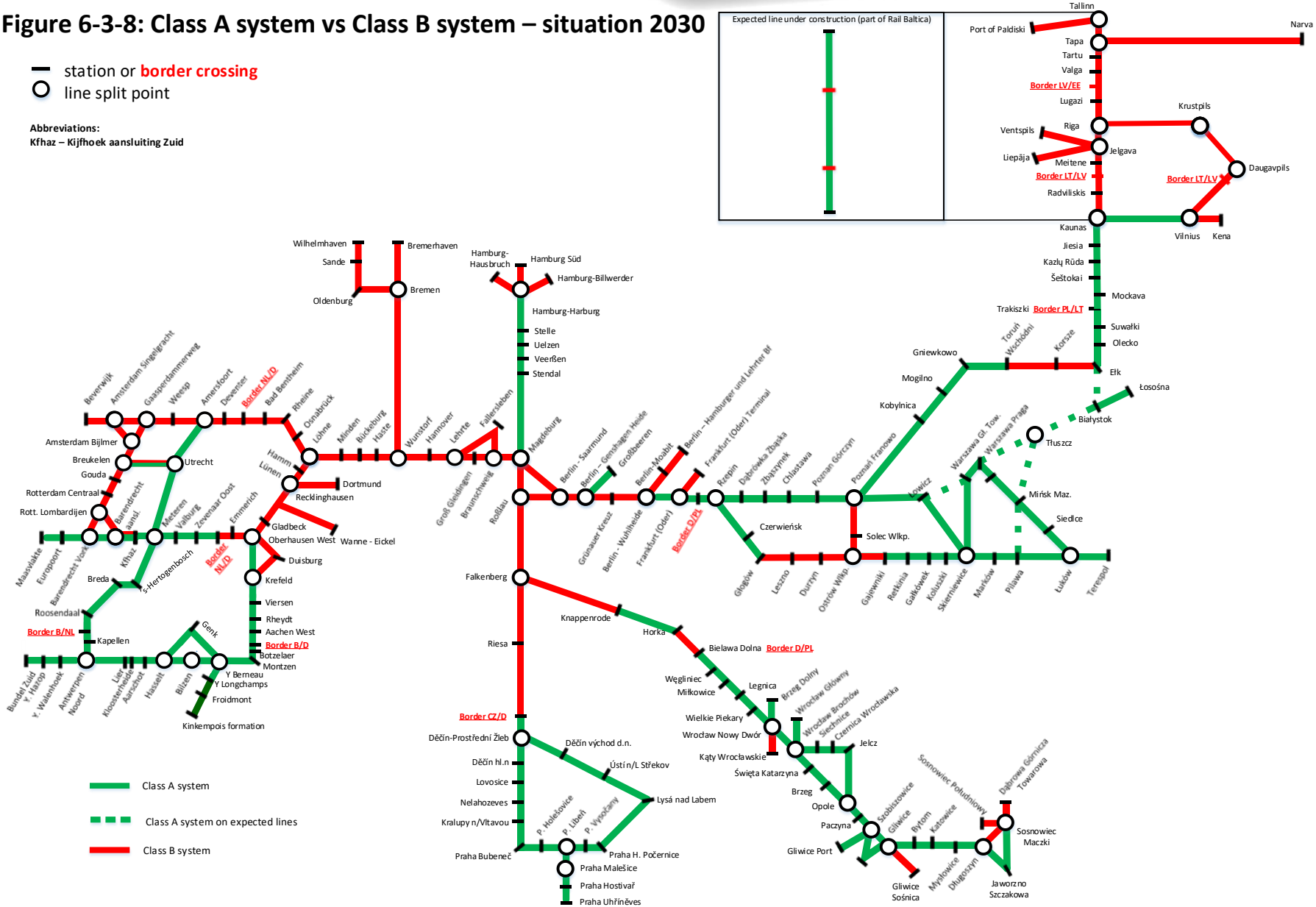


Rail Freight Corridor
North Sea – Baltic

Figure 6-3-8: Class A system vs Class B system – situation 2030

station or **border crossing**
line split point

Abbreviations:
Kfhaz – Kijfhoek aansluiting Zuid



6.3.2. GSM-R

In 1994, ETSI GSM standard was selected by UIC as the bearer for the first Digital Railway Radio Communication System. Needs of railways were captured in dedicated specifications named EIRENE, including both functional and system aspects. These specifications were reinforced as GSM-R within ETSI/3GPP international standards.

The first operational implementation of GSM-R targeting the setupset-up of this new technology was launched in 1999, and the first countrywidecountry-wide GSM-R operation started in 2004. In parallel, the EU Directives officially adopted the GSM-R as the basis for mobile communication between train and track for voice (train radio) and control-command and signaling data (ETCS), with the aim to form a worldwide standard, the European Rail Traffic Management System, the now well-known ERTMS.

Some of the clear objectives of ERTMS were to create a full homogeneity in the European railway networks, to optimize the global investments for train operations, and at the same time to guarantee the interoperability between national networks and commercial vehicles everywhere. This interoperability is regulated through the European Directives and the Technical Standards Specifications for Interoperability of Control Command and Signaling (CCS TSI), published by the EU and supervised by the European Union Agency for Railways (ERA).

GSM-R has been a great success not only in Europe where more than 100,000 km of railway tracks are daily operated through GSM-R but also worldwide, and this number will double within the next years due to the on-going installations of this technology all over the world,

Nevertheless, on one side the needs of the railways are constantly evolving, and on the other side the telecom standards evolution remains dependent of the telecom industry evolution cycles, with an end of support for GSM-R planned by 2030 onwards.

These considerations led UIC, as soon as 2012, to launch the first studies for a successor to GSM-R, pertinently named Future Rail Mobile Communications System (FRMCS),

FRMCS has the objective to become the worldwide standard, conforming to European regulation as well as responding to the needs and obligations of rail organizations outside of Europe. As such, the UIC FRMCS project duly associates non-European members and is a first concrete application of UIC strategy to build a Global Rail Traffic Management System for the whole rail industry.

The following text describes the GSM-R situation in the countries along the Corridor.

6.3.2.1. The Netherlands

The network is fully equipped with GSM-R.

6.3.2.2. Belgium

The network is fully equipped with GSM-R.

6.3.2.3. Germany

The network is fully equipped with GSM-R.

6.3.2.4. Czech Republic

All RFC North Sea – Baltic lines are already equipped with GSM-R system.

6.3.2.5. Poland

In Poland, the plan is to use the GSM-R as the train communication system, except for networks that are functionally separate from the rail system and to which the requirements concerning the interoperability of the rail system and shunting communications do not apply. The goal is to equip over 15000 km of railway lines with the GSM-R system (GSM-R network project 'Construction of ERTMS/GSM-R system infrastructure on PKP PLK S.A. railway lines under the KPW ERTMS' with other, line projects). Most of the GSM-R infrastructure will be installed as part of the GSM-R network project by 2023.

Until 2023, the VHF 150 MHz analog system (Polish class B system) will be used for voice communications. There is no plan for the VHF 150 MHz system to operate in parallel with the GSM-R system on the Polish railway network. After completion of the network GSM-R project and achieving full operation, the migration from the VHF 150 MHz to the GSM-R system will be carried out following the 'Day Zero' approach, i.e. the whole of the network will migrate from the VHF 150 MHz to the GSM-R system on the scheduled date.

6.3.2.6. Lithuania

All RFC North Sea – Baltic lines are already equipped with GSM-R system.

6.3.2.7. Latvia

According to Latvia national implementation plan of ERTMS, the deployment of GSM-R is expected not earlier than in 2028 for the 1,520 mm railways track gauge network. The ongoing design and construction of the new 1,435mm gauge European standard Rail Baltica line, aimed to integrate the Republic of Latvia into the European rail network, provides deployment of the ERTMS for the entire line and will be starting in 2022 (indicative data). The current project's design guidelines foresee the deployment of the Level 2 baseline 3 ETCS system, but may be revised, taking into account the latest developments. Decision regarding the mobile radio communications system will be taken at a later stage of the project, when the requirements for FRMCS will be formalised.

6.3.2.8. Estonia

According to the valid Estonian national implementation plan of ERTMS, the deployment of GSM-R is not expected to be implemented on the 1520 mm railway track gauge network.

Preparation regarding the mobile radio communications system will be taken at a later stage, when the requirements for FRMCS will be formalised. A cross-border cooperation platform for the Baltic States and Finland is under preparation to harmonise the region.

The ongoing design and construction of the new 1435mm gauge European standard Rail Baltica line, aimed to integrate the Republic of Estonia into the European rail network, provides deployment of the ERTMS for the entire line and will be starting in 2022 (indicative data). The current project's design guidelines foresee the deployment of the Level 2 baseline 3 ETCS system, but may be revised, taking into account the latest developments. Decision regarding the mobile radio communications system will be taken at a later stage of project, when the requirements for FRMCS will be formalised.

6.3.2.9. Overview of GSM-R deployment on the Corridor

Figures 6-3-9 and 6-3-10 show the GSM-R actual deployment on the Corridor and the 2030 deployment.

Figure 6-3-9: GSM-R – current situation

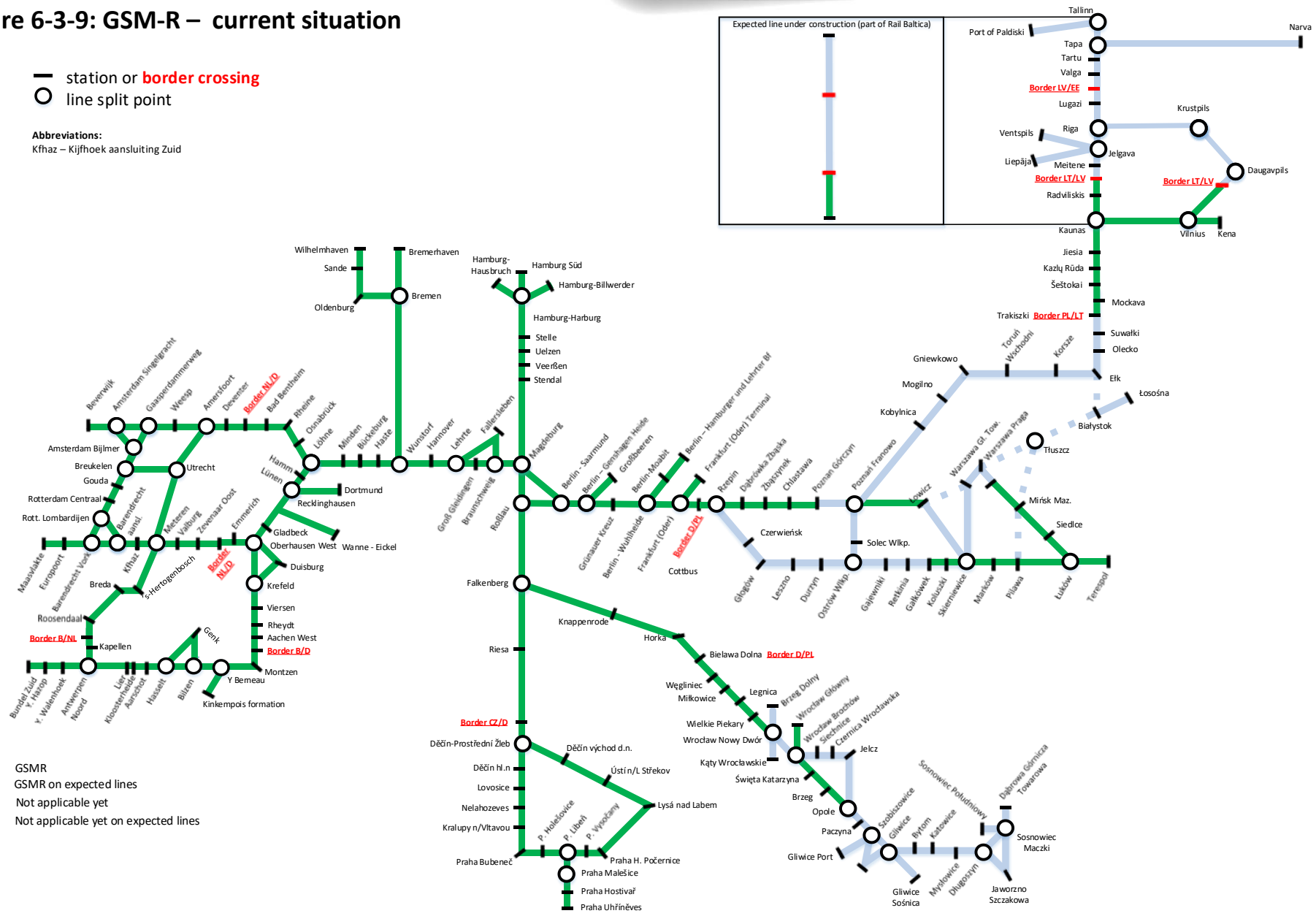
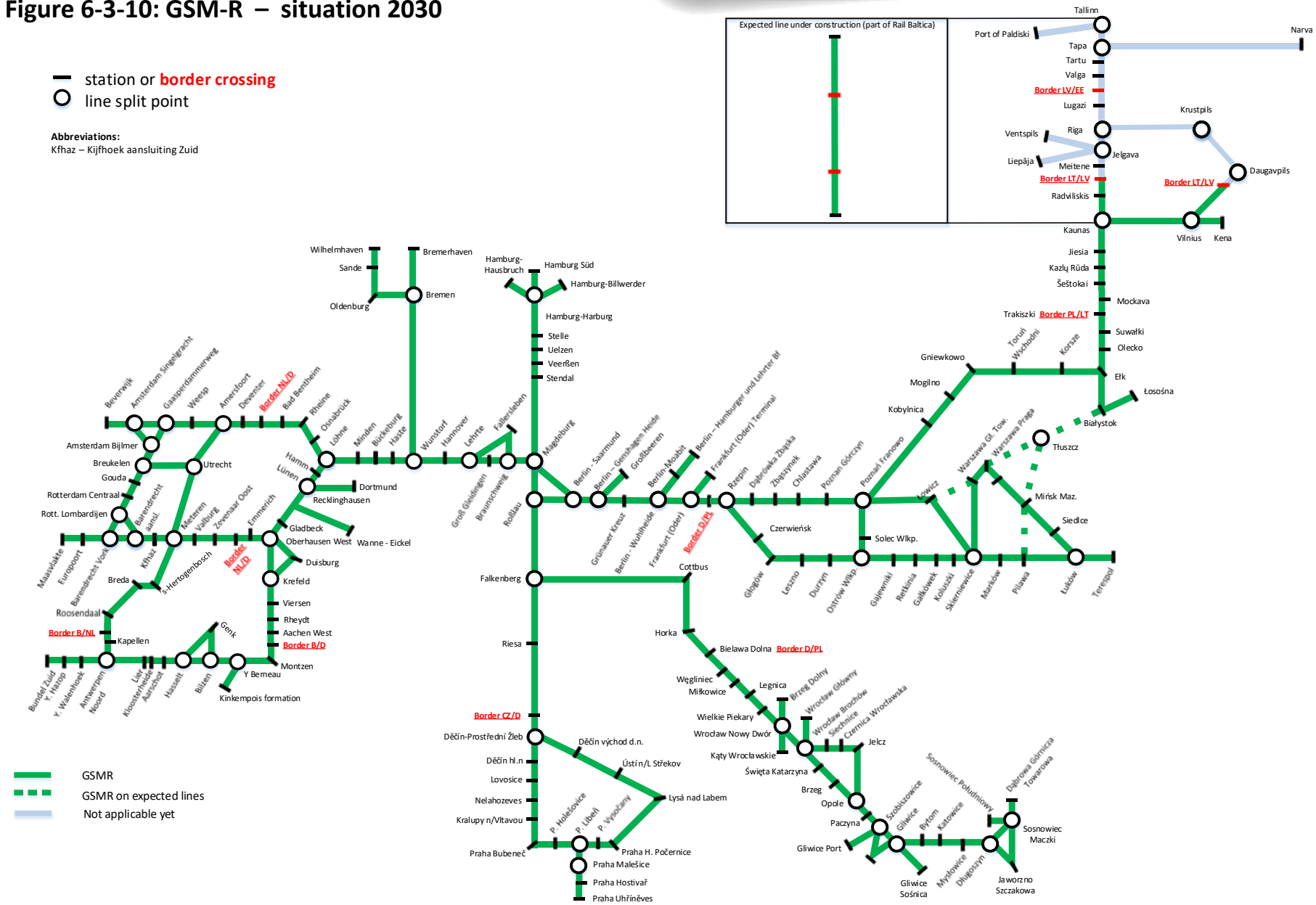


Figure 6-3-10: GSM-R – situation 2030



6.3.3. Border descriptions

Today's existing ERTMS trackside installations in Europe are mostly implemented and managed by one infrastructure manager without crossing borders. On RFC North Sea-Baltic, ERTMS will be applied and operated internationally, including border crossings. However, theinstallation 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 North Sea - Baltic 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. An overview of the cross-border solutions can be found in Annex 2:

6.4 Reference to Union Contribution

RFC North Sea - Baltic has been benefiting from European co-financing for several years. At the moment the Corridor is receiving money under the CEF Action. More info can be found on the INEA website.

