NORTH SEA-BALTIC RAIL FREIGHT CORRIDOR

TRANSPORT MARKET STUDY

2024 UPDATE

Funded by the European Union

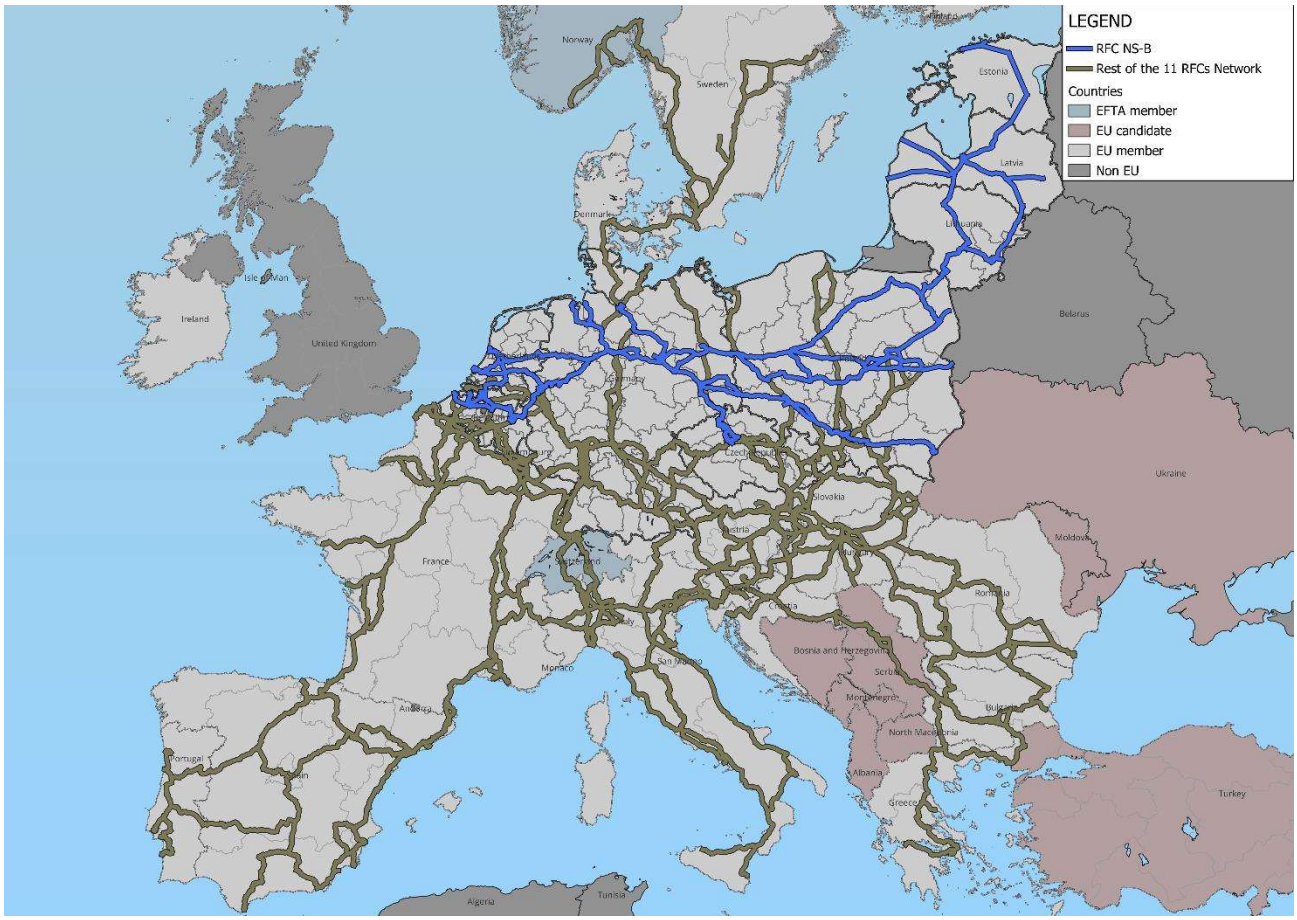
EXECUTIVE SUMMARY

RFC NS-B 2024 TMS UPDATE RESULTS WITHIN THE 2024 JOINT TMS UPDATE OF THE 11 RFCS BELONGING TO THE EUROPEAN RAIL NETWORK FOR COMPETITIVE FREIGHT

The Rail Freight Corridor -North Sea-Baltic (RFC NS-B) is one of the 11 RFCs currently in operation, established under the scope of Regulation (EU) 913/2010 concerning a *European rail network for competitive freight*. According to Article 9.3 of this regulation, the Management Board of the RFC shall carry out and periodically update a Transport Market Study (TMS) related to the observed and expected changes in the traffic on the freight corridor as a consequence of the RFC being established.

