TRANSPORT MARKET STUDY OF THE RAIL FREIGHT CORRIDOR NORTH SEA-BALTIC

Final report

Executive summary

February 2020

Prepared for:
EEIG "North Sea – Baltic Rail Freight Corridor" EZIG
74 Targowa St.
03-734 Warsaw
Poland

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

The Rail Freight Corridor North Sea – Baltic is co-financed by the European Union's Connecting Europe Facility – CEF. The sole responsibility of this publication lies with the authors. The European Union and the EEIG "North Sea – Baltic Rail Freight Corridor" EZIG are not responsible for any use that may be made of the information contained therein.

Glossary of abbreviations

BCP	Border Crossing Point
CAGR	Compound Average Growth Rate
CBA	Cost-Benefit Analysis
CEF	Connecting Europe Facility
CER	Community of European Railway and Infrastructure Companies
CID	Corridor Information Document
CIP	Corridor Information Platform
CIS	Commonwealth of Independent States
EC	European Commission
EFTA	European Free Trade Association
EIM	European Rail Infrastructure Managers
ERA	European Union Agency for Railways
ERTMS	European Rail Traffic Management System
EU	European Union
GDP	Gross Domestic Product
GVA	Gross Value Added
HGV	Heavy Goods Vehicles
IM	Infrastructure Manager
IMF	International Monetary Fund
INEA	Innovation and Networks Executive Agency
IT	Information Technology
IWW	Inland Waterway
LGV	Light Goods Vehicles
MB	Management Board of RFC NS-B
MoS	Motorways of the Sea
MS	Member State
NST	Standard Goods Classification for Transport Statistics (Nomenclature uniforme des marchandises pour les Statistiques de Transport)
NUTS	Nomenclature of territorial units for statistics (Nomenclature des Unités Territoriales Statistiques)
OBOR	One Belt One Road Initiative
O/D	Origin/Destination
OECD	Organisation for Economic Co-operation and Development
PEST	Political, Economic, Social and Technological analysis

PRIME	Platform of Rail Infrastructure Managers in Europe
RAG	Railway Undertaking Advisory Group
RFC	Rail Freight Corridor
RFC NS-B	Rail Freight Corridor North Sea – Baltic
RNE	RailNetEurope
TAC	Track Access Charges
TAG	Terminal Advisory Group
TEU	Twenty-foot Equivalent Unit
TMS	Transport Market Study
TEN-T	Trans-European Network-Transport
TENtec	European Commission's Information System to coordinate and support the Trans-European Transport Network Policy
ToR	Terms of Reference
TT	TimeTable
UIC	Union Internationale des Chemins de Fer (International Union of Railways)
UIRR	International Union for Road-Rail Combined Transport
WG TMS	Working Group Transport Market Study

Country codes after ISO 3166

Belgium	BE
Czech Republic	CZ
Estonia	EE
Germany	DE
Latvia	LV
Lithuania	LT
Netherlands	NL
Poland	PL

1 EXECUTIVE SUMMARY

1.1 Introduction

To enhance a European network for competitive rail freight, the 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 Rail Freight Corridor North Sea-Baltic (RFC NS-B) was established in November 2015. A mandatory part of the implementation plan for the RFC NS-B was to undertake a Transport Market Study (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.

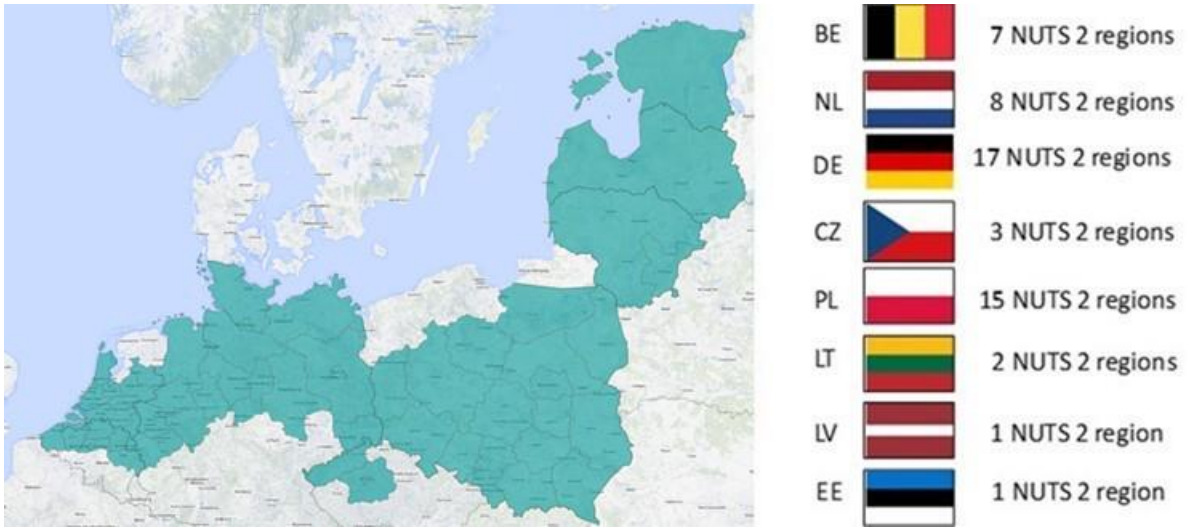
The scope of the TMS subject of this report concerns the existing corridor alignment as established in November 2015 and the additional planned and proposed extensions. More specifically, according to the amended Annex to Regulation (EU) 913/2010, the RFC NS-B has to be extended to Riga (Latvia) and 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 view of a possible application for extension of the corridor, the Management Board (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.

1.2 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 a 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 1-1 below).

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



Source: Own elaboration

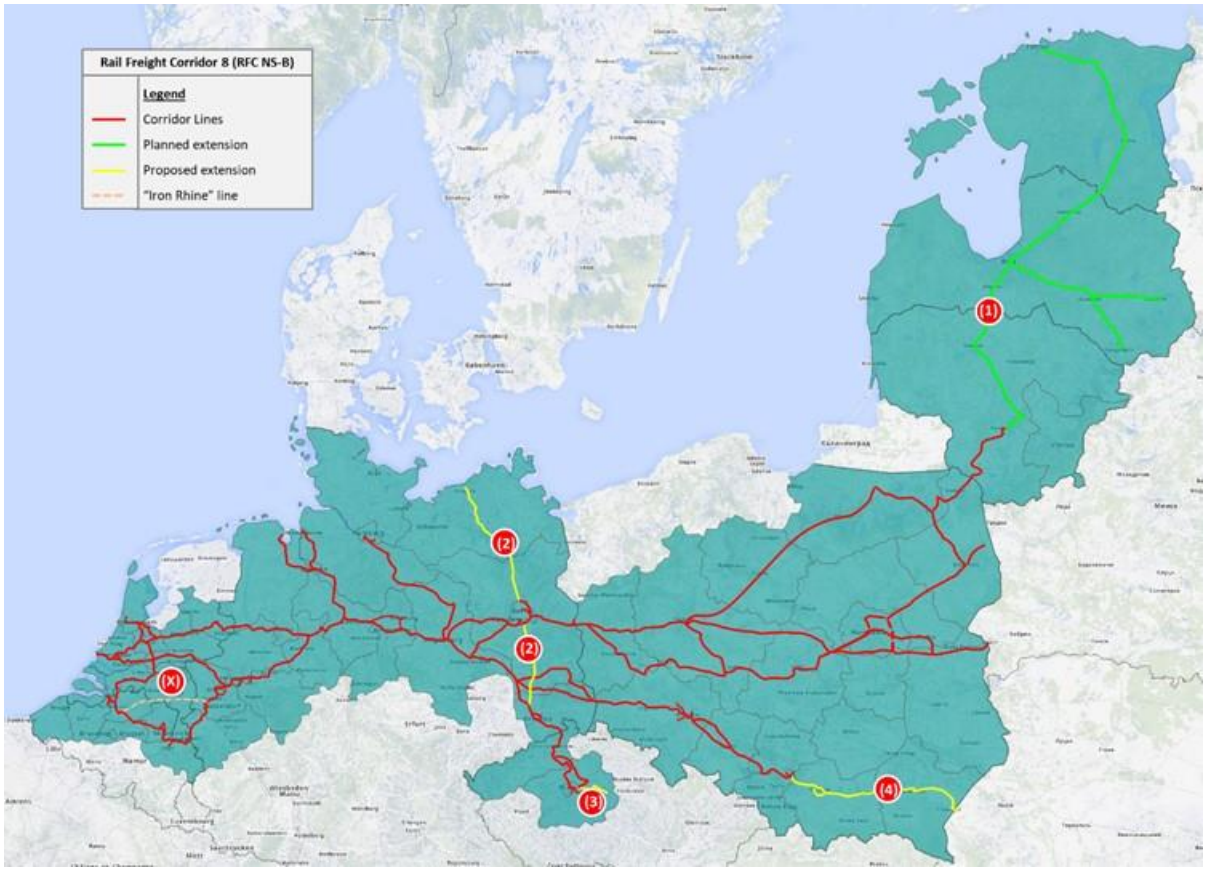
1.3 Corridor alignment: existing alignment and planned and proposed sections

The existing corridor alignment is pictured in the following Figure 1-2. 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 1-2 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 1-2 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), Belorussia (Daugavpils), and Tallinn (EE);
- (2) Rostock – Priestewitz / Dresden via Berlin (DE);
- (3) Praha Libeň – Kolín (CZ);
- (4) Katowice – Medyka (PL).

Figure 1-2 – Corridor alignment of the RFC NS-B with planned and proposed extensions



Source: Own 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 1-2 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.

1.4 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 Rail Freight Corridors (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.