Project number	Project description
2014-EU-TM-0217-S	Establishment of Rail Freight Corridor „North Sea – Baltic" and its further development aiming at improving conditions for international rail freight transport as required by the EU Regulations 913/2010, 1315/2013 and 1316/2013.

Annex 1: List of lines

(status as of 1st of September 2020)

Country	Line section	Length of section (km)	Type of line	Track gauge
NL	Maasvlakte - Zevenaar grens			
NL	Maasvlakte - Europoort	13,8	Principal	1435 mm
NL	Europoort - Botlek	10,6	Principal	1435 mm
NL	Botlek - Pernis	4,7	Principal	1435 mm
NL	Pernis - Waalhaven Zuid	5,3	Principal	1435 mm
NL	Waalhaven Zuid - Barendrecht Vork	5,3	Principal	1435 mm
NL	Barendrecht Vork - Barendrecht aansluiting	2,9	Principal	1435 mm
NL	Barendrecht aansluiting - Kijfhoek aansluiting Zuid	5,3	Principal	1435 mm
NL	Kijfhoek aansluiting Zuid - Meteren West	48	Principal	1435 mm
NL	Meteren West - Meteren	1	Principal	1435 mm
NL	Meteren - Valburg	49	Principal	1435 mm
NL	Valburg - Zevenaar Oost	21	Principal	1435 mm
NL	Zevenaar Oost - Zevenaar grens	3	Principal	1435 mm
NL	Kijfhoek - Weesp			
NL	Barendrecht Aansluiting - Rotterdam Lombardijen	3,2	Diversionary	1435 mm
NL	Barendrecht Vork - Rotterdam Lombardijen	0,7	Diversionary	1435 mm
NL	Rotterdam Lombardijen - Rotterdam Centraal	5,5	Diversionary	1435 mm
NL	Rotterdam Centraal - Gouda	24	Diversionary	1435 mm
NL	Gouda - Woerden	16	Diversionary	1435 mm
NL	Woerden - Harmelen	4	Diversionary	1435 mm
NL	Harmelen - Breukelen	8	Diversionary	1435 mm
NL	Breukelen - Amsterdam Bijlmer	18	Diversionary	1435 mm
NL	Amsterdam Bijlmer - Gaasperdammerweg	4	Diversionary	1435 mm
NL	Beverwijk - Oldenzaal grens			
NL	Beverwijk - Haarlem	11,5	Connecting	1435 mm
NL	Haarlem - Amsterdam Singelgracht aansluiting	17	Connecting	1435 mm
NL	Amsterdam Singelgracht aansluiting - Gaasperdammerweg	9	Principal	1435 mm
NL	Gaasperdammerweg - Weesp	4	Principal	1435 mm
NL	Weesp - Hilversum	15	Principal	1435 mm
NL	Hilversum - Amersfoort	16	Principal	1435 mm
NL	Amersfoort - Deventer	58	Principal	1435 mm
NL	Deventer - Hengelo	27	Principal	1435 mm
NL	Hengelo - Oldenzaal grens	18	Principal	1435 mm
NL	Roosendaal grens - 's Hertogenbosch			

NL	Roosendaal grens - Roosendaal	8,5	Connecting	1435 mm
NL	Roosendaal - Breda	22,5	Connecting	1435 mm
NL	Breda - Tilburg	21	Connecting	1435 mm
NL	Tilburg - 's Hertogenbosch	22,5	Connecting	1435 mm
NL	's Hertogenbosch - Amersfoort			
NL	's Hertogenbosch - Meteren Zuid	20	Connecting	1435 mm
Nl	Meteren Zuid - Meteren	2	Connecting	1435 mm
NL	Meteren Zuid - Meteren Noord	2	Connecting	1435 mm
NL	Meteren Noord - Utrecht	27	Connecting	1435 mm
NL	Utrecht - Amersfoort	21	Connecting	1435 mm
BE	Antwerpen Noord- Montzen Border			
BE	Antwerpen Noord - Lier	26	Principal	1435 mm
BE	Lier - Kloosterheide	3,3	Principal	1435 mm
BE	Kloosterheide - Y. Oost Driehoek Aarschot	23,2	Principal	1435 mm
BE	Y. Oost Driehoek Aarschot -Hasselt	36,1	Principal	1435 mm
BE	Hasselt - Botzelaer	69,9	Principal	1435 mm
BE	Botzelaer - Montzen Border	1,1	Principal	1435 mm
BE	Antwerpen Noord - Essen Border			
BE	Antwerpen Noord -Kapellen	3,3	Connecting	1435 mm
BE	Kapellen - Essen Border	18	Connecting	1435 mm
BE	Liefkenshoek rail link			
BE	Antwerpen Noord - Y. Walenhoek	5,1	Diversionary	1435 mm
BE	Y. Walenhoek - Y. Hazop	15,9	Diversionary	1435 mm
BE	Y. Hazop - Bundel Zuid	0,4	Diversionary	1435 mm
BE	Hasselt - Genk Goederen			
BE	Y West Driehoek Hasselt - Y. Zonhoven	2,6	Connecting	1435 mm
BE	Y. Zonhoven - Genk Goederen	13,2	Connecting	1435 mm
BE	Bilzen - Genk Goederen			
BE	Bilzen - Genk Goederen	13,8	Connecting	1435 mm
BE	Bilzen - Genk Zuid			
BE	Bilzen - Genk Zuid	8,0	Connecting	1435 mm
BE	Y Berneau - Kinkempois			
BE	Y Berneau - Visé	3,6	Connecting	1435 mm
BE	Visé - Froidmont	16,0	Connecting	1435 mm
BE	Froidmont - Kinkempois formation	2,0	Connecting	1435 mm
BE	Liier - Hamont Border (Iron Rhine)			
BE	Lier-Debiest	3,1	Expected principal	1435 mm
BE	Debiest-Herentals	16,5	Expected principal	1435 mm
BE	Herentals-Olen	6,2	Expected principal	1435 mm

BE	Olen-Mol	15,3	Expected principal	1435 mm
BE	Mol-Neerpelt	23	Expected principal	1435 mm
BE	Neerpelt-Hamont border	9,7	Expected principal	1435 mm
DE	Aachen Border BE/DE - Oberhausen West			
DE	Aachen Border BE/DE - Aachen West (Strecke 2552)	5,4	Principal	1435 mm
DE	Aachen West - Rheydt Hbf (Strecke 2550)	55,5	Principal	1435 mm
DE	Rheydt Hbf - Viersen Hbf (Strecke 2550, 2520)	12,5	Principal	1435 mm
DE	Rheydt (Gbf) - Viersen-Helenabrunn (Strecke 2522)	11,7	Connecting	1435 mm
DE	Viersen Hbf - Krefeld (Strecke 2520)	15,5	Principal	1435 mm
DE	Krefeld - Meerbeck - Oberhausen West (Strecken 2505, 2340, 2330, 2331)	40,8	Principal	1435 mm
DE	(Krefeld -) Duisburg - Oberhausen West (Strecke 2505, 2323, 2320)	17,9	Connecting	1435 mm
DE	Border NL/DE - Emmerich - Oberhausen-Osterfeld			
DE	Border NL/DE - Emmerich - Ob.-Sterkrade - Ob.-Osterfeld (Strecke 2270, 2206)	75,7	Principal	1435 mm
DE	Oberhausen West - Löhne			
DE	Oberhausen West - Oberhausen-Osterfeld - Gladbeck W (Str. 2206, 2320, 2250)	19,3	Principal	1435 mm
DE	Gladbeck West - Recklinghausen Ost (Strecke 2250)	18,6	Principal	1435 mm
DE	Recklinghausen Ost - Wanne-Eickel (Strecke 2250)	9,3	Connecting	1435 mm
DE	Recklinghausen - Hamm Rbf (Strecke 2250)	43,6	Principal	1435 mm
DE	Lünen Hbf - Dortmund Hbf (Strecke 2100)	13,9	Connecting	1435 mm
DE	Hamm - Löhne (Strecke 2990)	92,2	Principal	1435 mm
DE	Hamm - Löhne (Strecke 1700)	90,9	Diversionary	1435 mm
DE	Border NL/DE - Bad Bentheim - Löhne			
DE	Border NL/DE - Bad Bentheim - Osnabrück (Strecke 2026, 2931, 2992)	77,0	Principal	1435 mm
DE	Osnabrück - Löhne (Strecke 2992)	47,3	Principal	1435 mm
DE	Löhne - Wunstorf			
DE	Löhne - Minden (Strecke 2990)	23,4	Principal	1435 mm
DE	Löhne - Minden (Strecke 1700)	20,9	Diversionary	1435 mm
DE	Minden - Haste (Strecke 1700)	43,0	Principal	1435 mm
DE	Wilhelmshaven - Bremen			
DE	Wilhelmshaven - Sande (Strecken 1522, 1540, 1552)	15,7	Principal	1435 mm
DE	Sande - Oldenburg (Strecke 1522)	45,0	Principal	1435 mm
DE	Oldenburg - Bremen (Strecke 1500)	44,3	Principal	1435 mm
DE	Bremerhaven - Bremen - Wunstorf			
DE	Bremerhaven - Bremen (Strecke 1740)	72,7	Principal	1435 mm
DE	Bremen - Wunstorf (Strecke 1740)	100,8	Principal	1435 mm
DE	Wunstorf - Hannover-Linden/Hannover Hbf - Lehrte - Magdeburg			
DE	Wunstorf - Hannover-Linden - Lehrte (Strecke 1750)	43,3	Principal	1435 mm

DE	Wunstorf - Hannover Hbf - Lehrte (Strecke 1700, 1730)	37,7	Diversionary	1435 mm
DE	Lehrte - Groß Gleidingen (Strecke 1730)	36,8	Principal	1435 mm
DE	Lehrte - Fallersleben (Strecke 6107)	52,9	Connecting	1435 mm
DE	Groß Gleidingen - Magdeburg Hbf (Strecke 1730, 1900, 6400, 6110)	91,4	Principal	1435 mm
DE	Groß Gleidingen - Braunschweig Rbf (Strecke 1910, 1911, 1912, 1913, 1914)	22,4	Connecting	1435 mm
DE	(Braunschweig -) Weddel - Fallersleben (Strecke 1956)	20,5	Connecting	1435 mm
DE	Hamburg - (Magdeburg) Brücke			
DE	Hamburg-Hausbruch - Hamburg-Harburg (Strecke 1720)	5,7	Principal	1435 mm
DE	Hamburg Süd - Hamburg-Harburg (Strecke 1255)	11,8	Principal	1435 mm
DE	Hamburg-Billwerder - Hamburg-Harburg (Strecke 1280)	16,5	Connecting	1435 mm
DE	Hamburg-Harburg - Stelle (Strecke 1280/1284)	11,4	Principal	1435 mm
DE	Hamburg-Harburg - Stelle (Strecke 1720)	11,2	Connecting	1435 mm
DE	Stelle - Uelzen (Strecke 1720)	61,8	Principal	1435 mm
DE	Stelle - Lüneburg (Strecke 1153)	24,9	Principal	1435 mm
DE	Uelzen - Stendal (Strecke 6899)	107,3	Principal	1435 mm
DE	Stendal - (Magdeburg) Brücke (Strecke 6402, 6406, 6408)	55,8	Principal	1435 mm
DE	Madgeburg - Berlin-Saarmund			
DE	Magdeburg Hbf - Saarmund (Strecke 6110, 6112, 6116)	122,1	Principal	1435 mm
DE	(Madgeburg -) Biederitz - Roßlau (Elbe) - Falkenberg			
DE	Biederitz -Rodleben (Strw. 6411-6415) (Strecke 6410, 6411)	46,2	Principal	1435 mm
DE	Rodleben (Strw. 6411-6415) - Roßlau (Elbe) (Strecke 6411)	1,4	Connecting	1435 mm
DE	Rodleben (Strw. 6411-6415) - Falkenberg (Strecke 6415, 6417, 6207)	83,9	Principal	1435 mm
DE	Roßlau (Elbe) - Bft Roßlau (Elbe) Aw (Strecke 6207)	4,3	Connecting	1435 mm
DE	Falkenberg - Knappenrode - Horka - Border DE/PL			
DE	Falkenberg - Knappenrode (Strecke 6207)	82,5	Principal	1435 mm
DE	Knappenrode - Horka - Border DE/PL (Strecke 6207)	53,7	Principal	1435 mm
DE	Falkenberg - Cottbus - Horka			
DE	Falkenberg - Cottbus (Strecke 6345)	79,3	Diversionary	1435 mm
DE	Cottbus - Horka (Strecke 6142, 6208)	73,9	Diversionary	1435 mm
DE	Roßlau - Berlin - Frankfurt (Oder) - Border DE/PL			
DE	Roßlau - Saarmund (Strecke 6414, 6118, 6124, 6122, 6117)	84,5	Diversionary	1435 mm
DE	Saarmund - Berlin-Eichgestell (Strecke 6126)	35,6	Principal	1435 mm
DE	Berlin-Genshagener Heide - Großbeeren (Strecke 6065, 6127, 6129, 6130)	9,7	Connecting	1435 mm
DE	Berlin-Eichgestell - Frankfurt (O) - Border DE/PL (Strecke 6080, 6148, 6153, 6155)	77,0	Principal	1435 mm
DE	Falkenberg - Bad Schandau - Border CZ/DE			
DE	Falkenberg - Zeithain Bogendreieck (Riesa) (Strecke 6133)	30,5	Principal	1435 mm
DE	Röderau - Riesa (Strecke 6254)	3,5	Connecting	1435 mm
DE	Röderau Bogendreieck - Zeithain Bogendreieck (Strecke 6363)	3,6	Connecting	1435 mm
DE	Zeithain Bogendr. - Bad Schand. - Bord. CZ/DE (Str. 6241, 6363, 6248, 6249, 6240, 6244)	98,0	Principal	1435 mm
DE	Terminal at Frankurt (Oder)			