Over the past decade, RFCs elaborated first TMSs and, in most cases, TMS updates. However, these studies were carried out without a common approach or a shared methodological framework. To support the RFCs in achieving compliance with the above requirement in a coordinated and harmonised manner, the Management Boards of the 11 RFCs decided to execute a Joint TMS Update under the coordination of RailNetEurope (RNE). The main findings and results of the 2024 TMS Update for RFC NS-B are summarised in the following paragraphs.

RFC NS-B within the 11 RFCs network



Source: Authors based on CIP

For the analysis of the current and future transport markets along the 11 RFCs, a European-wide transport model has been used – the NEAC Model – which combines socio-economic, trade and transport statistics

with traffic flows for different transport modes. The geographic scope of the model covers the European Union and the non-EU countries crossed by the 11 RFCs and involved in their catchment areas. The model has been calibrated to the year 2022 (Model Base Year). Future scenarios have been elaborated for the 2030 time horizon.

Due to the adoption of a common, network-wide approach and use of an EU-wide network model, the analysis of the individual RFCs has been performed within the framework of the 11 RFCs network and overall European policy and market trends. This approach is also appropriate considering that the 11 RFCs share many infrastructure components, i.e. corridor lines, logistics nodes and Border Crossing Points, as well as their catchment areas. Also, regulatory, policy and economic backgrounds and developments, as well as most available statistics on the sector, generally concern the country or EU territorial scale.

Specifically concerning the study policy background, the 2024 11 RFCs Joint TMS Update has been conducted in the framework of the rail sector specific milestones introduced by the European Commission in its Smart and Sustainable Mobility Strategy to support the achievement of the ambitious target of the European Green Deal, of reducing transport emissions by 90% by 2050 (compared to 1990 levels), i.e., doubling passenger high-speed rail traffic by 2030 and tripling it by 2050, while increasing rail freight by 50% by 2030 and doubling it by 2050 (compared to 2015 levels). With reference to the 50% target growth set in the EU policies for the period 2015-2030, the following table provides rail freight transport volumes in million tkm for the EU27 in 2015, and 2022. Data show that the gap to be filled between 2023 and 2030 is significant, especially for the international segment.

Freight volume (million tkm) in 2015 and 2022

	2015	2022	Var. % '15-22
International rail freight transport	155,289	149,032	-4%
National rail freight transport	181,811	199,830	10%
Total rail freight transport	337,100	348,862	3%

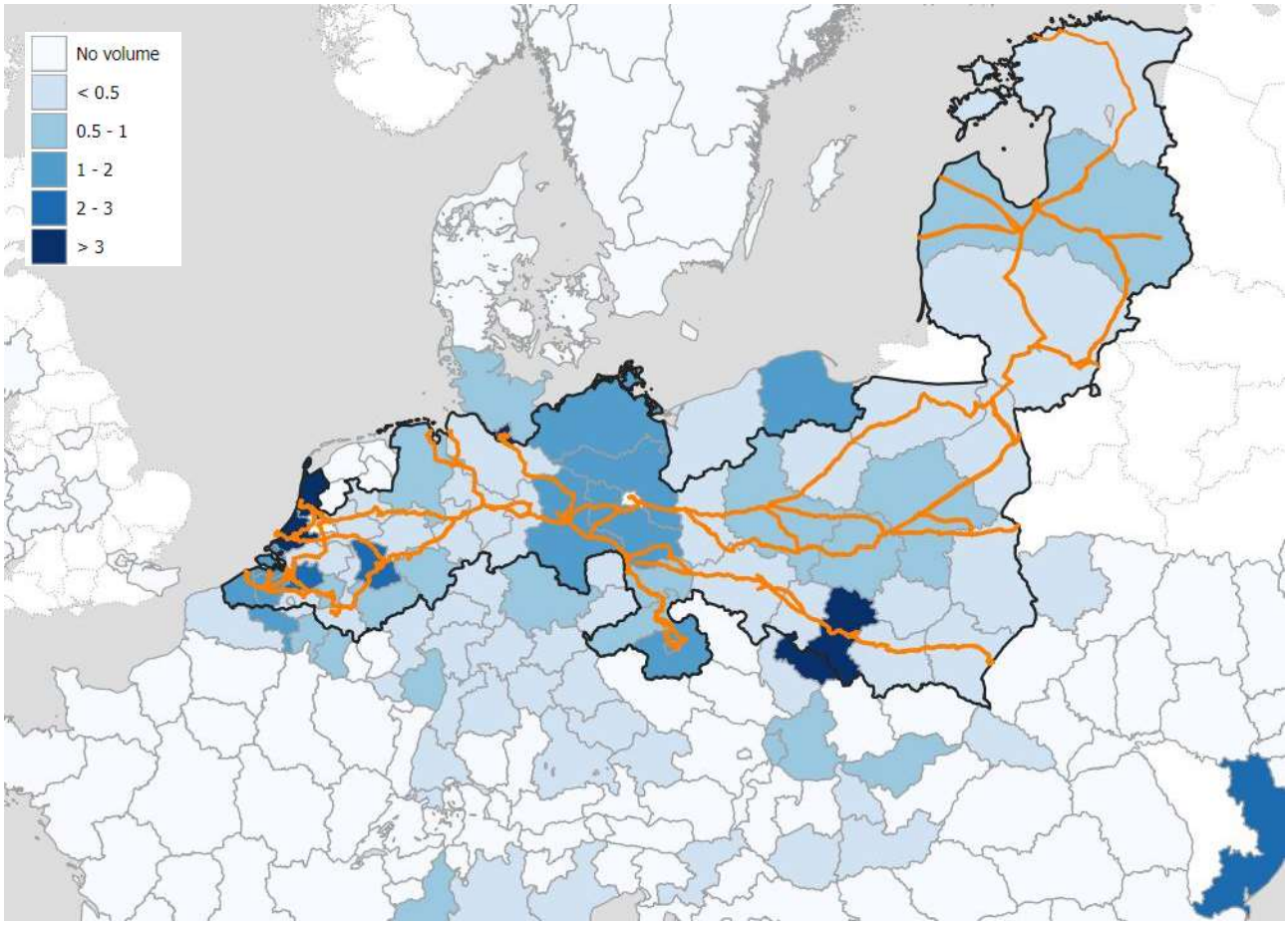
Source: Eurostat [rail_go_typepas];