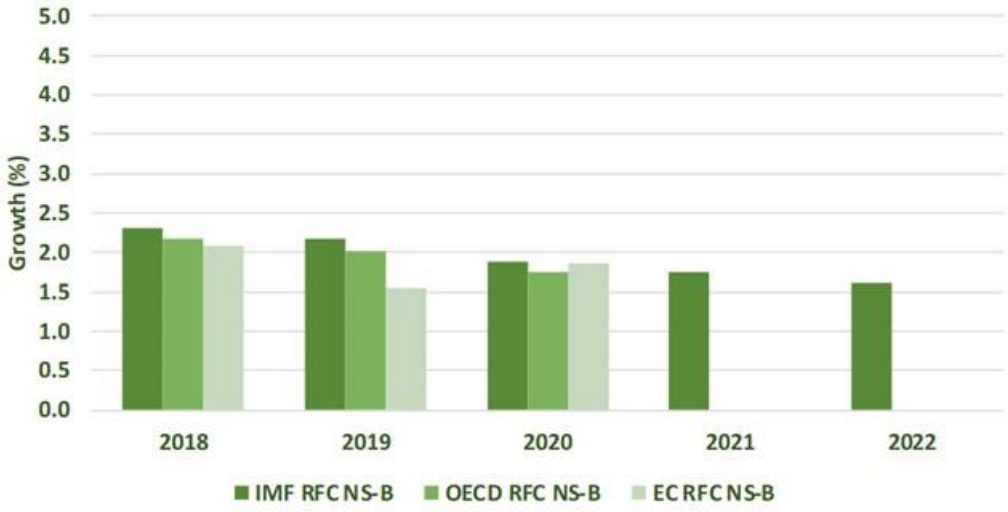
Regarding the Eurasia Land Bridge under development as part of the One Belt One Road (OBOR) initiative by the Chinese Government, it is noticeable that whereas its routing is still to be fully defined, the RFC NS-B seems currently representing the main access itinerary for the traffic between the EU 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 1-3 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 1-3 – 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 1-4 – RFC NS-B GDP short-term forecasts



Source: IMF, OECD and EC

Figure 1-4 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.

1.5 Analysis of the current transport market on the Corridor

1.5.1 Rail freight transport between RFC NS-B Member States

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

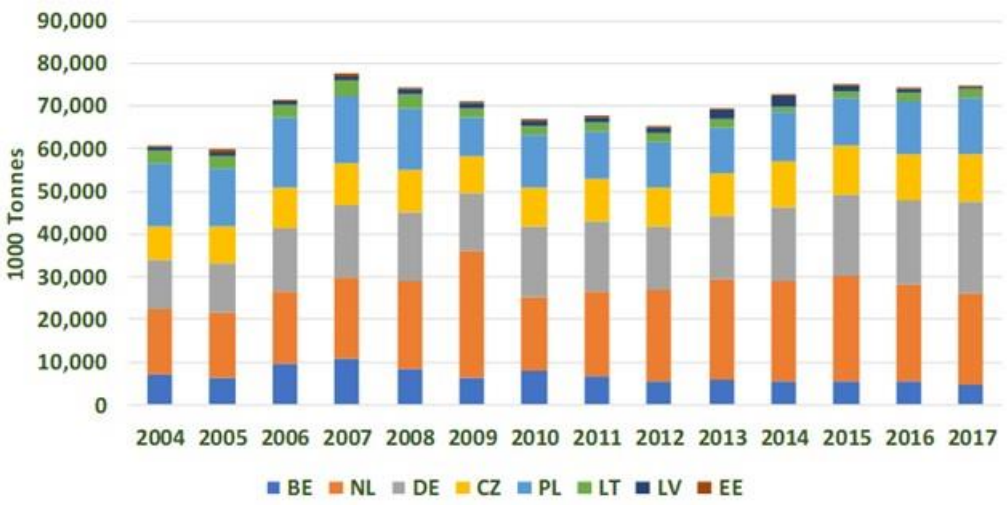
Table 1-1 – 2017 Rail freight O/D matrix ('000 tonnes)

		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).

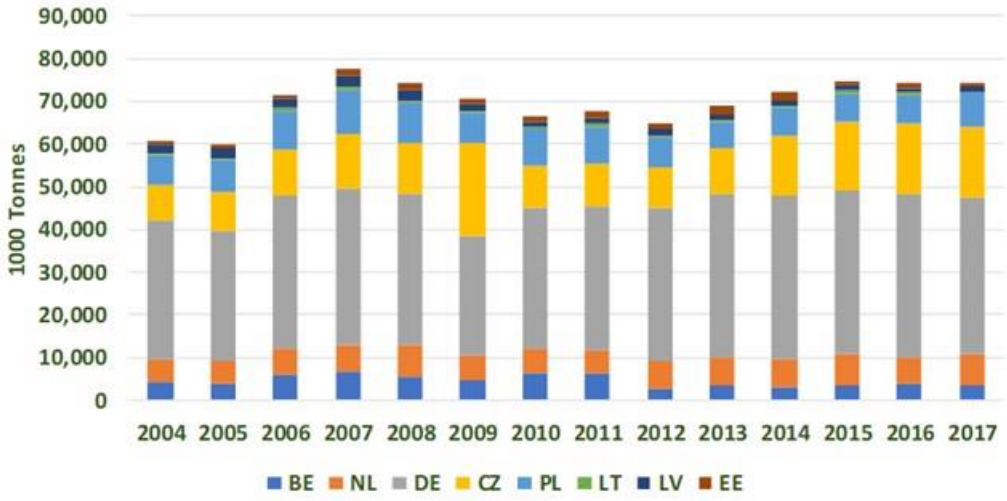
Figure 1-5 – Outbound rail freight transport – historical trend



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.

Figure 1-6 – 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 1-6.

1.5.2 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 1-2 – 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 1-3 – 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 1-4 – 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 1-5 – 2012-2017 Rail freight growth rates by O/D

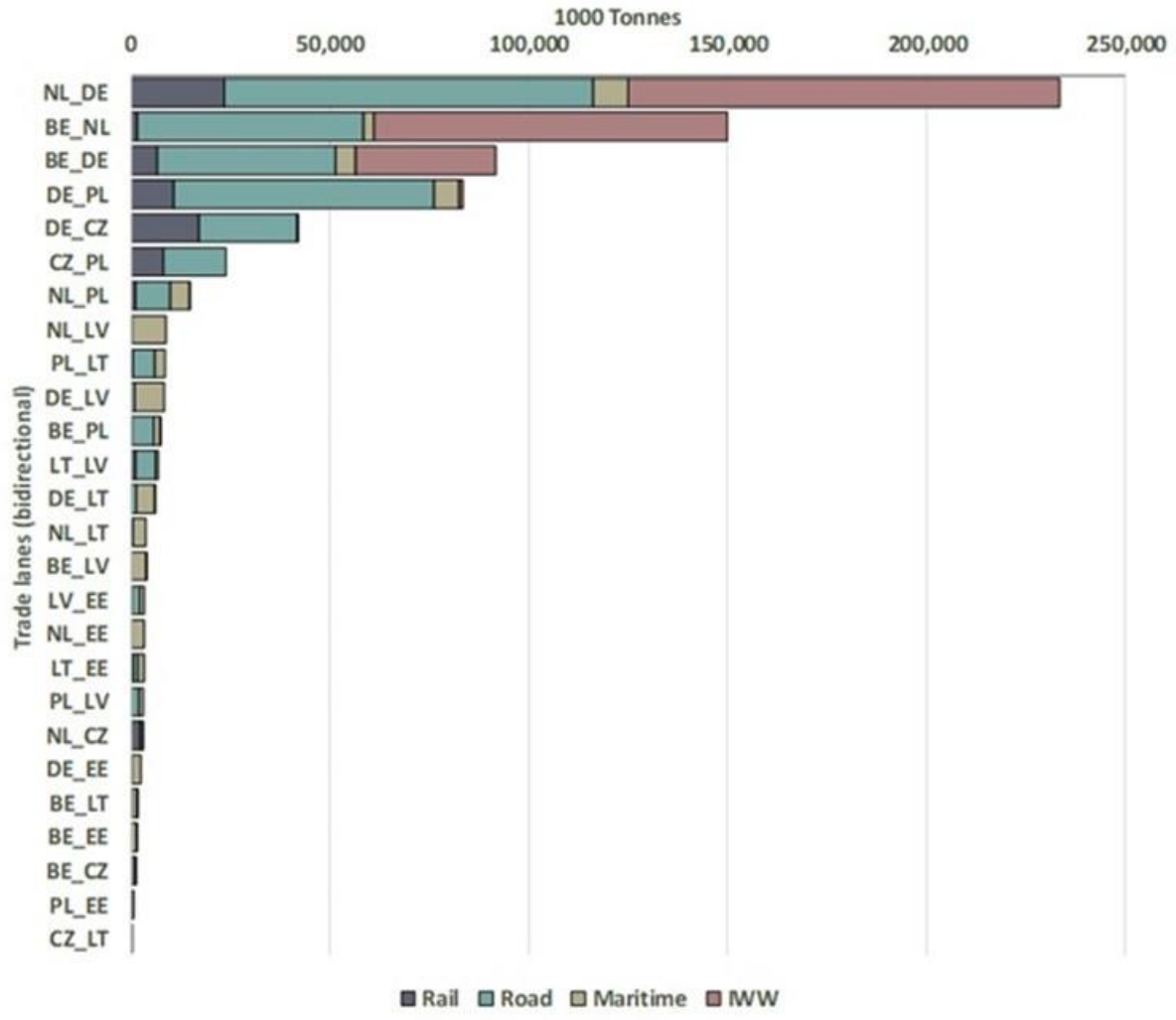
Loading Country \ Unloading Country	BE	NL	DE	CZ	PL	LT	LV	EE	TOT
BE	-	-0.3%	-3.1%	**11.8%**	**8.9%**	-	-	-	**-2.2%**
NL	**2.3%**	-	-1.5%	**13.5%**	**41.8%**	-	-	-	**-0.3%**
DE	**7.7%**	**0.4%**	-	**15.2%**	**5.2%**	**38.0%**	-	-	**7.8%**
CZ	-0.3%	**3.9%**	**8.0%**	-	-4.4%	0.0%	-	-	**4.0%**
PL	-7.1%	**54.1%**	**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

1.5.3 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 1-7) and percentage (Figure 1-8) on the trade lanes involving the RFC NS-B Member States in 2017.