DE	Frankfurt (Oder) Pbf - Terminal Frankfurt (Oder) (Strecke 6156)	1,7	Connecting	1435 mm
DE	Terminal at Berlin Westhafen			
DE	Berlin-Stadtforst - Berlin-Moabit (Strecke 6153, 6140, 6170)	21,3	Connecting	1435 mm
DE	Berlin-Moabit - Berlin-Hamburger und Lehrter Bf (Strecke 6106)	2,3	Connecting	1435 mm
CZ	Praha Libeň - Praha Holešovice	5,186	Principal	1435 mm
CZ	Praha Holešovice - Praha Bubeneč	1,523	Principal	1435 mm
CZ	Praha Bubeneč - Kralupy n/Vltavou	22,051	Principal	1435 mm
CZ	Kralupy n/Vltavou - Nelahozeves	5,408	Principal	1435 mm
CZ	Nelahozeves - Lovosice	52,473	Principal	1435 mm
CZ	Lovosice - Děčín hl.n.	44,581	Principal	1435 mm
CZ	Děčín hl.n. - Děčín Prostřední Žleb	3,288	Principal	1435 mm
CZ	Děčín Prostřední Žleb - state border Germany	8,052	Principal	1435 mm
CZ	Praha Libeň - Praha Vysočany	1,229	Diversionary	1435 mm
CZ	Praha Vysočany - Praha H.Počernice	8,572	Diversionary	1435 mm
CZ	Praha H.Počernice - Lysá n/Labem	20,53	Diversionary	1435 mm
CZ	Lysá n/Labem - Ústí n/L Střekov	93,511	Diversionary	1435 mm
CZ	Ústí n/L Střekov - Děčín východ d.n.	25,759	Diversionary	1435 mm
CZ	Děčín východ d.n. - Děčín Prostřední Žleb	2,755	Diversionary	1435 mm
CZ	Praha Libeň - Praha Malešice	3,884	Connecting	1435 mm
CZ	Praha Malešice - Praha Hostivař	3,869	Connecting	1435 mm
CZ	Praha Hostivař - Praha Uhříněves	4,831	Connecting	1435 mm
PL	Border D/PL - Poznań - Terespol (Border PL/Belorussia)			
PL	Kunowice (Border D/PL) - Rzepin	17,317	Principal	1435 mm
PL	Rzepin - Chlastawa	78,258	Principal	1435 mm
PL	Chlastawa - Poznań Górczyn	73,599	Principal	1435 mm
PL	Poznań Górczyn - Poznań Starołęka PSK	2,674	Principal	1435 mm
PL	Poznań Starołęka PSK - Poznań Starołęka	1,177	Principal	1435 mm
PL	Poznań Starołęka - Pokrzywno	2,560	Principal	1435 mm
PL	Pokrzywno - Poznań Franowo PFA	4,888	Principal	1435 mm
PL	Poznań Franowo PFA - Swarzędz	5,817	Principal	1435 mm
PL	Swarzędz - Barłogi	124,637	Principal	1435 mm
PL	Barłogi - Kutno	40,204	Principal	1435 mm
PL	Kutno - Łowicz Główny	45,254	Principal	1435 mm
PL	Łowicz Główny - Placencja	3,500	Principal	1435 mm
PL	Placencja - Skierniewka	1,876	Principal	1435 mm
PL	Placencja - Skierniewka	14,726	Principal	1435 mm
PL	Skierniewka - Skierniewice	1,616	Principal	1435 mm
PL	Skierniewice - Marków	9,275	Principal	1435 mm
PL	Skierniewice - Marków	15,780	Principal	1435 mm
PL	Marków - Czachówek Zachodni	39,690	Principal	1435 mm
PL	Czachówek Zachodni - Czachówek Wschodni	2,782	Principal	1435 mm
PL	Czachówek Wschodni - Jaźwiny (Pilawa)	29,278	Principal	1435 mm

PL	Pilawa - Poważe	58,403	Principal	1435 mm
PL	Poważe - Łuków	3,385	Principal	1435 mm
PL	Łuków - Biała Podlaska	52,415	Principal	1435 mm
PL	Biała Podlaska - Małaszewicze	28,712	Principal	1435 mm
PL	Małaszewicze - Terespol	7,705	Principal	1435 mm
PL	Terespol - Terespol (Boder PL/Belorussia)	2,377	Principal	1435 mm
PL	Ełk - Trakiszki (Border PL/LT)			
PL	Ełk - Olecko	28,486	Principal	1435 mm
PL	Olecko - (Gw)	16,457	Principal	1435 mm
PL	(Gw) - Papiernia	20,700	Principal	1435 mm
PL	Papiernia - Suwałki	5,745	Principal	1435 mm
PL	Suwałki - Trakiszki	25,690	Principal	1435 mm
PL	Trakiszki - Trakiszki (Border PL/LT)	3,432	Principal	1435 mm
PL	Poznań - Stary Staw			
PL	(Poznań Gł.) P. Starołęka Psk - Poznań Krzesiny	5,556	Diversionary	1435 mm
PL	Poznań Krzesiny - Kórnik	8,622	Diversionary	1435 mm
PL	Kórnik - Solec Wlkp.	32,84	Diversionary	1435 mm
PL	Solec Wlkp. - Jarocin	16,586	Diversionary	1435 mm
PL	Jarocin - Franklinów	26,747	Diversionary	1435 mm
PL	Franklinów - Stary Staw	1,466	Diversionary	1435 mm
PL	Rzepin - Skierniewice			
PL	Rzepin - Jerzmanice Lubuskie	6,628	Diversionary	1435 mm
PL	Jerzmanice Lubuskie - Czerwieńsk	50,018	Diversionary	1435 mm
PL	Czerwieńsk - Głogów	67,45	Diversionary	1435 mm
PL	Głogów - Leszno	46,782	Diversionary	1435 mm
PL	Leszno - Kąkolewo	11,874	Diversionary	1435 mm
PL	Kąkolewo - Osusz	56,262	Diversionary	1435 mm
PL	Osusz - Durzyn	5,289	Diversionary	1435 mm
PL	Durzyn - Ostrów Wielkopolski	26,322	Diversionary	1435 mm
PL	Ostrów Wielkopolski - Gajewniki	96,279	Diversionary	1435 mm
PL	Gajewnik - Retkinia	37,492	Diversionary	1435 mm
PL	Retkinia - Łódź Kaliska Towarowa	1,752	Diversionary	1435 mm
PL	Łódź Kaliska Towarowa - Łódź Chojny	5,161	Diversionary	1435 mm
PL	Łódź Chojny - Łódź Olechów	7,979	Diversionary	1435 mm
PL	Łódź Olechów - Gałkówek	9,302	Diversionary	1435 mm
PL	Gałkówek - Koluszki	7,203	Diversionary	1435 mm
PL	Koluszki - Skierniewice	39,265	Diversionary	1435 mm
PL	Łowicz - Warszawa - Łuków			
PL	Łowicz - Warszawa Główna Towarowa	72,281	Expected diversionary	1435 mm
PL	Warszawa Główna Towarowa - Warszawa Gdańska	9,175	Diversionary	1435 mm
PL	Warszawa Gdańska - Warszawa Praga	3,963	Diversionary	1435 mm
PL	Warszawa Targówek - Warszawa Michałów	1,211	Diversionary	1435 mm

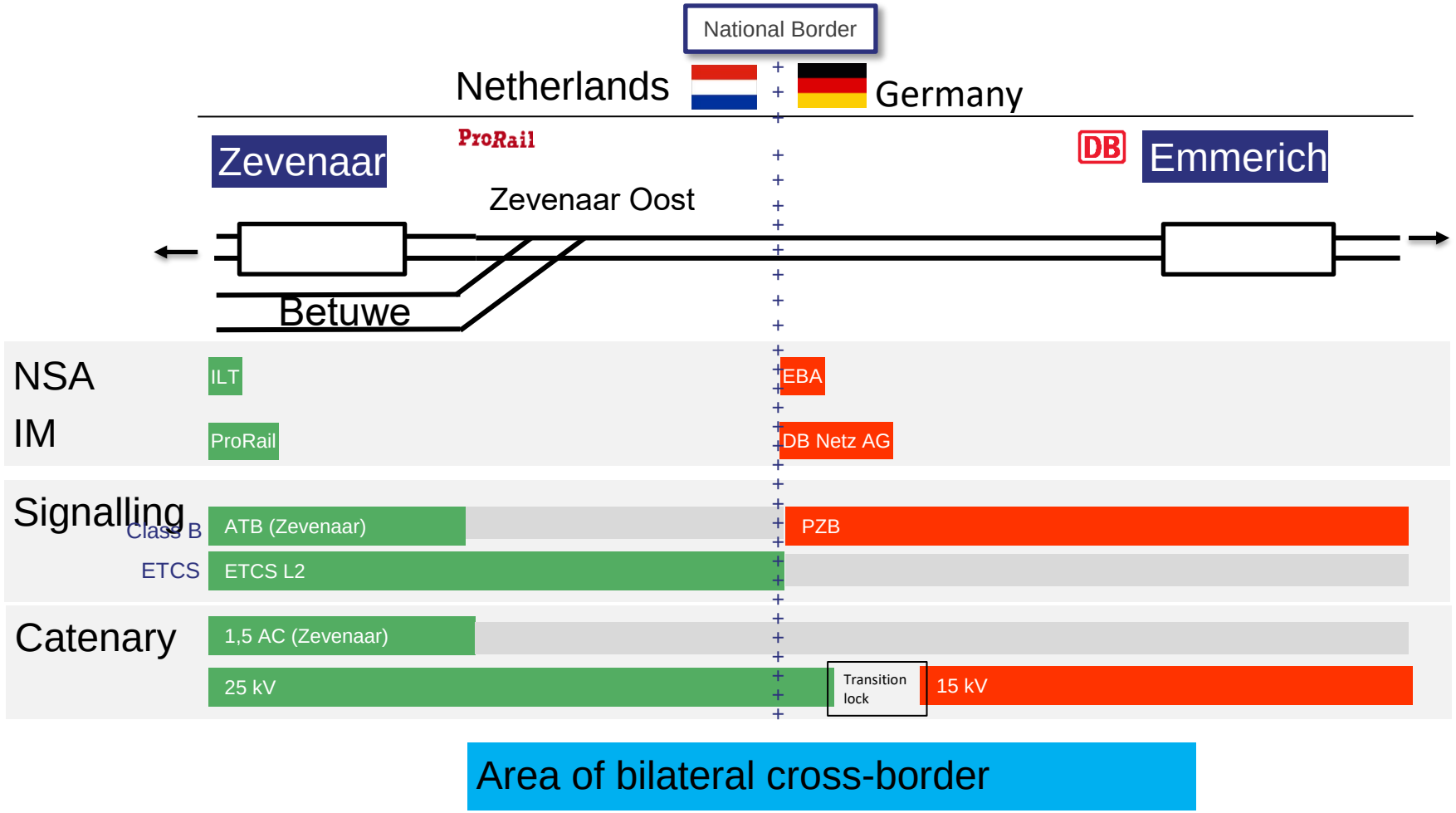
PL	Warszawa Michałów - Warszawa Wschodnia Tow.	1,559	Diversionary	1435 mm
PL	Warszawa Wschodnia Tow. - Warszawa Rembertów	3,923	Diversionary	1435 mm
PL	Warszawa Rembertów - Stojadła	27,262	Diversionary	1435 mm
PL	Stojadła - Mińsk Mazowiecki	1,58	Diversionary	1435 mm
PL	Mińsk Mazowiecki - Siedlce	52,099	Diversionary	1435 mm
PL	Siedlce - Łuków	27,754	Diversionary	1435 mm
PL	Piława - Tłuszcz			
PL	Pilawa - Tłuszcz	59,595	Expected principal	1435 mm
PL	Warszawa Praga - Tłuszcz - Białystok - Ełk			
PL	Warszawa Praga - Tłuszcz	44,271	Expected diversionary	1435 mm
PL	Tłuszcz - Czyżew	74,036	Expected principal	1435 mm
PL	Czyżew - Białystok	65,467	Expected principal	1435 mm
PL	Białystok - Ełk	103,236	Expected principal	1435 mm
PL	Skierniewice - Warszawa Główna Towarowa			
PL	Skierniewice - Pruszków	50,038	Diversionary	1435 mm
PL	Pruszków - Józefinów Podg	3,435	Diversionary	1435 mm
PL	Warszawa Główna Towarowa - Józefinów	5,161	connecting	1435 mm
PL	Warszawa Główna Towarowa - Warszawa Główna Towarowa	1,094	connecting	1435 mm
PL	Białystok - Sokółka			
PL	Białystok - Sokółka	41,222	connecting	1435 mm
PL	Poznań - Ełk			
PL	Poznań Franowo - Kobylnica	7,901	Diversionary	1435 mm
PL	Kobylnica - Mogilno	63,91	Diversionary	1435 mm
PL	Mogilno - Gniewkowo	35,39	Diversionary	1435 mm
PL	Gniewkowo - Toruń Wschód	15,2	Diversionary	1435 mm
PL	Toruń Wschód - Korsze	353	Diversionary	1435 mm
PL	Ełk - Korsze	98,808	Diversionary	1435 mm
PL	Wrocław Brochów - Wrocław Główny			
PL	Wrocław Brochów - Wrocław Główny	2,43	connecting	1435 mm
PL	Bielawa Dolna (Border D/PL) - Jaworzno Szczakowa.			
PL	Bielawa Dolna (Border D/PL) - Węgliniec	12,902	Principal	1435 mm
PL	Węgliniec - Miłkowice	62,099	Principal	1435 mm
PL	Miłkowice - Legnica	9,459	Principal	1435 mm
PL	Legnica - WROCŁAW NOWY DWÓR	58,215	Principal	1435 mm
PL	Wrocław Nowy Dwór - Wrocław Muchobór	1,858	Principal	1435 mm
PL	Wrocław Muchobór - Wrocław Stadion	3,357	Principal	1435 mm
PL	Wrocław Stadion - Wrocław Brochów	8,01	Principal	1435 mm
PL	Wrocław Brochów - Siechnica	6,590	Principal	1435 mm
PL	Siechnica - Czernica Wrocławska	6,884	Principal	1435 mm

PL	Czernica Wrocławska - Jelcz Miłoszyce	5,235	Principal	1435 mm
PL	Jelcz Miłoszyce - Biskupice Oławskie	17,261	Principal	1435 mm
PL	Biskupice Oławskie - Opole Groszowice	54,261	Principal	1435 mm
PL	Opole Groszowice - Strzelce Opolskie	28,838	Principal	1435 mm
PL	Strzelce Opolskie - Paczyna	22,128	Principal	1435 mm
PL	Paczyna - Pyskowice	5,232	Principal	1435 mm
PL	Pyskowice - Gliwice Łabędy	6,097	Principal	1435 mm
PL	Gliwice Łabędy - Gliwice	5,286	Principal	1435 mm
PL	Szobiszowice - Gliwice Port	1,760	connecting	1435 mm
PL	Gliwice - Szobiszowice	0,900	connecting	1435 mm
PL	Gliwice - Gliwice Sośnica	0,900	connecting	1435 mm
PL	Gliwice - Zabrze Biskupice	13,630	Principal	1435 mm
PL	Zabrze Biskupice - Bytom	6,8	Principal	1435 mm
PL	Bytom - Chorzów Stary	6,3	Principal	1435 mm
PL	Chorzów Stary - Katowice Szopienice Północne	12,054	Principal	1435 mm
PL	Szabelnia - Katowice Szopienice Północne	1,359	Principal	1435 mm
PL	Katowice Szopienice Północne - Stawiska Podg	9,651	Principal	1435 mm
PL	Stawiska Podg - Stawiska Podg	0,466	Principal	1435 mm
PL	Stawiska - Mysłowice	1,815	Principal	1435 mm
PL	Mysłowice - Szabelnia	3,305	Principal	1435 mm
PL	Mysłowice - Długoszyn	9,359	Principal	1435 mm
PL	Jaworzno Szczakowa JSB - Długoszyn Podg	1,941	Principal	1435 mm
PL	Długoszyn Podg - Sosnowiec Maczki	1,863	Principal	1435 mm
PL	Sosnowiec Maczki - Sosnowiec Maczki	1,076	Principal	1435 mm
PL	Sosnowiec Maczki - Jaworzno Szczakowa	2	Principal	1435 mm
PL	Wrocław - Opole			
PL	Wrocław Brochów - Święta Katarzyna	6,591	Diversionary	1435 mm
PL	Święta Katarzyna - Brzeg	31,527	Diversionary	1435 mm
PL	Brzeg - Opole Groszowice	43,678	Diversionary	1435 mm
PL	Wrocław - Brzeg Dolny			
PL	Wrocław Nowy Dwór - Wrocław Gądów	1,321	connecting	1435 mm
PL	Wrocław Gądów - Wrocław Kuźniki	1,798	connecting	1435 mm
PL	Wrocław Kuźniki - Brzeg Dolny	23,137	connecting	1435 mm
PL	Wrocław - Kąty Wrocławskie			
PL	Wrocław Gądów - Wrocław Zachodni	5,401	connecting	1435 mm
PL	Wrocław Zachodni - Kąty Wrocławskie	15,164	connecting	1435 mm
PL	Sosnowiec Maczki - Sosnowiec Południowy			
PL	Sosnowiec Maczki - Sosnowiec Kazimierz SKZ1	3,669	connecting	1435 mm
PL	Sosnowiec Kazimierz SKZ1 - Sosnowiec Kazimierz SKZ2	0,956	connecting	1435 mm
PL	Sosnowiec Kazimierz SKZ2 - Sosnowiec Południowy	9,124	connecting	1435 mm
PL	Sosnowiec Maczki - Dąbrowa Górnicza Towarowa			
PL	Sosnowiec Maczki - Dorota	2,575	connecting	1435 mm