Notes: (1) Data for Belgium are excluded from the total as they are not available for 2015 and 2022.
(2) Data are limited to main undertakings

For the analysis of the current market (Base year scenario), train data from the Train Information System (TIS) managed by RNE have been used, which combined with available trade and economic data available at the NUTS 2 area, served as a basis to define the RFC NS-B catchment area and main origin and destinations, prior to estimate the volumes of the transported goods and the modal share by land transport mode.

The catchment area for international rail freight transport of the RFC NS-B - namely the NUTS 2 regions where trains crossing at least one RFC NS-B BCP have either their origin and/or destination exceeds the corridor area, i.e. the area crossed by the corridor infrastructure (see overview in the overleaf figures). The RFC NS-B corridor area captures (large parts of) the Netherlands, Belgium, Germany, Czechia, Poland, Lithuania, Latvia and Estonia. A large proportion of the rail freight transport uses the RFC NS-B, and its border crossing points, to ship freight by rail from different origins to different destinations. The picture below shows the origins of the RFC NS-B, with important origins such as Rotterdam, Amsterdam, Hamburg, Ostrava, and Katowice. Also, outside the corridor area different zones can be seen that contribute to rail freight of the RFC NS-B, such as Southern Germany, Sweden, Northern Italy, Slovakia, and Ukraine.

Origins of international rail freight volume (in million tonnes) that use the RFC NS-B rail network corridor and catchment area