Figure 1-7 – Modal split (‘000 tonnes) of the bidirectional freight transport between RFC NS-B Member States in 2017

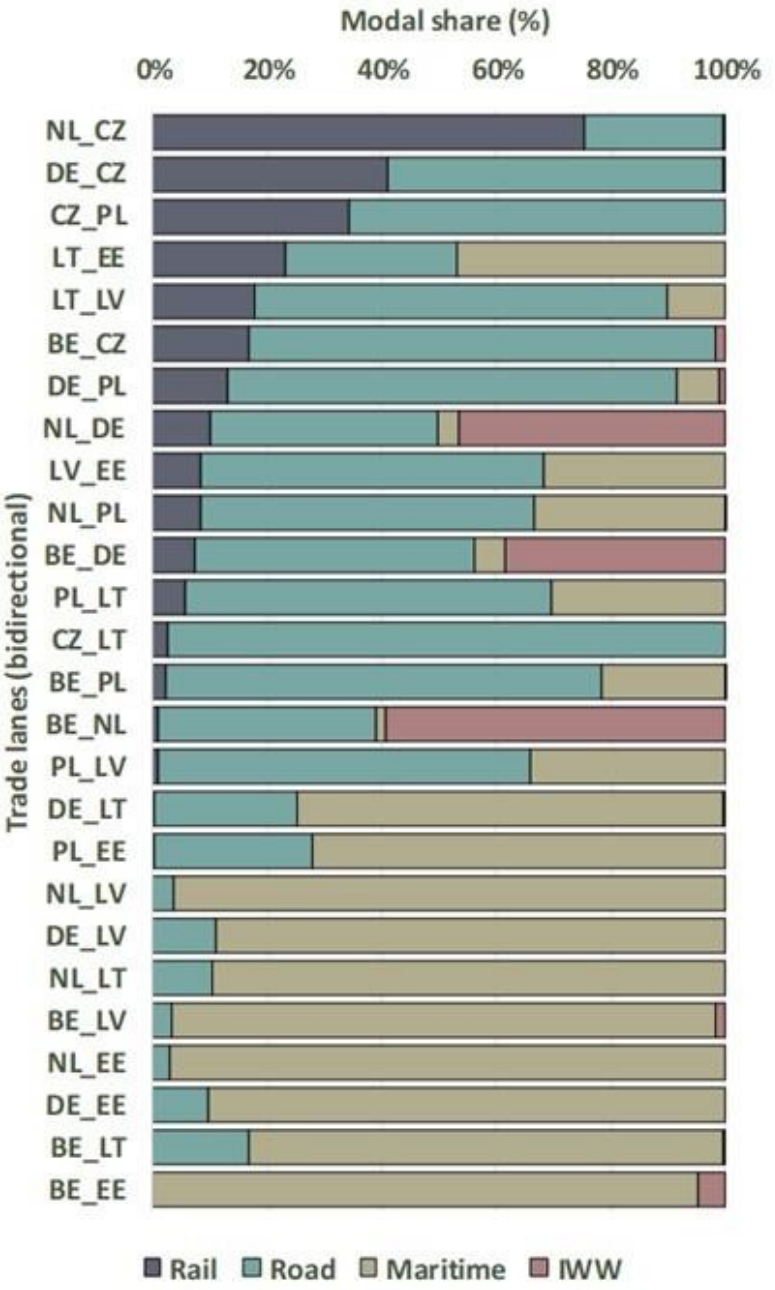


Source: Eurostat. Note: Figures relate to total transport at country level (NUTS 0)

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 1-8 – 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)

1.5.4 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 Infrastructure Managers, 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 BCP between the RFC NS-B Member States, and/or arriving/departing from one of the ports in the RFC NS-B catchment area[1]. Due to limitations in the datasets available to national Infrastructure Managers, 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 border crossing points (BCPs) between the RFC NS-B Member States as made available by each reporting Infrastructure Manager 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 1-6 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 Infrastructure Managers 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 1-6 – 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

[1] 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*
Bad Schandau (DE) – Děčín (CZ)	Czech Republic	14,290
	Germany	14,160
Frankfurt (Oder) (DE) – Rzepin (PL)	Poland	7,470
	Germany	7,170
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 1-6 above includes the list of 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 border crossing points have not been considered in the study at the same level of detail of the RFC NS-B BCPs listed in Table 1-6 above. Interconnecting the European Union railway network with the one of the neighbouring countries, at least one side of these border crossing points 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 1-6 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 1-7 for the year 2017.

Table 1-7 – 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*

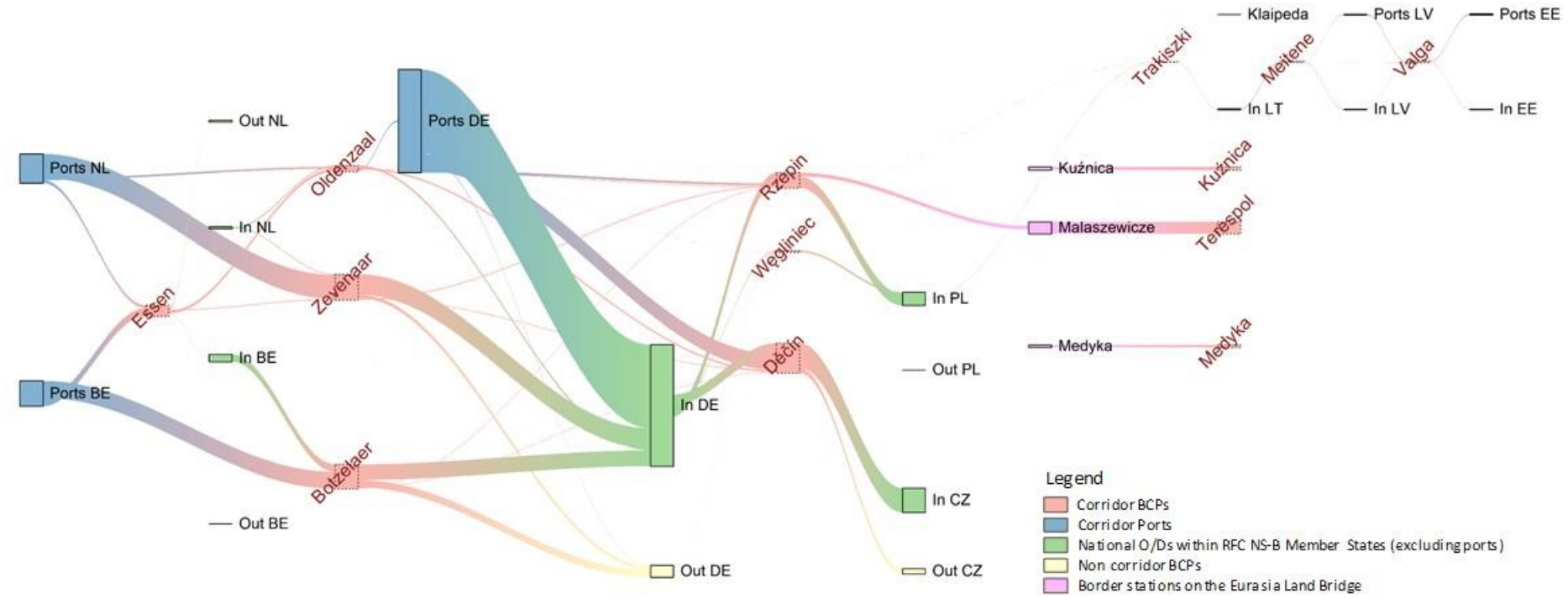
The plot in Figure 1-9 represents the O/D distribution of the bidirectional train flows crossing the RFC NS-B BCPs estimated on the basis of the data provided by the Infrastructure Managers. The plot also includes the distribution of the total traffic with O/Ds from the German ports due to their relevance 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 1-10 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.