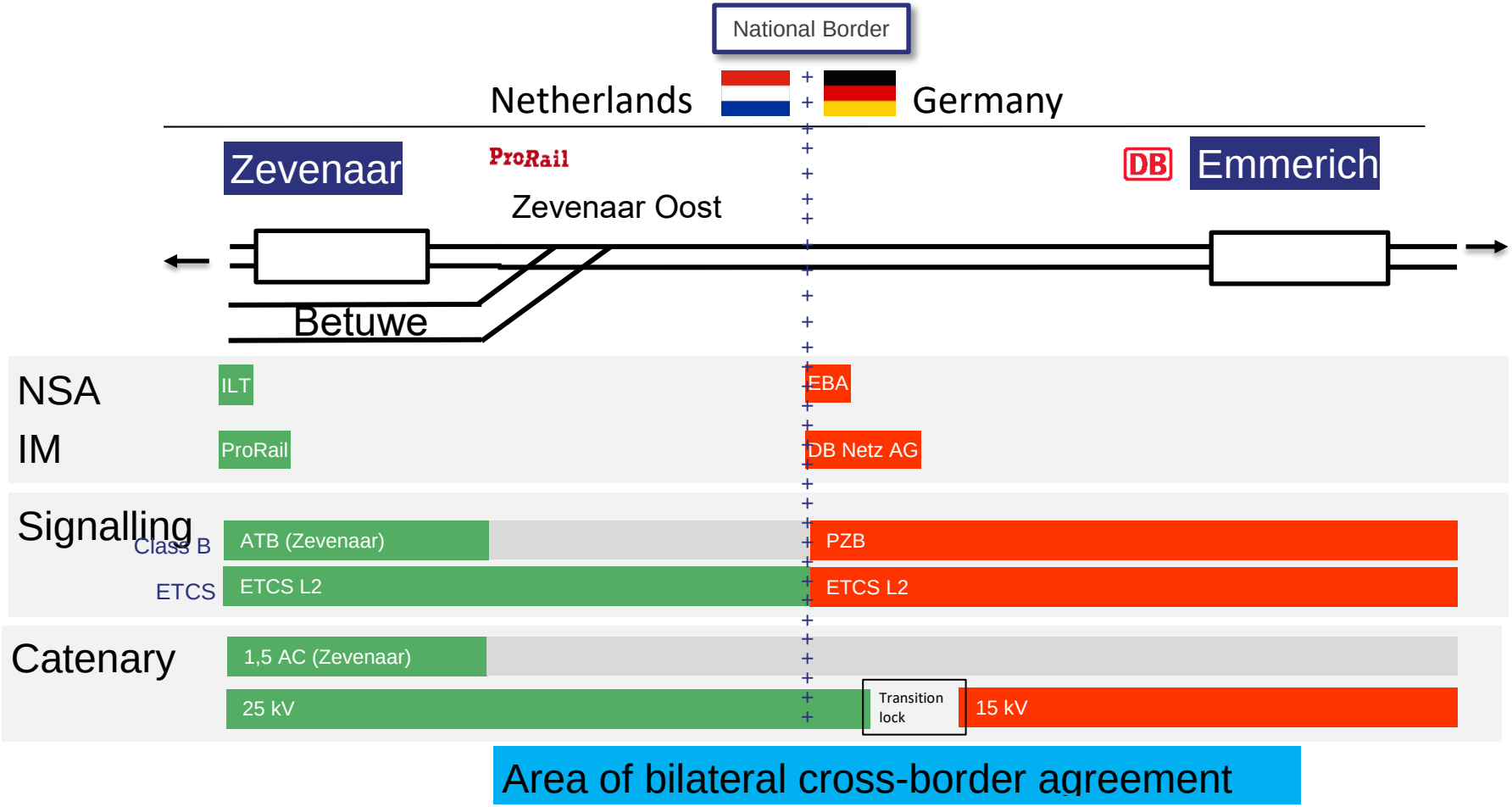
PL	Dorota - Dąbrowa Górnicza Towarowa	12,317	connecting	1435 mm
LT	Trakiszki (Border PL/LT) - Mockava	14,3	Principal	1435mm
LT	Mockava - Šeštokai	7,48	Principal	1435mm
LT	Šeštokai - Kazlų rūda	57	Principal	1520mm
LT	Kazlų rūda - Jiesia	28,54	Principal	1520mm
LT	Jiesia - Kaunas/Palemonas	17,83	Principal	1520mm
LT	Kaunas/Palemonas- Radviliškis	127,95	Principal	1520mm
LT	Radviliškis (Border LT/LV)- Meitene	79.33	Principal	1520mm
LT	Kaunas/Palemonas- Vilnius	93,79	Diversionary	1520mm
LT	Vilnius (Border LT/LV)- Daugavpils	138,92	Diversionary	1520mm
LT	Vilnius- Kena	29,13	Connecting	1520mm
LT	Exact Rail Baltica line (expected as principal line 1435mm) routing not known yet	xx	Expected Principal	1435mm
EE	Valga - Tartu	84,812	Principal	1520 mm
EE	Tartu - Tapa	112,534	Principal	1520 mm
EE	Tapa - Tallinn	69,608	Principal	1520 mm
EE	Tallinn - Muuga	17,462	Principal	1520 mm
EE	Tallinn-Rapla (Rail Baltica line)	47,1	Expected Principal	1435mm
EE	Rapla-Pärnu (Rail Baltica line)	54,7	Expected Principal	1435mm
EE	Pärnu-EE/LV border (Rail Baltica line)	93,7	Expected Principal	1435mm
LV	BorderLT/LV-Meitene-Jelgava	33	Principal	1520 mm
LV	Jelgava-Riga	43	Principal	1520 mm
LV	Riga-Lugazi-Border LV/EE	166	Principal	1520 mm
LV	Krustpils-Riga	129	Diversionary	1520 mm
LV	BorderLT/LV-Daugavpils	25	Diversionary	1520 mm
LV	Daugavpils-Krustpils	89	Diversionary	1520 mm
LV	Jelgava- Liepaja	180	Connecting	1520 mm
LV	Jelgava-Ventspils	178	Connecting	1520 mm
LV	Border EE/LV - Upeslejas junction	116,7	Expected Principal	1435mm
LV	Upeslejas junction - Riga Central Station - Riga airport - Misa junction	70,3	Expected Principal	1435mm
LV	Riga bypass (Upeslejas junction - Salaspils freight station - Misa junction)	28,1	Expected Principal	1435mm
LV	Misa junction - Border LV/LT	47,5	Expected Principal	1435mm
	Total length	**8 964,30**		
	Principal	4 480,32		
	Diversionary	2 524,95		
	Connecting	1 008,24		
	Expected principal and diversionary	950,79		

Annex 2: Overview of the cross-border solutions

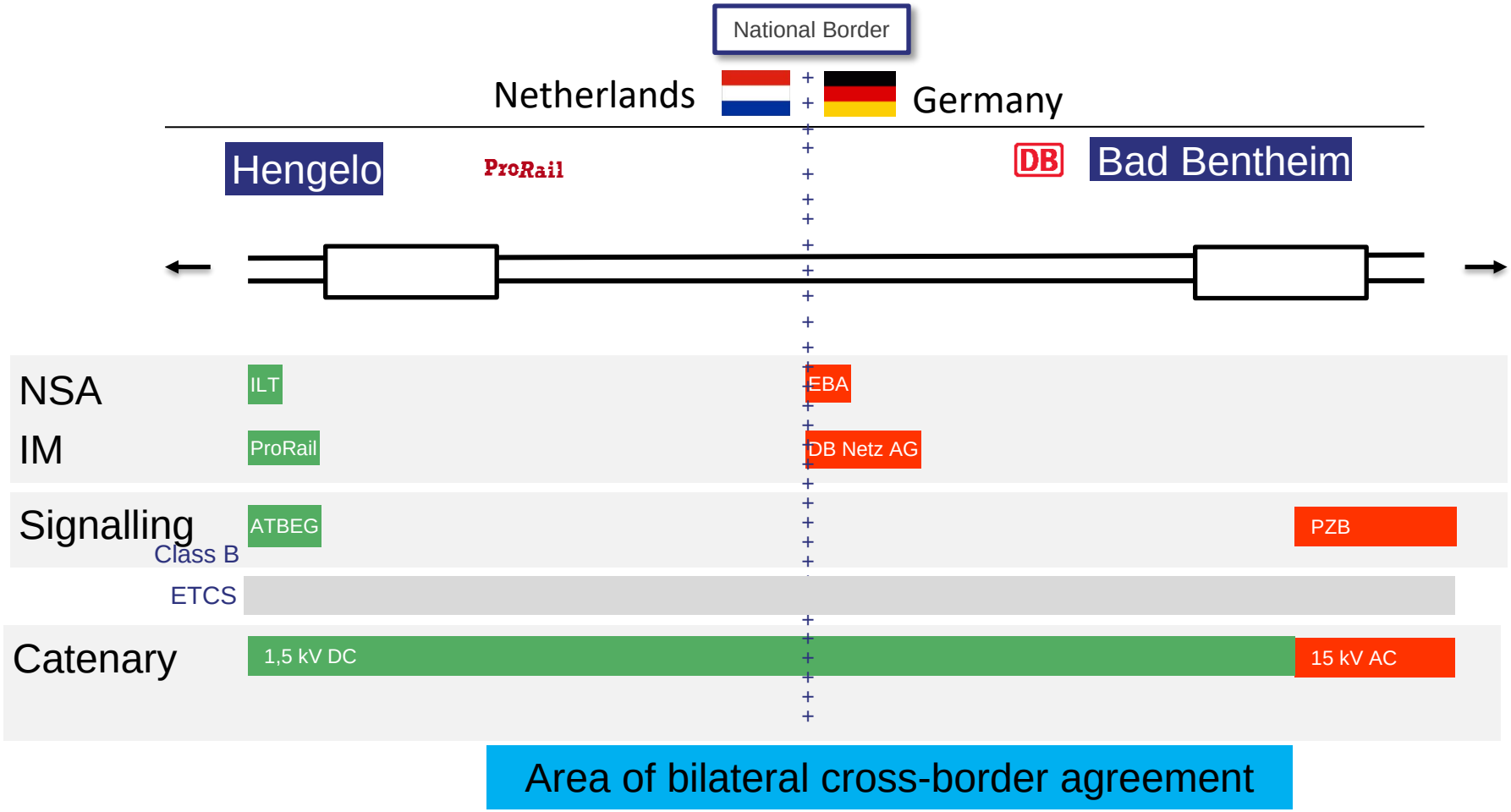
Cross-border agreement schematic overview Zevenaar - Emmerich (2022)



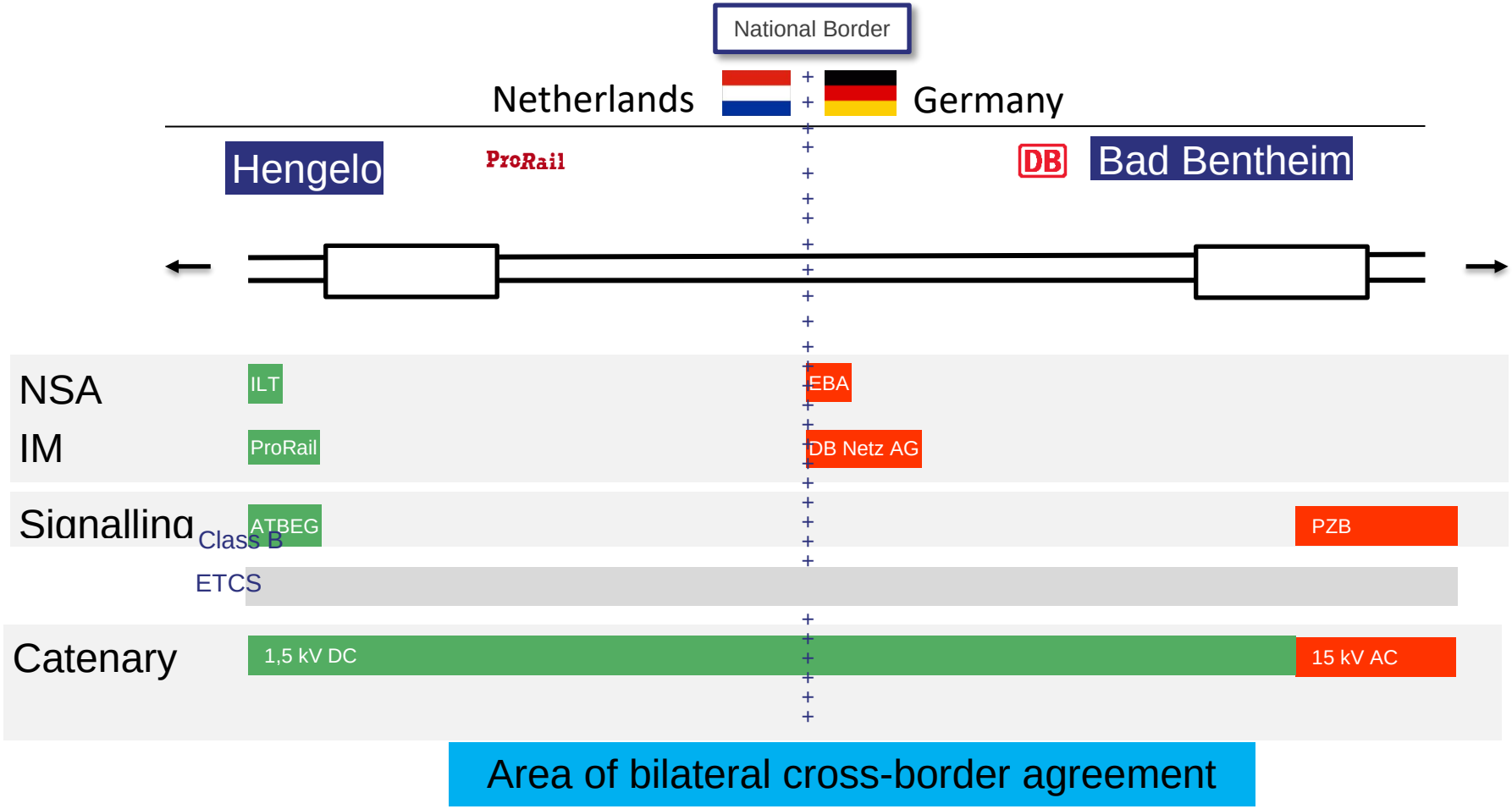
Cross-border agreement schematic overview Zevenaar - Emmerich (20xx)



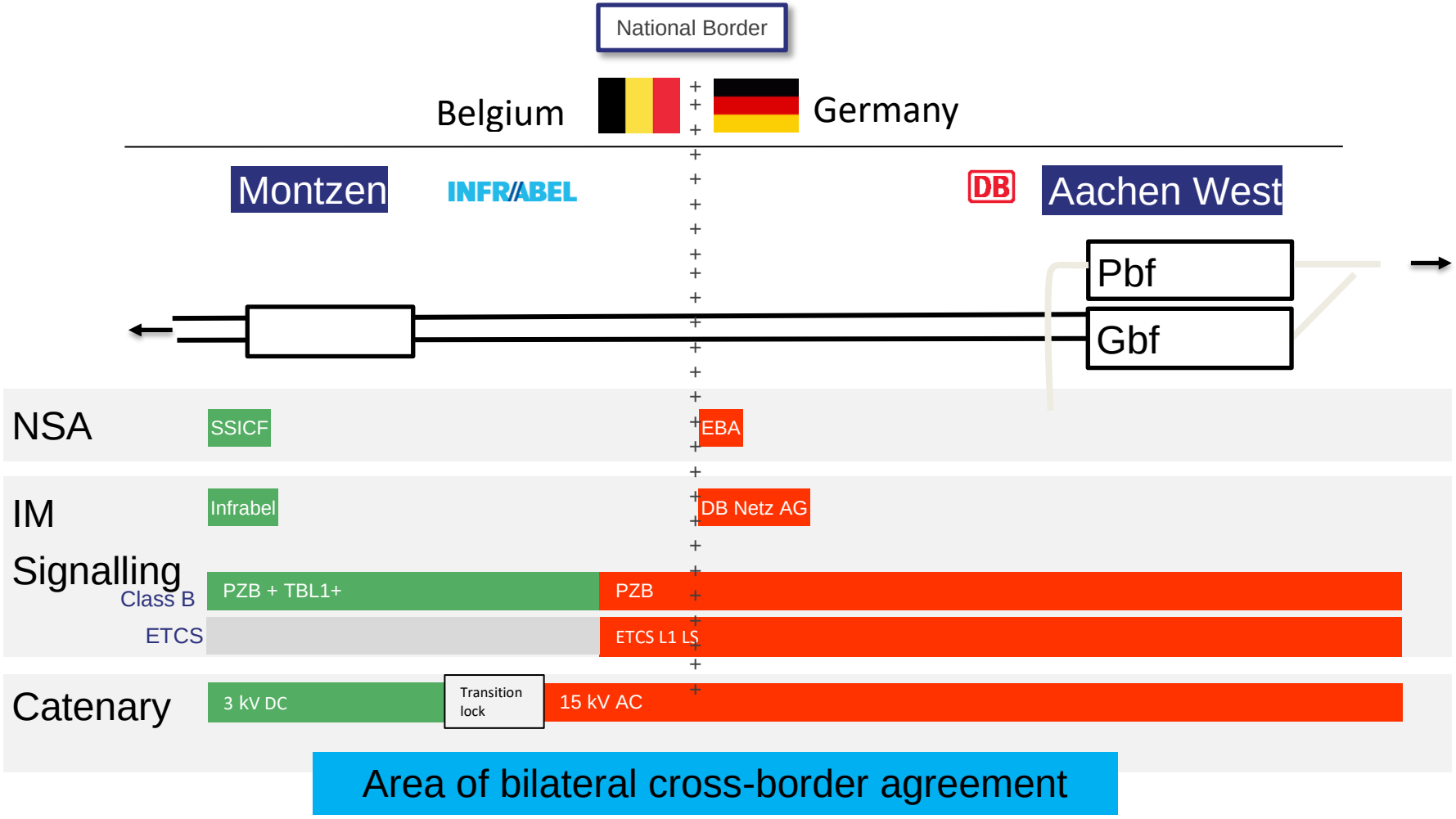
Cross-border agreement schematic overview Hengelo – Bad Bentheim (2020)



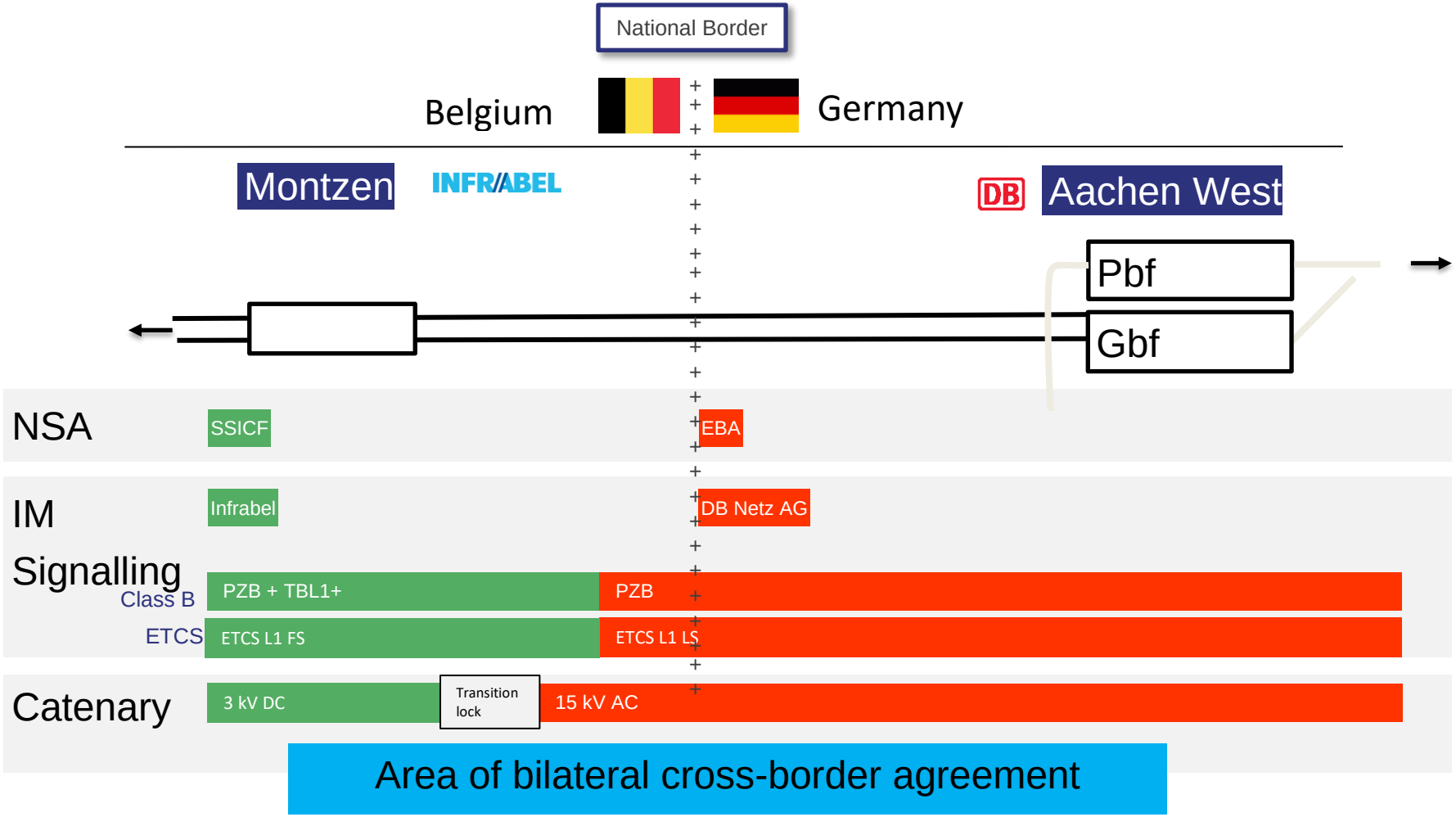
Cross-border agreement schematic overview Hengelo – Bad Bentheim (20XX)



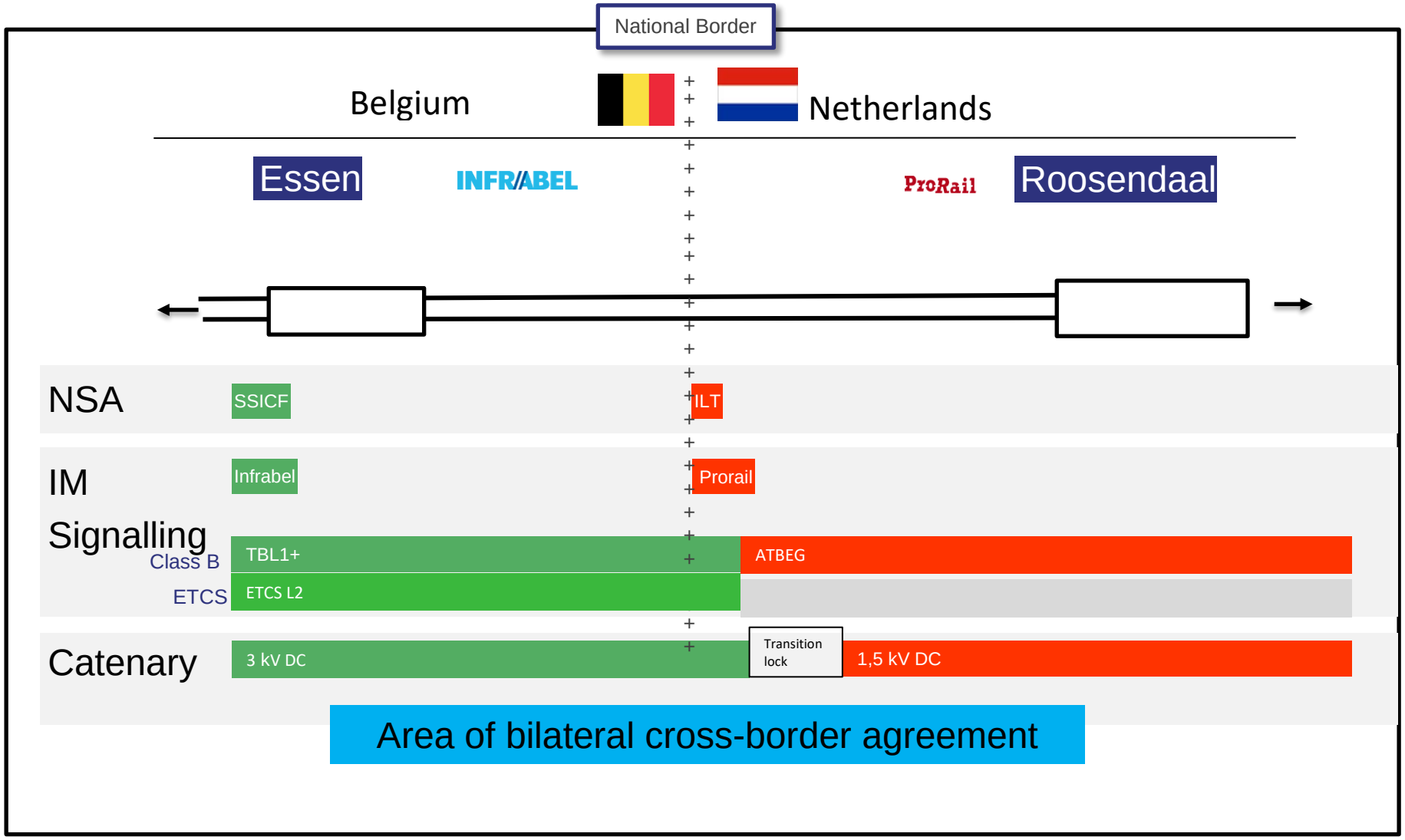
Cross-border agreement schematic overview Montzen – Aachen West (2021)



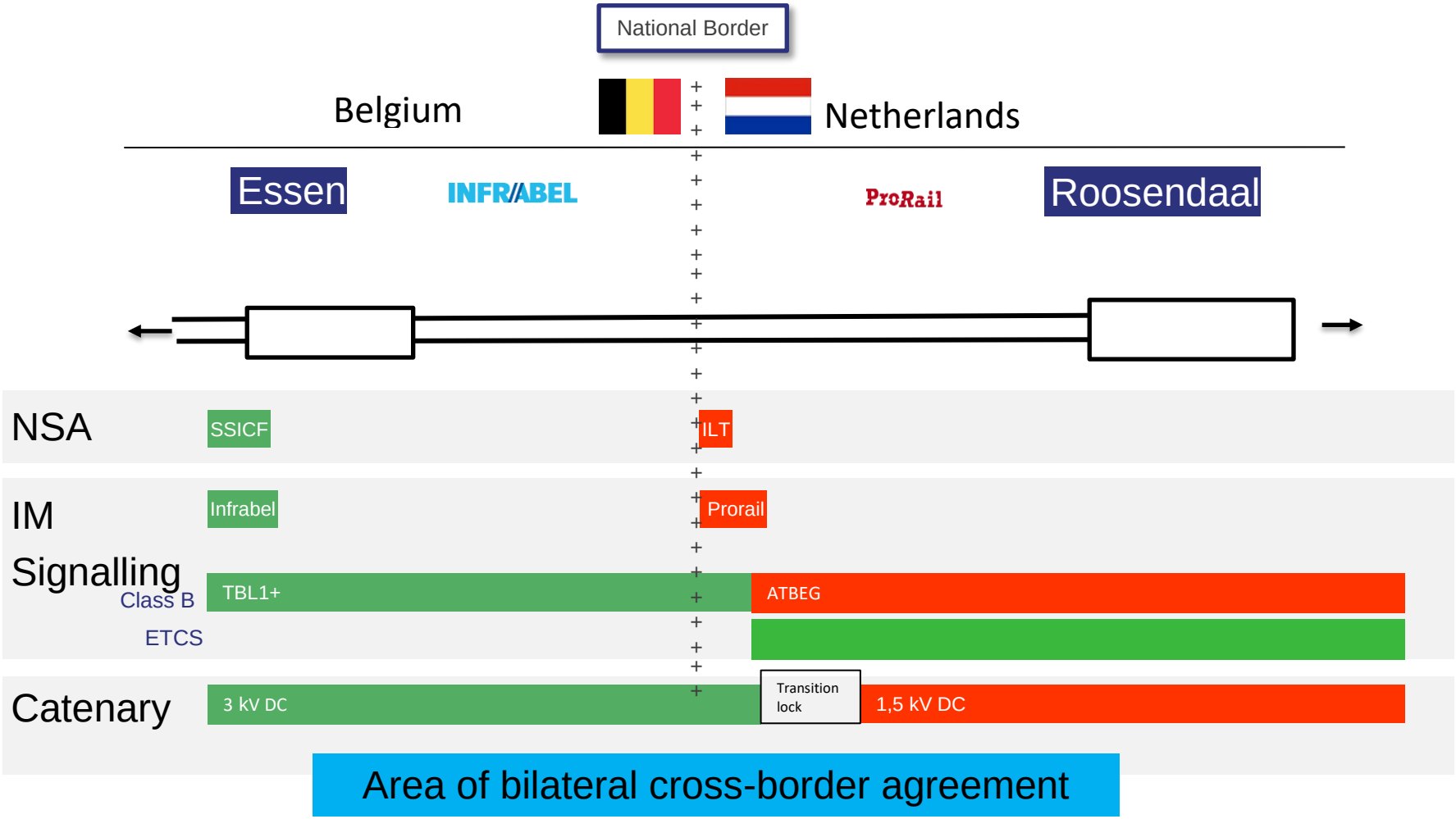
Cross-border agreement schematic overview Montzen – Aachen West (2023)