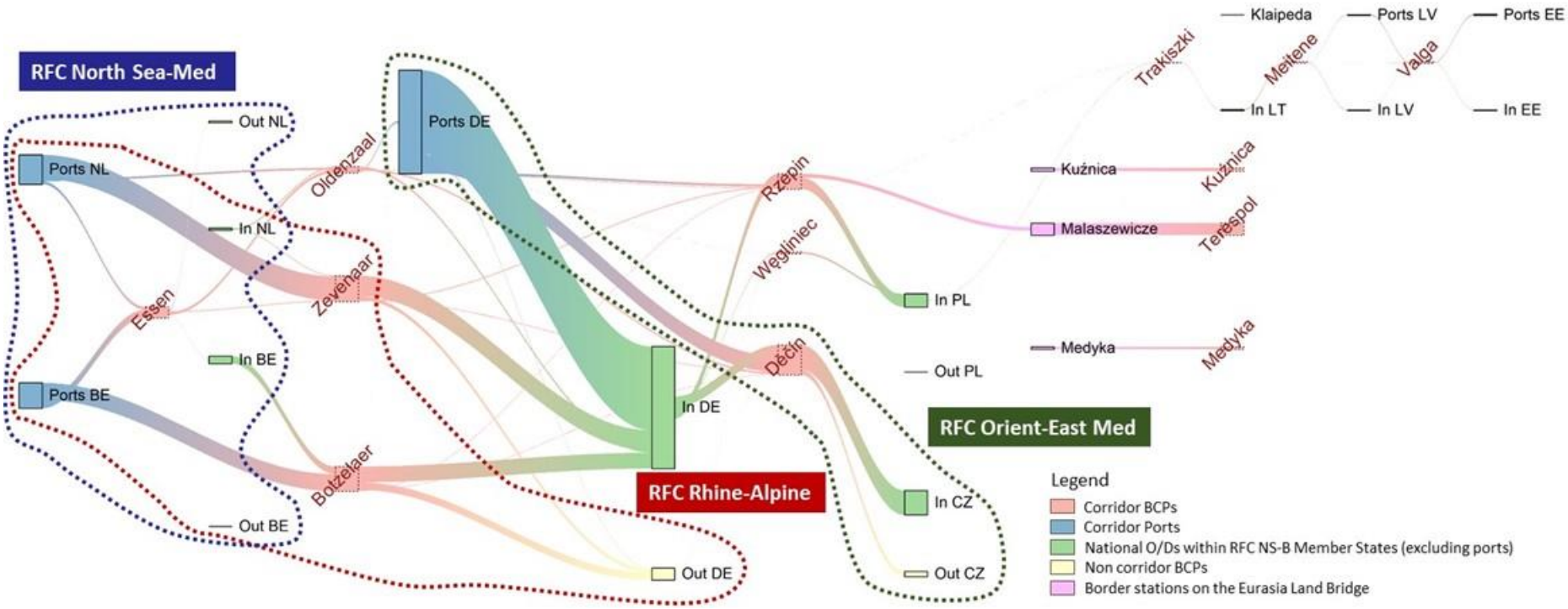
Finally an additional map has been elaborated concerning the flows of international trains along the RFC NS-B (Figure 1-11). This is aimed at representing the trains crossing the corridor BCPs between the RFC NS-B Member States. Compared to the other maps, this plot presents an additional level of aggregation 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 1.6.3 below.

Figure 1-9 – 2017 Train flows along the RFC NS-B crossing a corridor BCP including national traffic with O/D at German Ports



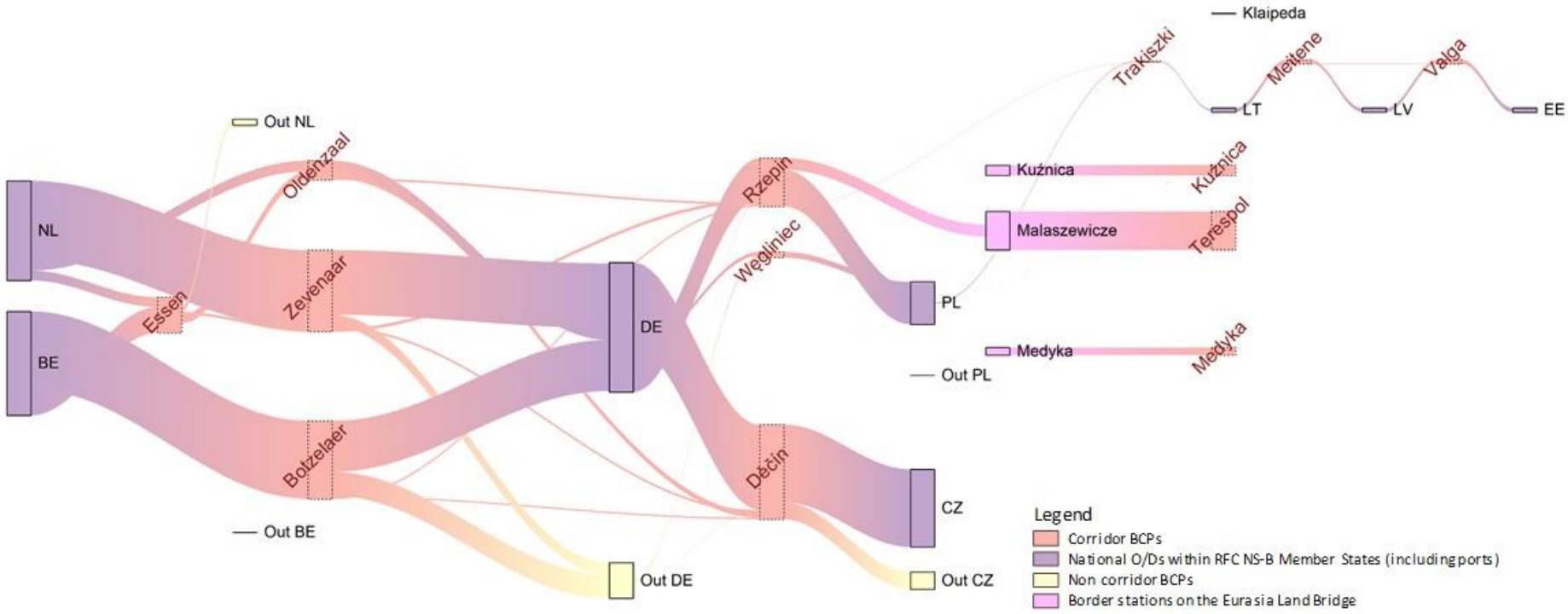
Source: Own elaboration on 2017 data provided by the IMs. Note: relations with a train frequency lower than 100 trains per year are not plotted; Train data for the Kuźnica Małaszewicze and Medyka border stations were provided only between these stations and the border crossing points with Belarus and 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 1-10 – 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 1-11 – 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

1.5.5 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.

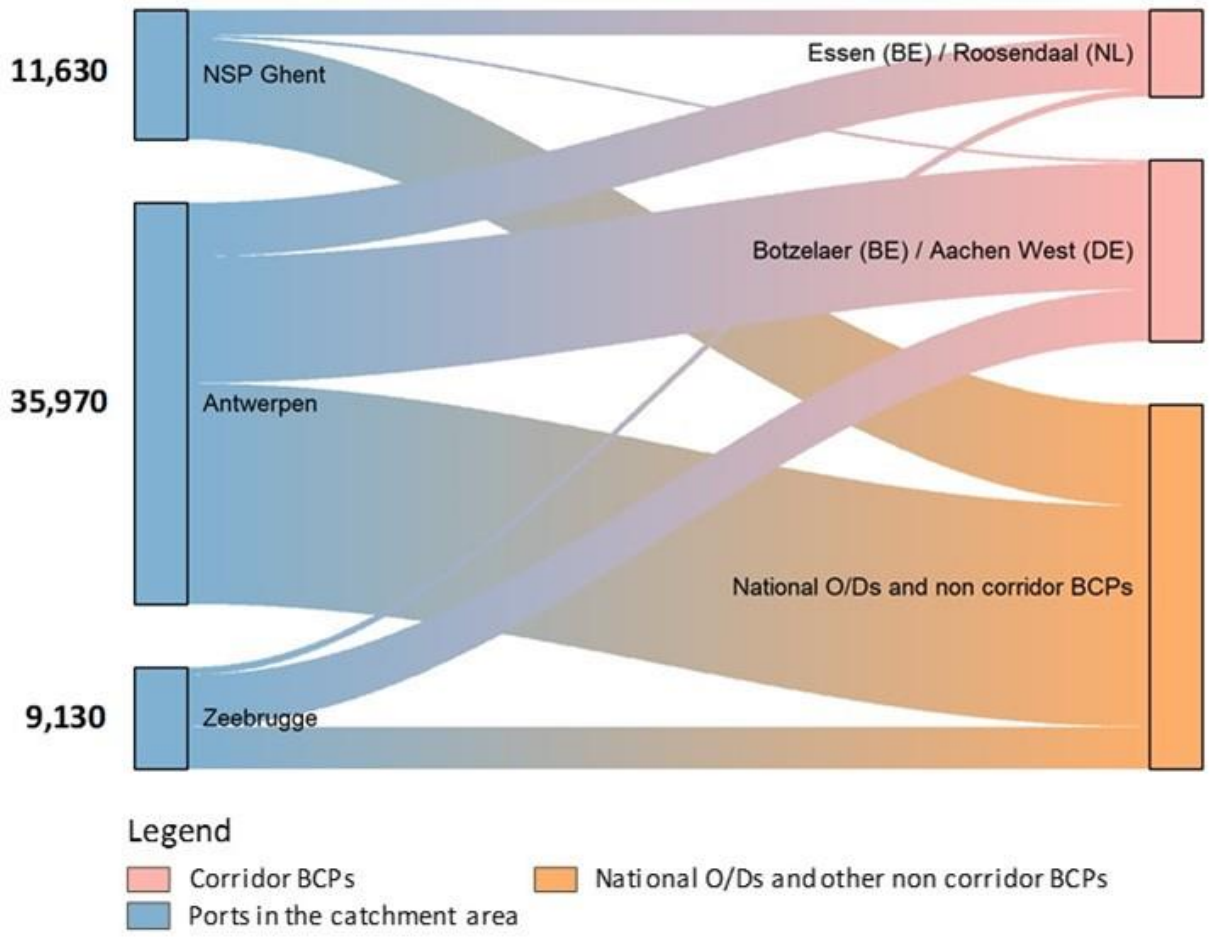
This sequence reflects the relevance of the O/D under the corridor analysis perspective. In each plot, the total value of the involved traffic volume is provided, together with the related distribution among the various train relations. Again, values of the bidirectional rail traffic crossing each corridor 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 Infrastructure Managers. 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 1-12 – 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[2]:

- 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:

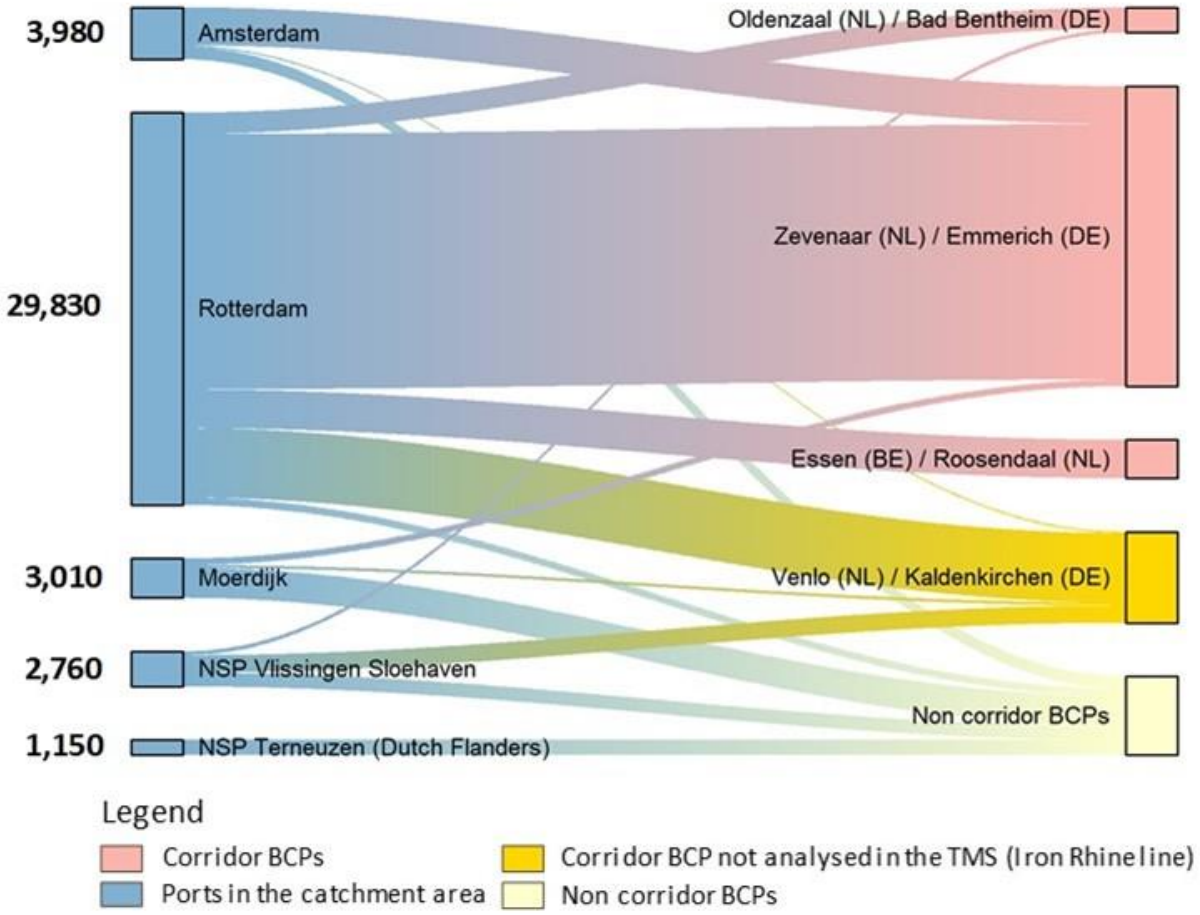
- 24,050 trains (42.4%) to/from the corridor BCPs;
- 32,670 trains (28.7%) to/from national and international O/Ds crossing non corridor BCPs.

[2] 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 1-13 – 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[3]:

- 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;

[3] 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.

- 1,150 trains (2.83%) to/from the North Sea Port Terneuzen (Dutch Flanders).

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 1-14 overleaf.

The corridor traffic share among the Western BCPs is the following[4]:

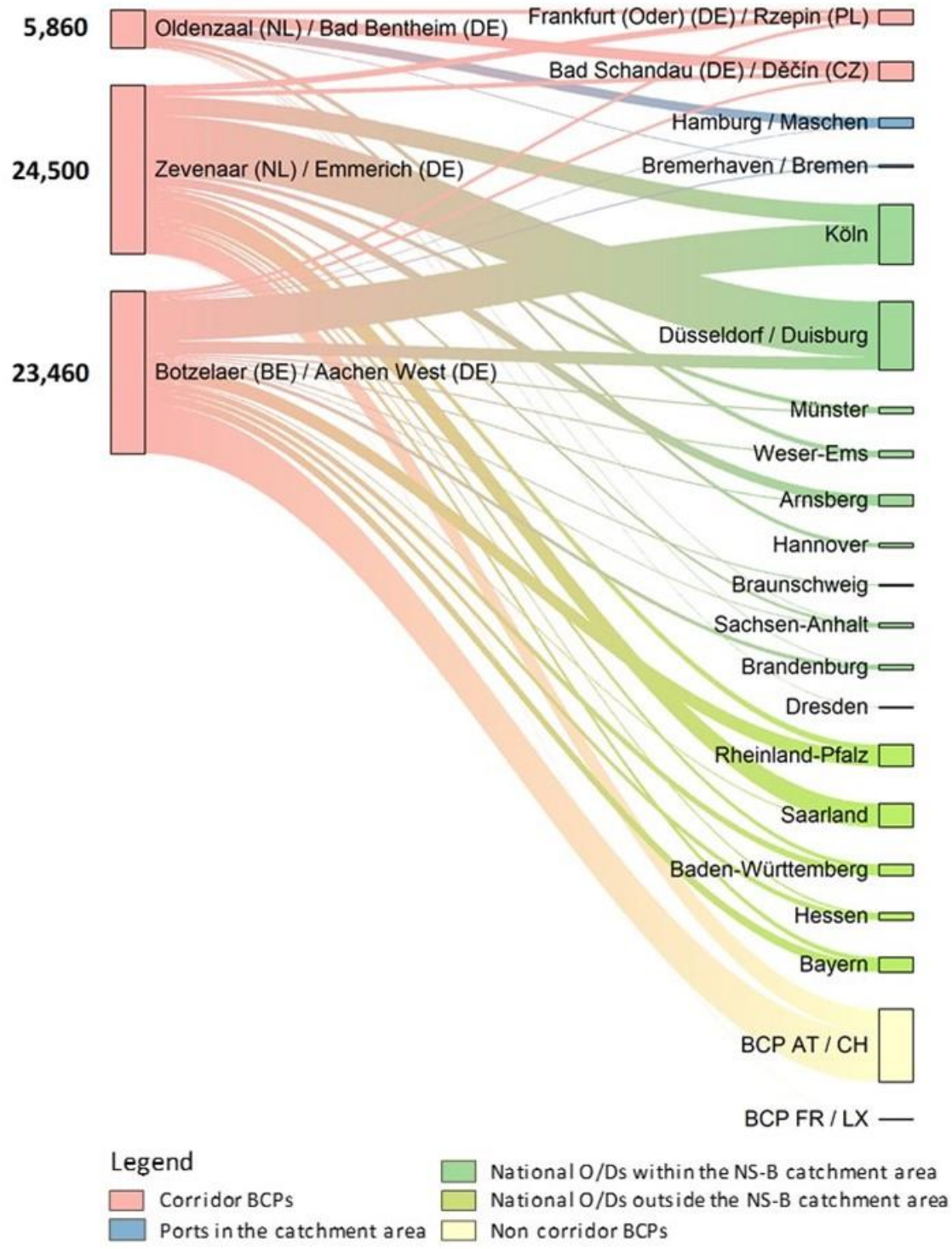
- 5,860 trains (10.9%) to/from the Oldenzaal (NL) - Bad Bentheim (DE);
- 24,500 trains (45.5%) to/from the Zevenaar (NL) - Emmerich (DE) BCP;
- 23,460 trains (43.6%) to/from the Botzelaer (BE) - Aachen West (DE) BCP.

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.

[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.

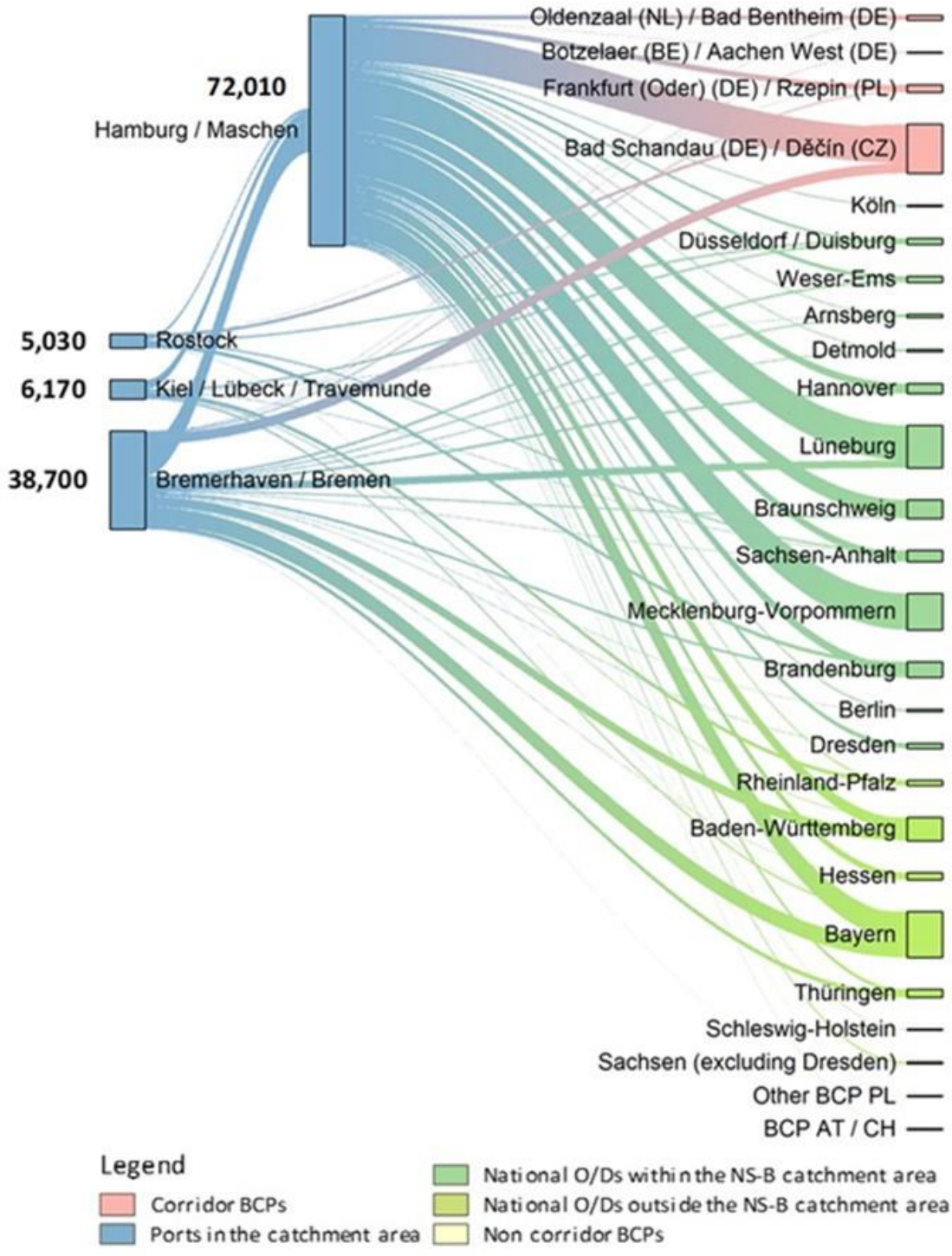
Figure 1-14 – Bidirectional train traffic at the Botzelaer (BE) - Aachen (DE), Zevenaar (NL) - Emmerich (DE) and Oldenzaal (NL) - Bad Bentheim (DE) BCPs – Germany side