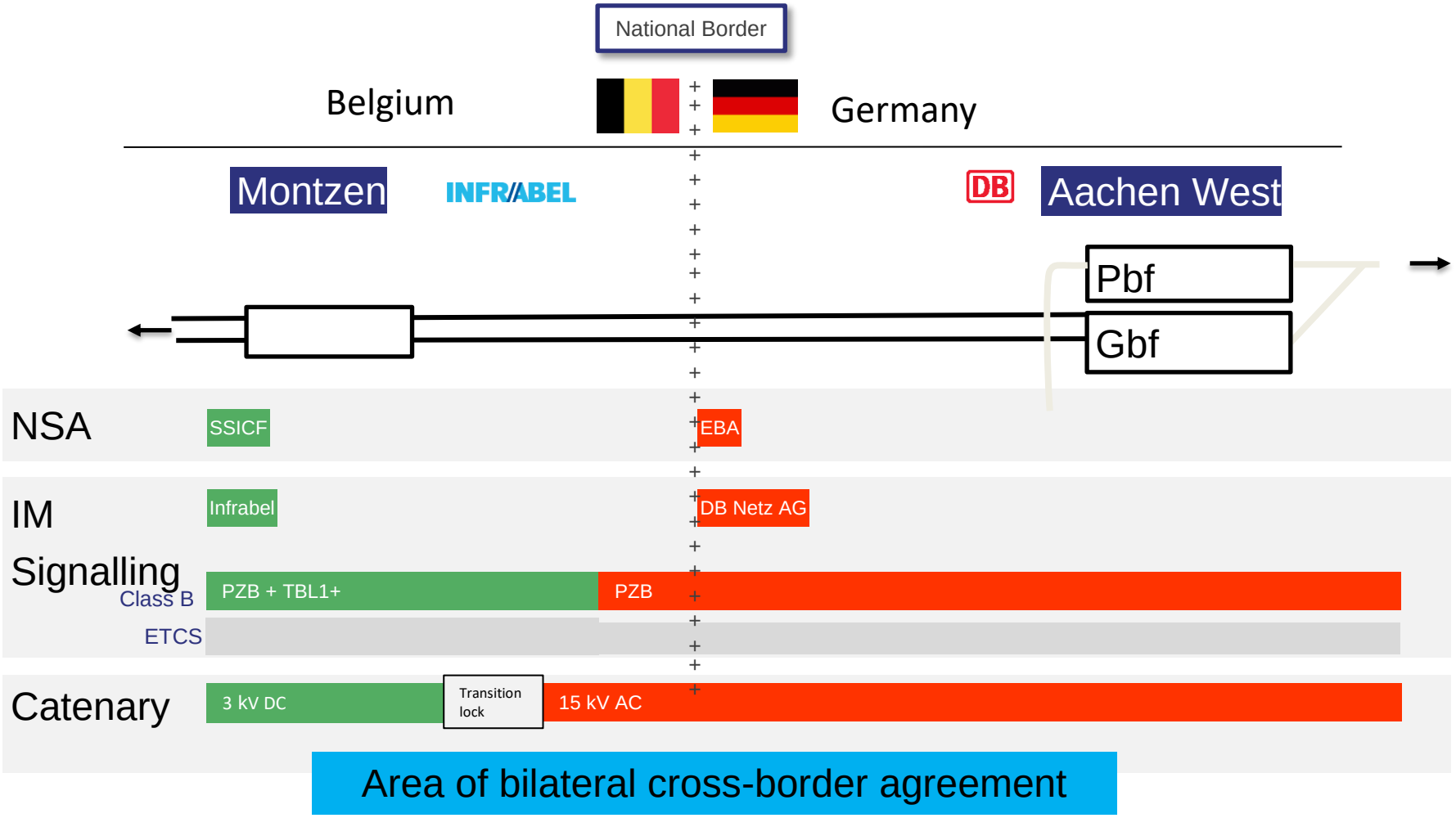
Cross-border agreement schematic overview Essen – Roosendaal (2021)



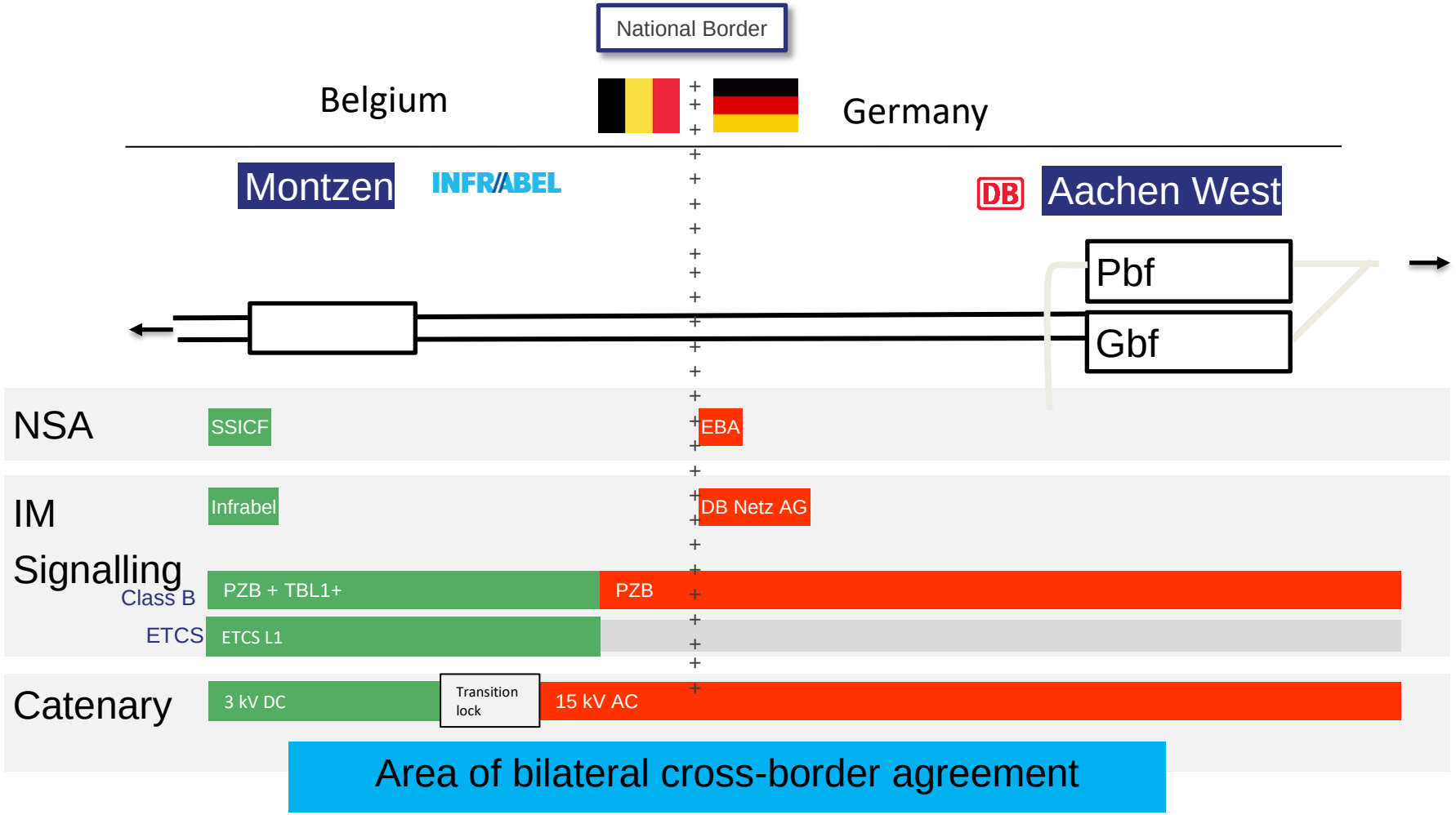
Cross-border agreement schematic overview Essen – Roosendaal (2028)



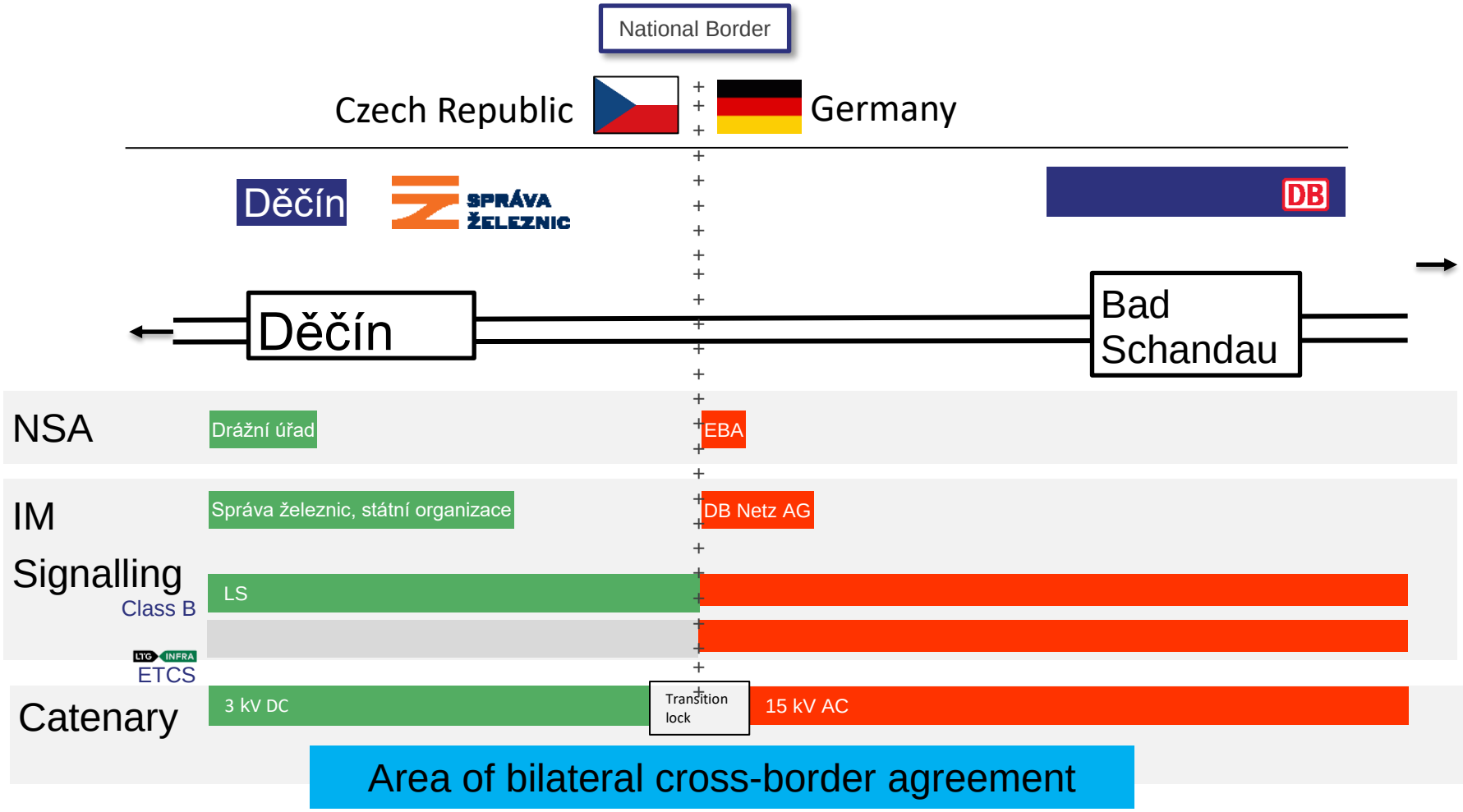
Cross-border agreement schematic overview Montzen – Aachen West (2021)



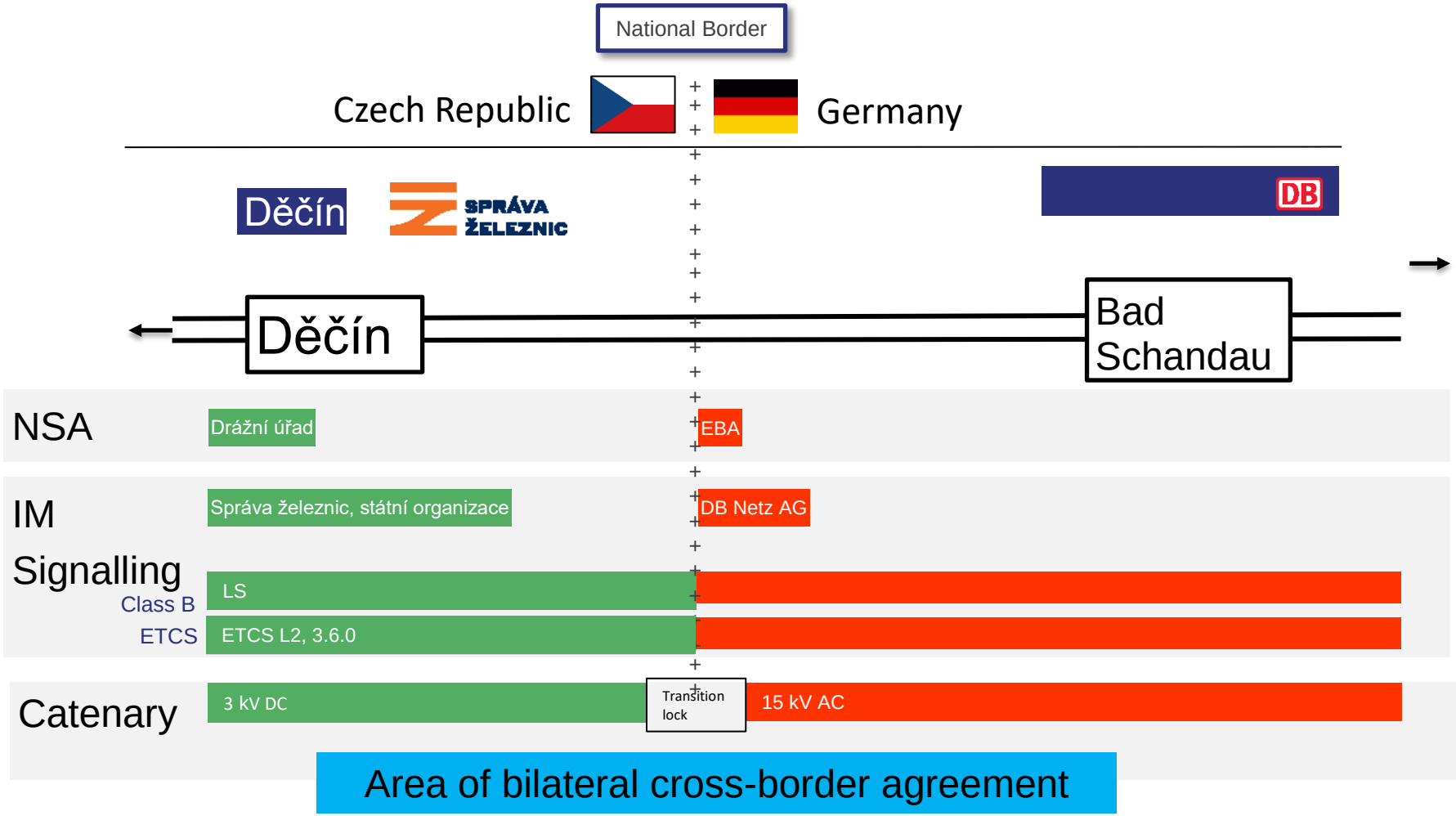
Cross-border agreement schematic overview Montzen – Aachen West (2023)



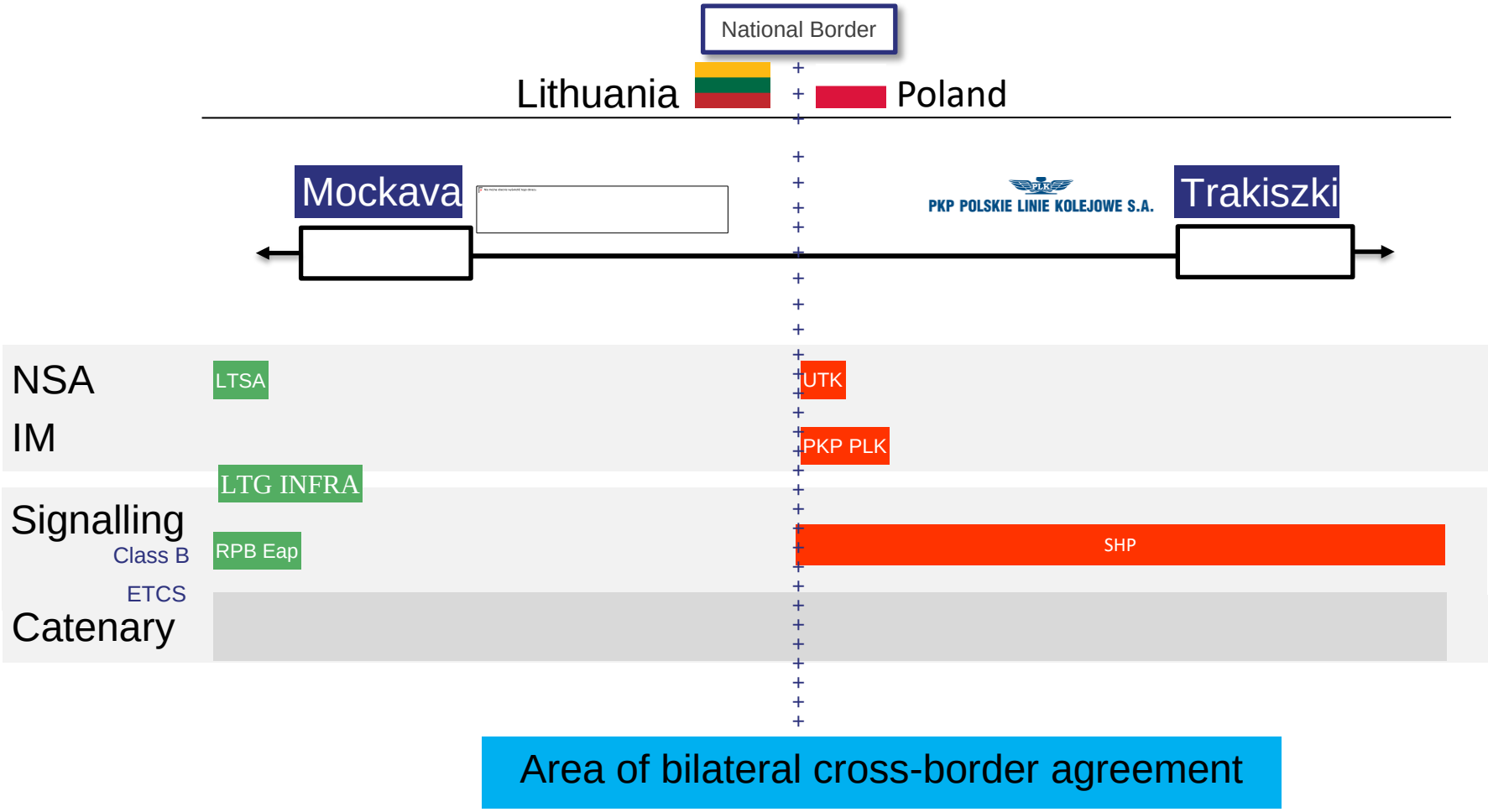
Cross-border agreement schematic overview Děčín – Bad Schandau (2020)



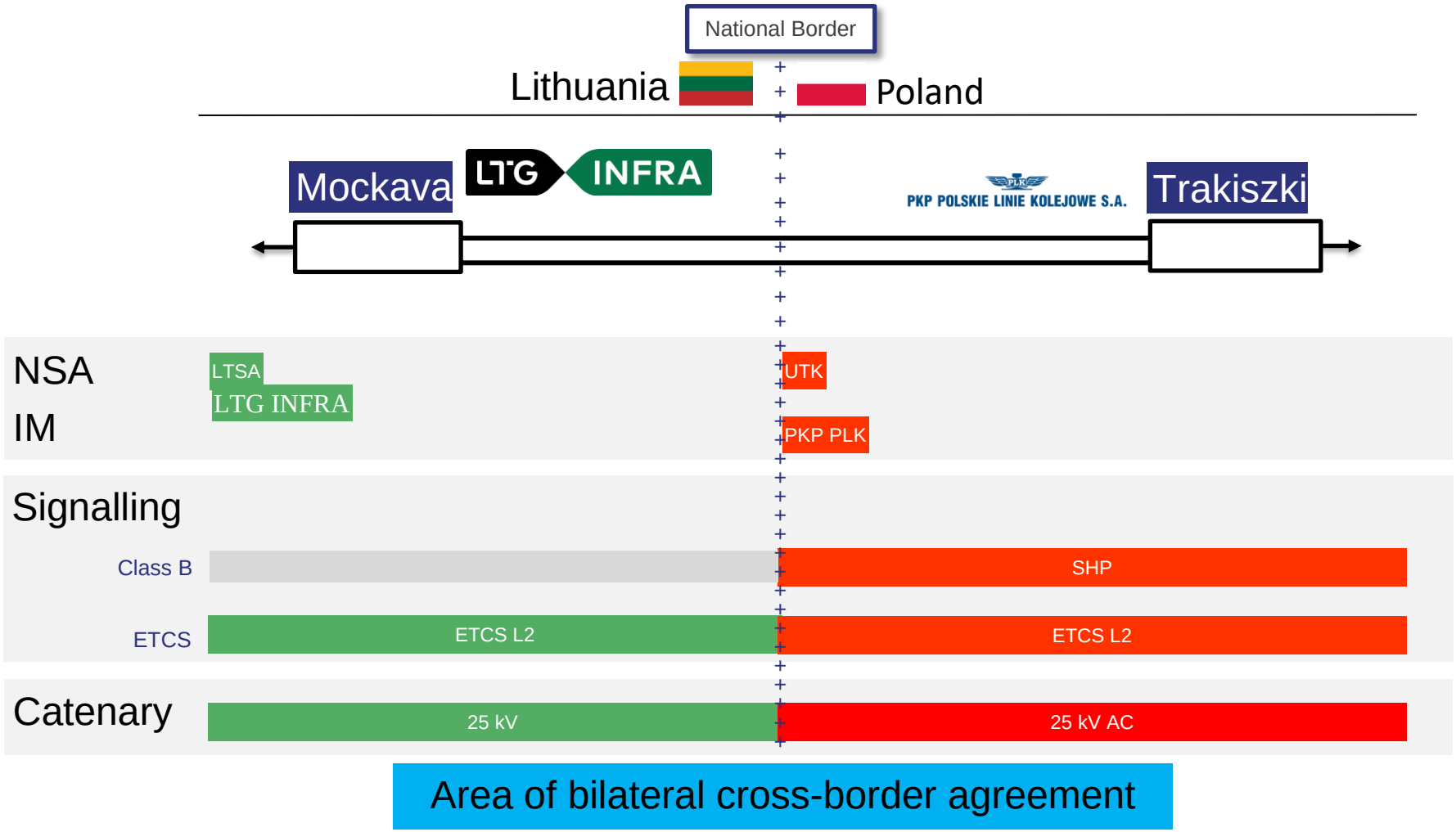
Cross-border agreement schematic overview Děčín – Bad Schandau (2023)



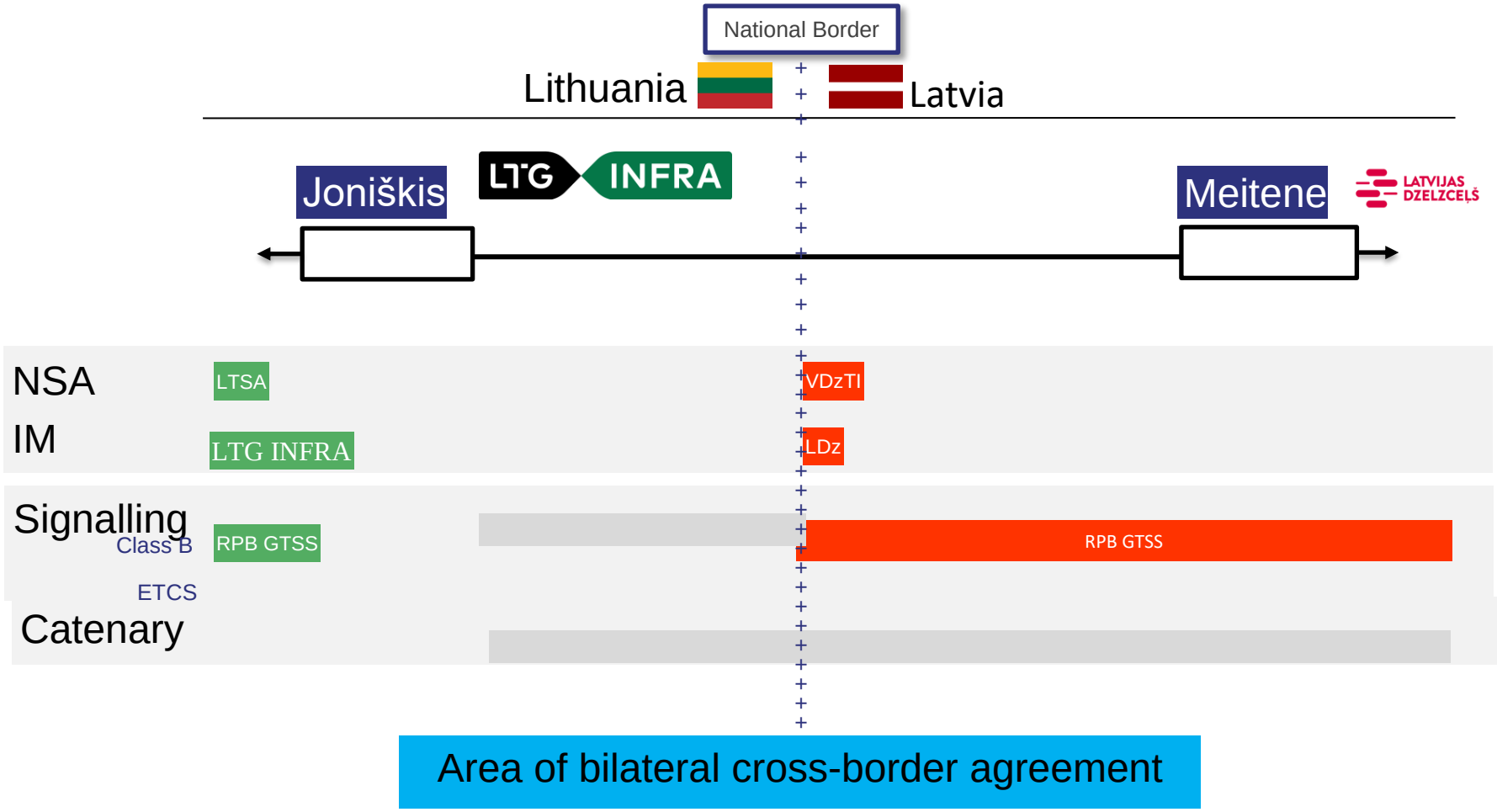
Cross-border agreement schematic overview Mockava - Trakiszki 1435mm (current situation)



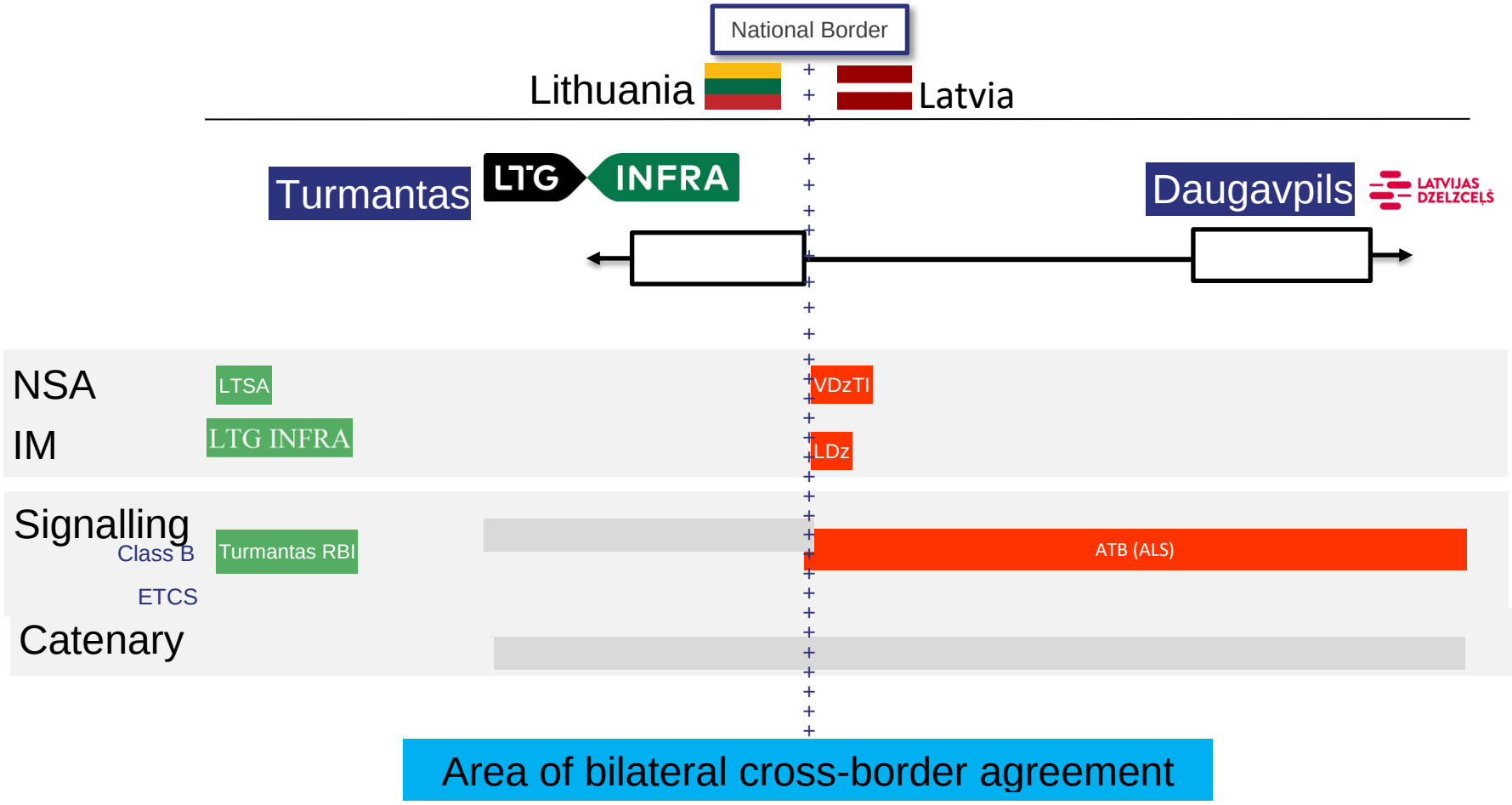
Cross-border agreement schematic overview Mockava – Trakiszki 1435mm (2027)