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 1-15 – 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[5]:

- 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.

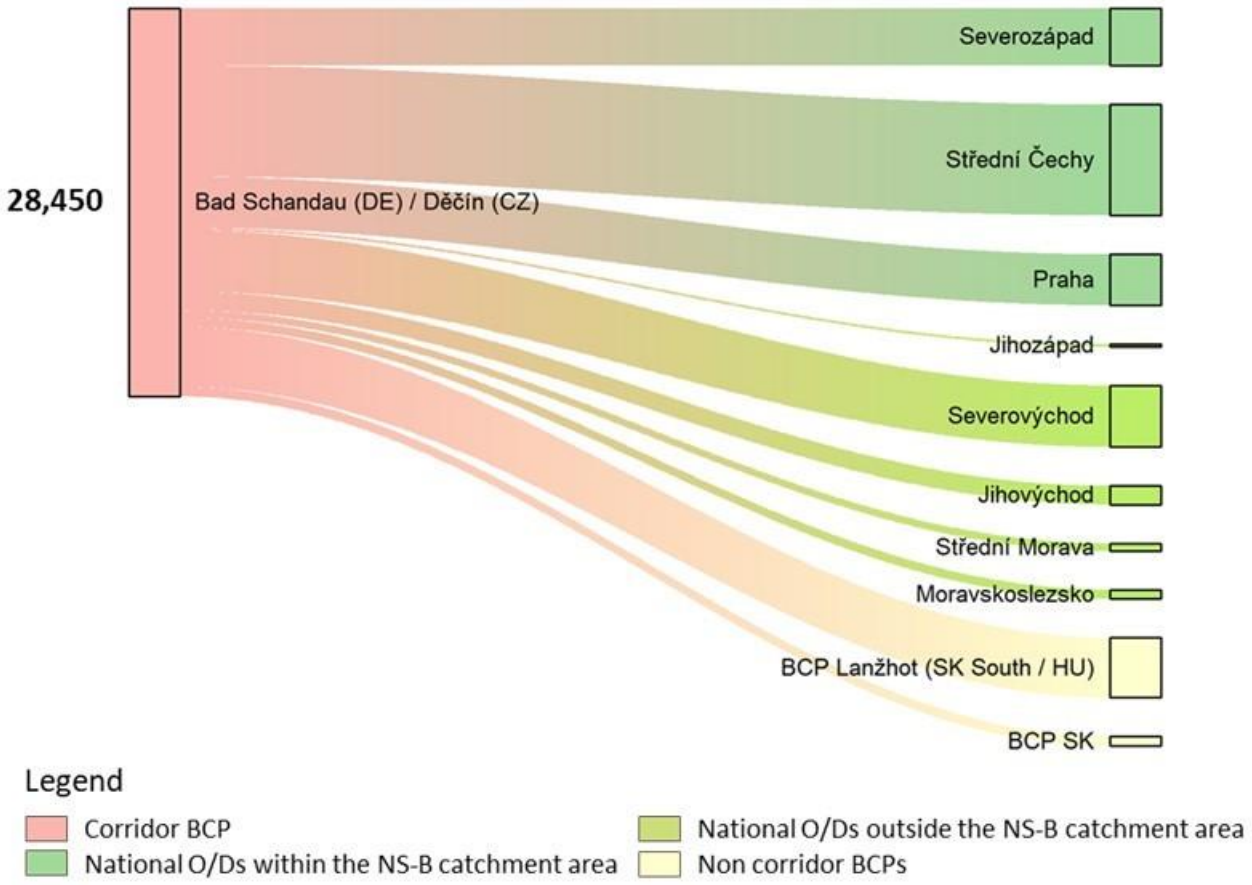
Train traffic flows in Germany were also analysed for the corridor extension Rostock – Priestewitz / Dresden via Berlin. This North-South corridor extension, running from Rostock to Priestewitz through Berlin, crosses the current West-East alignment of the RFC NS-B, eventually connecting Rostock to the 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.

[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 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 1-16 – 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[6]:

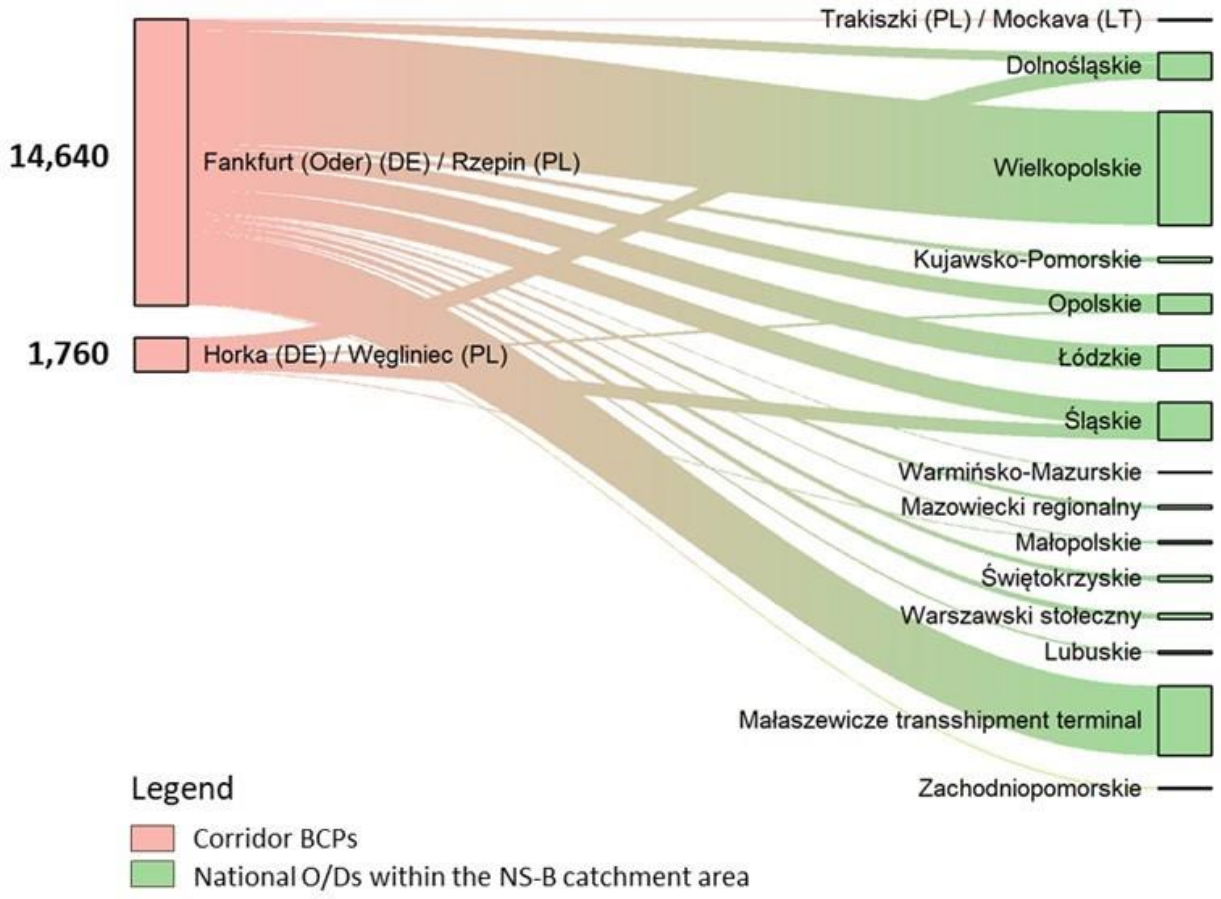
- 16,040 trains (56.4%) to/from national O/Ds within the corridor catchment area;
- 7,260 trains (25.5%) to/from national O/Ds outside the corridor catchment area;
- 5,150 trains (18.1%) to/from international O/Ds crossing non corridor BCPs.

[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.

Poland

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

Figure 1-17 – 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[7]:

- 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;

[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.