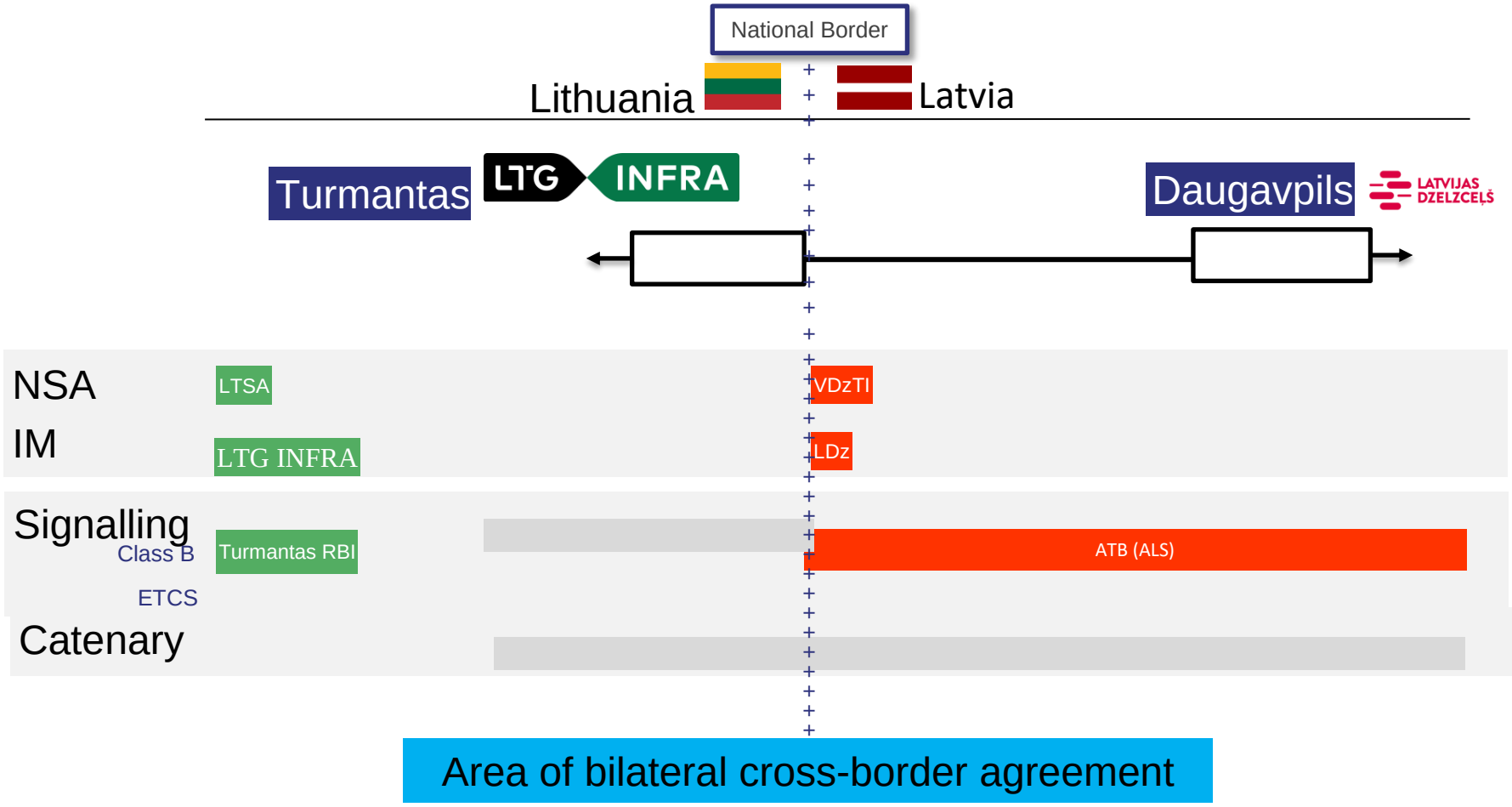
Cross-border agreement schematic overview Joniškis – Meitene 1520mm (current situation)



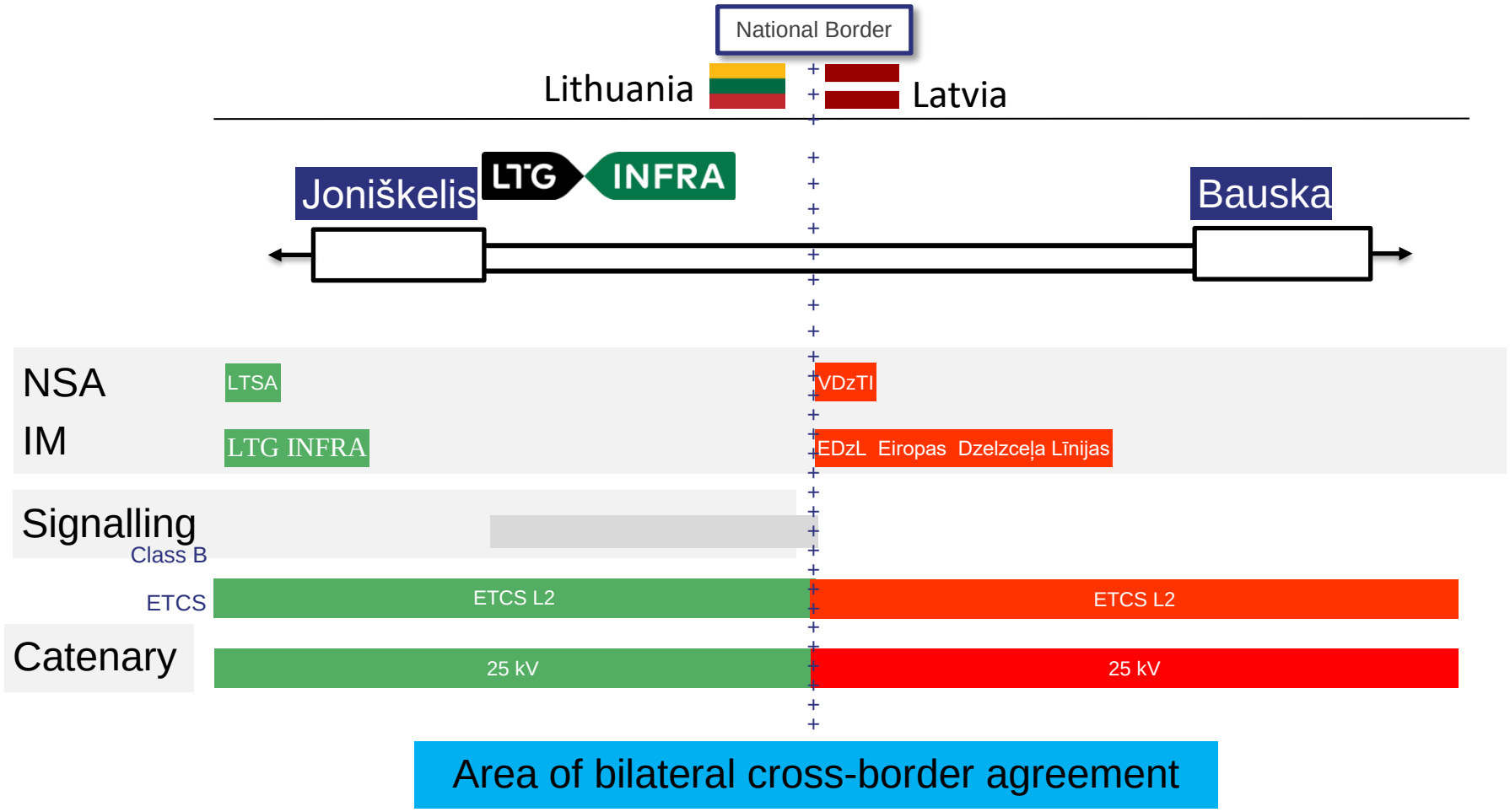
Cross-border agreement schematic overview Turmantas – Daugavpils 1520mm (current situation)



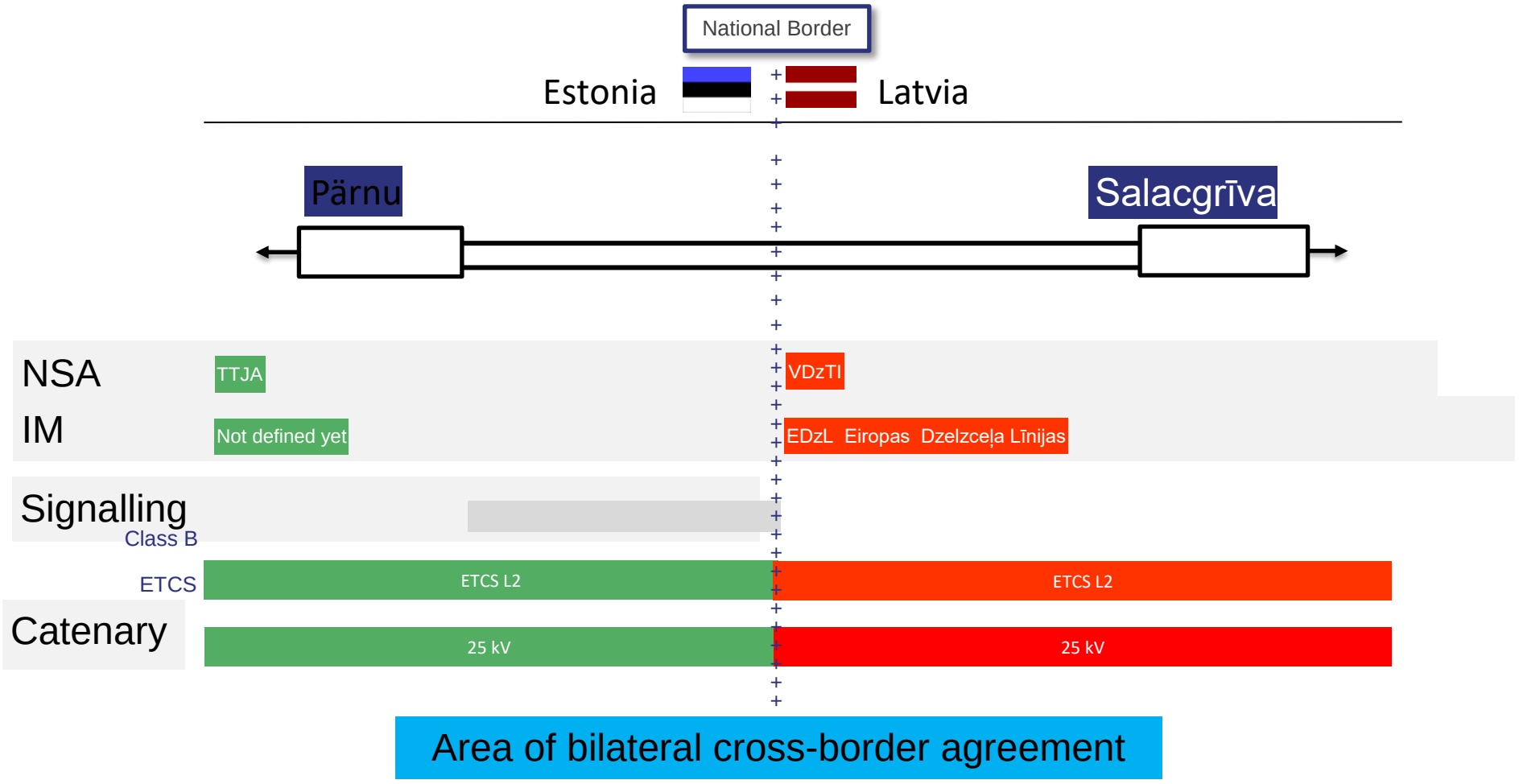
Cross-border agreement schematic overview Turmantas – Daugavpils 1520mm (2026)



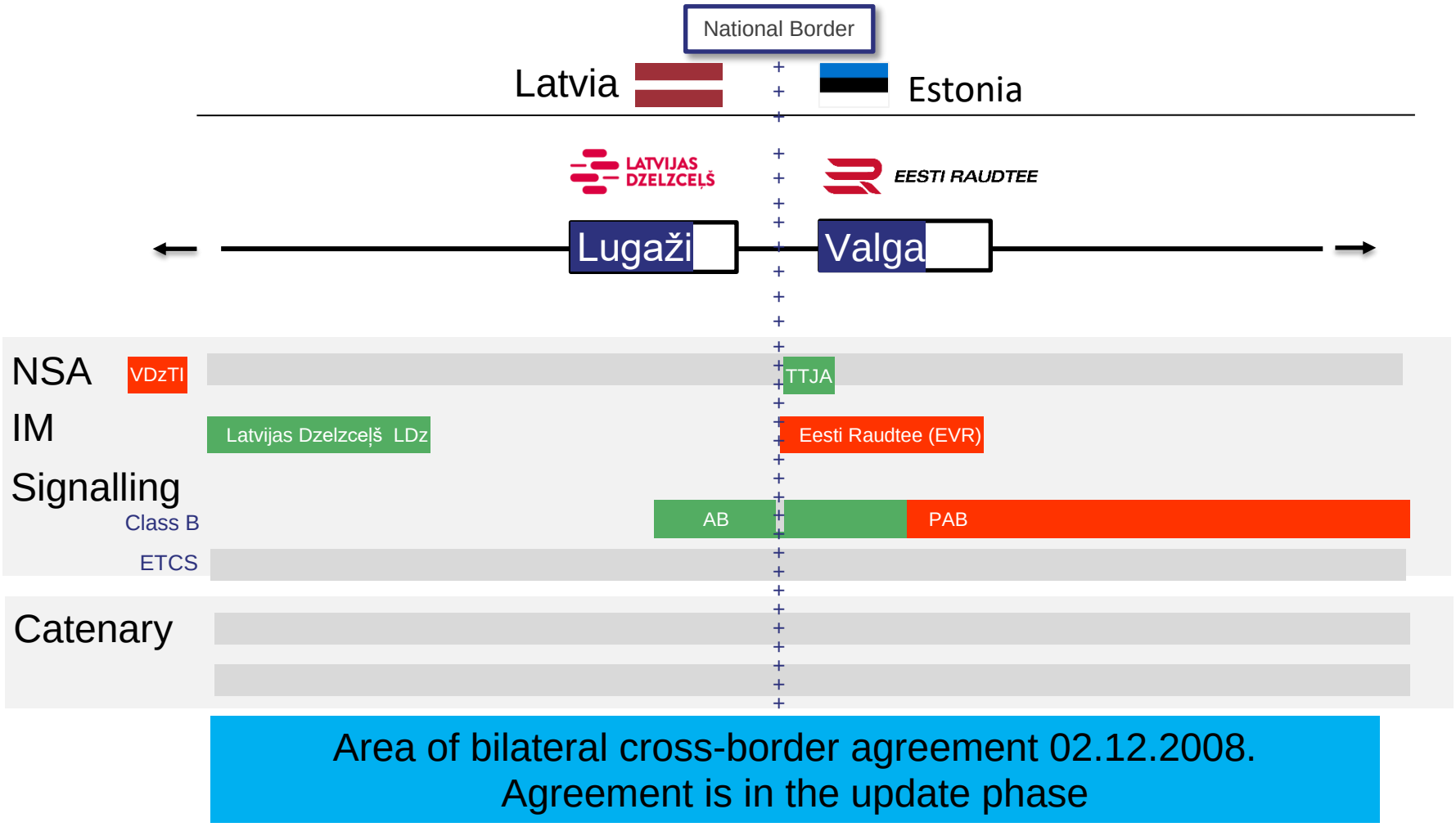
Cross-border agreement schematic overview Joniškelis – Bauska 1435mm (2026)



Cross-border agreement schematic overview Pärnu – Salacgrīva 1435mm (2026)



Cross-border agreement schematic overview Lugaži - Valga (2008) Update of agreement is in progress



Area of bilateral cross-border agreement 02.12.2008.
Agreement is in the update phase

Project “Establishment of Rail Freight Corridor “North Sea – Baltic” and its further development aiming at improving conditions for international rail freight transport” number 2014-EU-TM-0217-S is co-financed by the European Union’s CEF program.
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 contained therein.