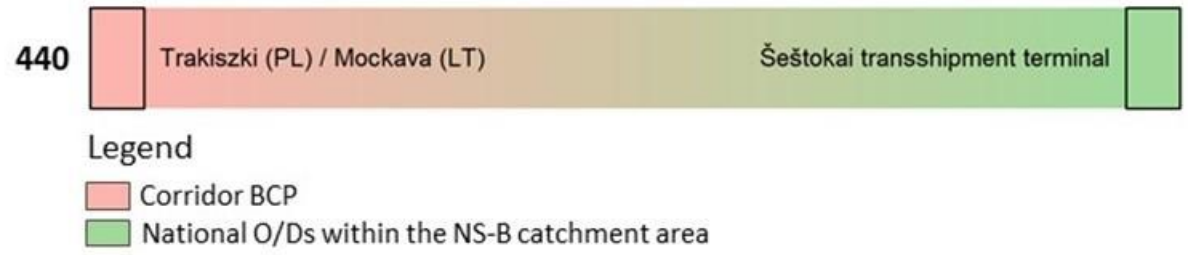
- 80 trains (0.5%) to/from national O/Ds outside the corridor catchment area (not shown in the plot);
- 50 trains (0.3%) to/from international O/Ds crossing non corridor BCPs (not shown in the plot).

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.

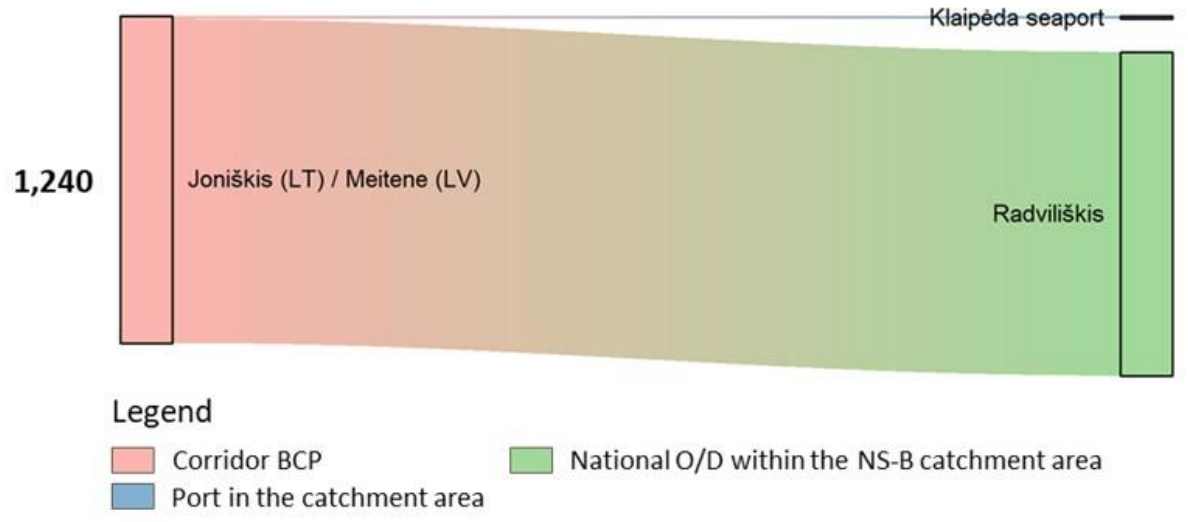
Figure 1-18 – Bidirectional train traffic at the Trakiszki BCP – Lithuania side



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 1-19 – 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

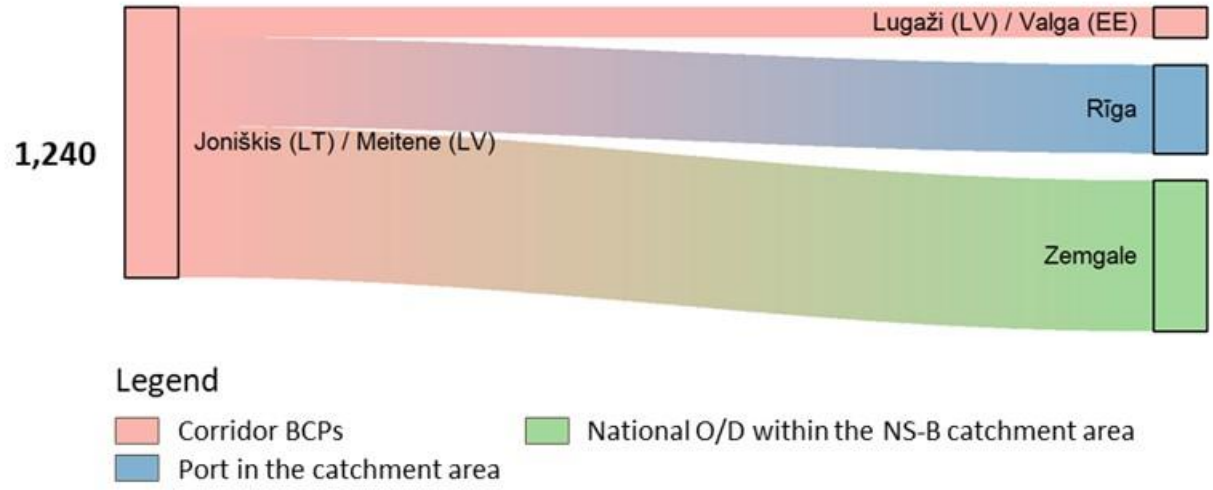
This traffic volume is distributed as follows[8]:

- 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 1-20 – 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

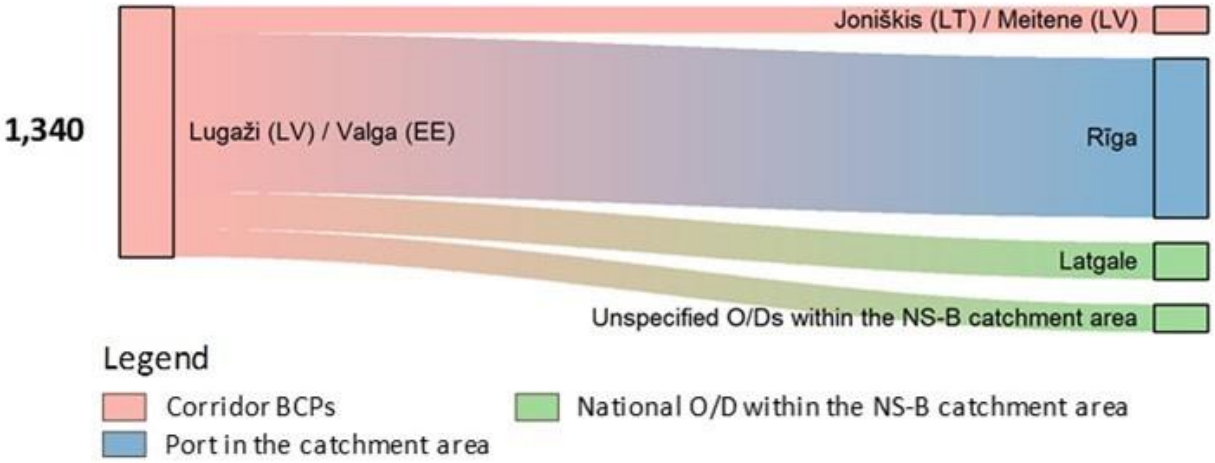
This traffic volume is distributed as follows:

- 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.

[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.

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

Figure 1-21 – 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[9]:

- 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.

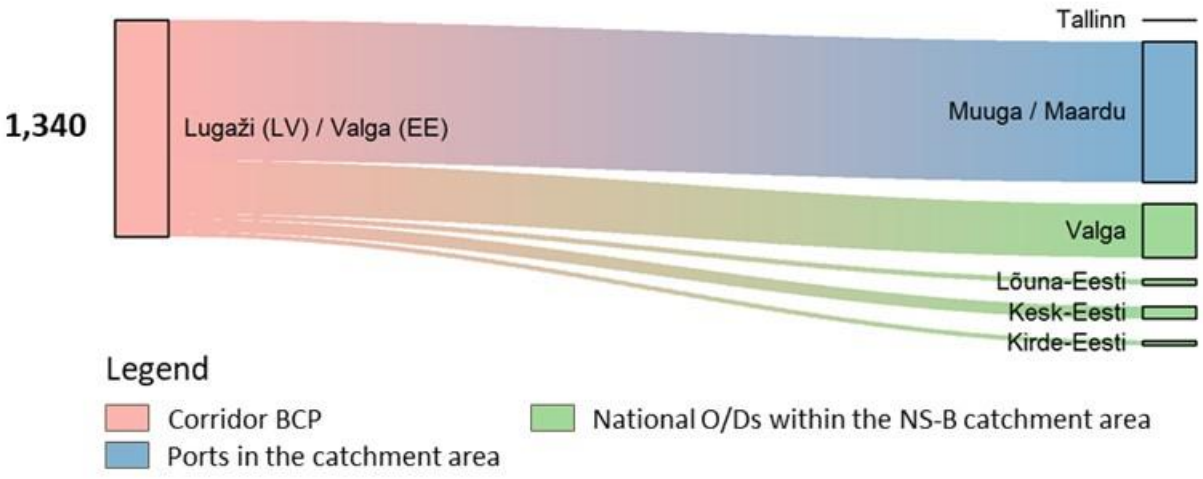
The total amount of bidirectional rail freight traffic departing from/arriving to the Latvian ports in the catchment area is equal to 25,540 trains.

[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.

Estonia

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

Figure 1-22 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.

1.6 Analysis of the future transport market on the corridor

1.6.1 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 1-8 – 2017 Land freight O/D matrix ('000 tonnes)

Loading Country \ Unloading Country	BE	NL	DE	CZ	PL	LT	LV	EE	TOT
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 1-9 – 2022 Land freight O/D matrix ('000 tonnes)

Loading Country \ Unloading Country	BE	NL	DE	CZ	PL	LT	LV	EE	TOT
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 1-10 – 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

1.6.2 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 1-1) to about 85 million tonnes/year, with a CAGR of 2.8%.

Table 1-11 – 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: Own 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 1-12 – 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.

1.6.3 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 1-13 below.

Table 1-13 – 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.

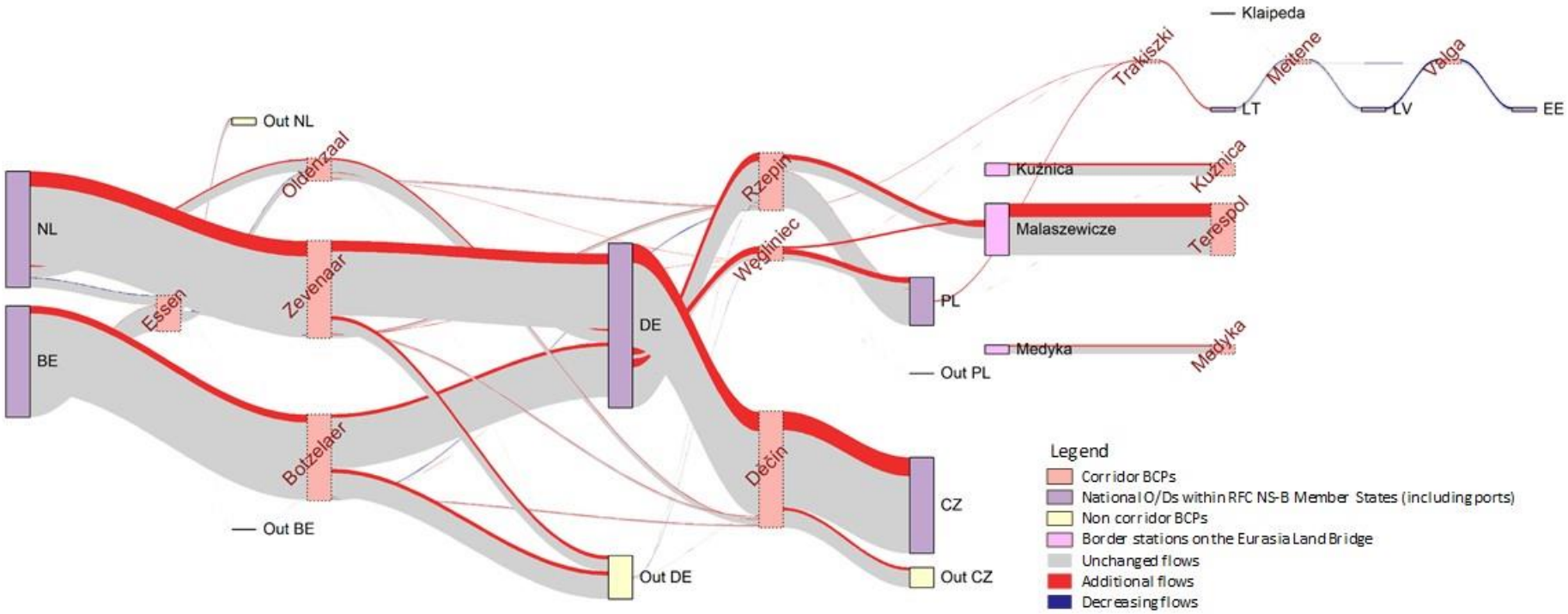
Table 1-14 – 2017-2022 Comparison of train flows at Terespol

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 1-11, the graph in Figure 1-23 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 1-13, 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 1-23 – 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

1.7 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 1-24 – 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 Infrastructure Managers for their inclusion in the TMS.

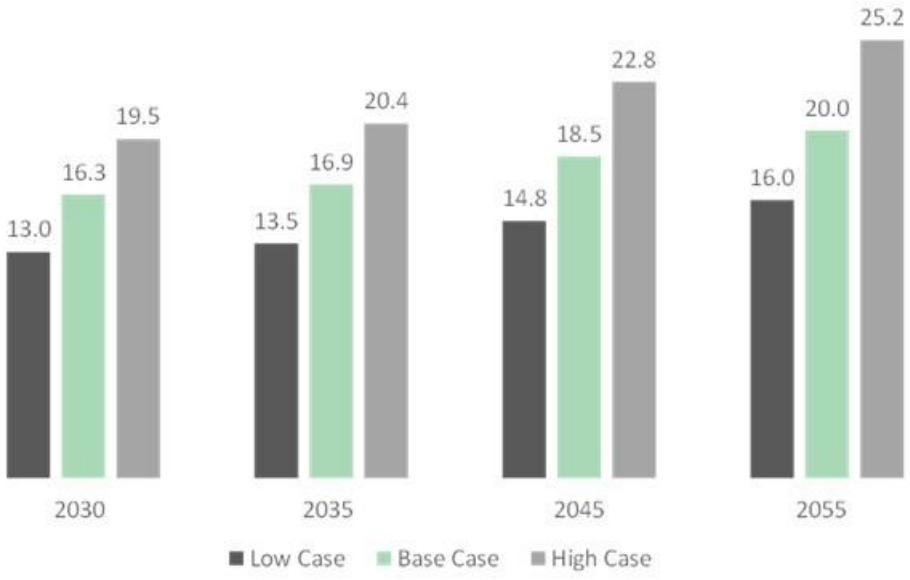
Freight traffic forecasts are based on the combination of future market growth assumptions (i.e., what is the size of the overall market in a particular year), as well as future modal assignment and modal choice assumptions (i.e., what modes are expected to be chosen for freight shipments). Different 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 1-25 – Rail Baltica Freight Market Forecast (million tonnes)

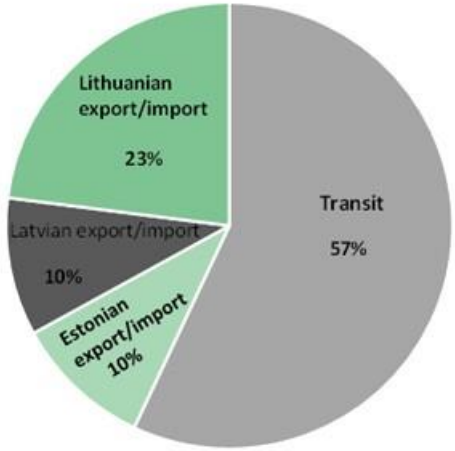


Source: Rail Baltica Global Project Cost-Benefit Analysis Final Report, 30 April 2017

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.

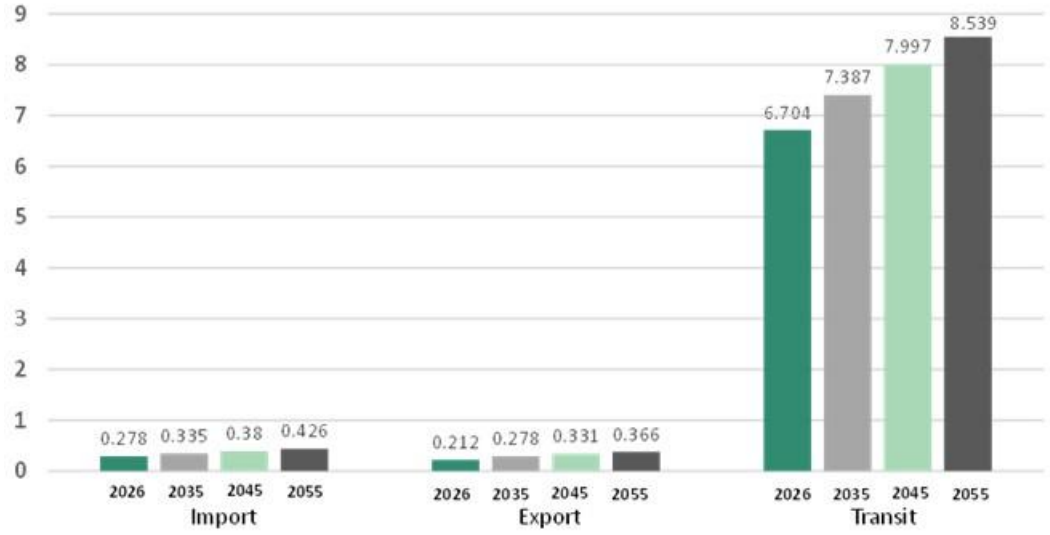
Figure 1-26 – Structure of freight transport



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 1-27. 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).

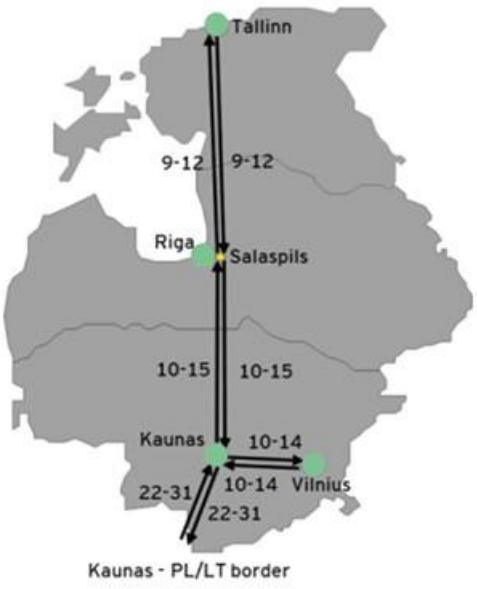
Figure 1-27 – Transit between the countries with 1,520mm railway system (CIS) and the EU (Base case) (million tonnes)



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

Figure 1-28 below visualises these train movements on a map for the base case scenario considering the development from 2030 to 2050.

Figure 1-28 – 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

1.8 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 the 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 Infrastructure Managers 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 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.