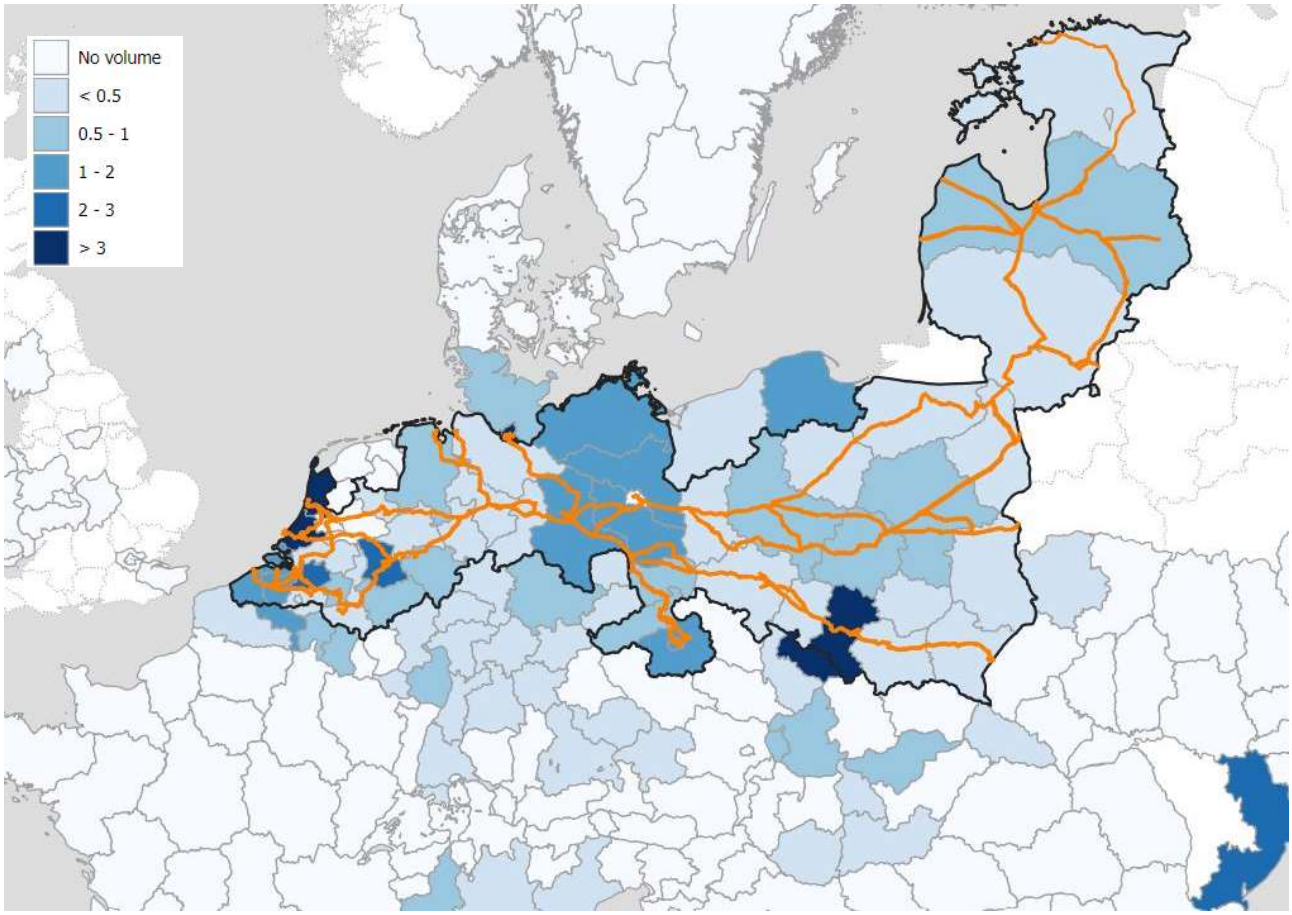
Legend: Orange = railway lines of RFC NS-B. Blue = Volume by origin. Black = Delineation of corridor area

The next figure presents the destinations within the RFC NS-B catchment area. The figure highlights similar zones as the origins that exhibit the high freight volumes dispatched from these destinations. It is evident from the figure that numerous zones benefiting from RFC NS-B's services fall outside the corridor area, such as areas in Southern Germany, Northern Italy, Slovakia, and Ukraine.

For the purpose of the 2024 Joint TMS Update, future scenarios have been built only considering socio-economic and infrastructure developments. This solution reflects the decision to develop only short-term forecasts up to 2030 and adopt a pragmatic and as far as possible, concrete approach, thus omitting the simulation of the possible effects associated with policy developments such as:

- The proposed Weights and Dimensions Directive and electrification of Heavy Goods Vehicles;
- The internalization of external costs of road transport (road pricing);
- Incentives to rail/combined transport operations;
- Technological/operational improvements of intermodal transport solutions and logistics chains;
- Market sensitivity to climate and energy transition.

Destinations of international rail freight volume (in million tonnes) that use the RFC NS-B rail network corridor and catchment area



Legend: Orange = railway lines of RFC NS-B. Blue = Volume by origin. Black = Delineation of corridor area

In line with this approach, the following scenarios have been defined, all of them at the 2030 time horizon:

- *Reference or background scenario*: It describes the economic developments (in terms of GDP changes), that have the most important impact on the future of rail transport. The base for this is the EU 2020-2050 reference scenario and the World Economic Outlook 2023.
- *Projects scenario*: It provides an overview of the impact resulting from the expected developments in the rail transport system. Currently, a number of projects are ongoing and/or planned for the improvement of the railway infrastructure belonging to the 11 RFCs network. Such projects were first identified in the 11 RFCs Implementation Plans, which were further confirmed by the 11 RFCs. Furthermore, the list of the investments planned for the development of the 9 TEN-T Core Network Corridors was consulted to complement the information available from the RFCs. The ongoing and planned investments differ in size. Some are big projects such as Rail Baltica or the Fehmarnbelt. But there are also many investments related to the modernisation and rehabilitation of railway lines to meet the TEN-T standards, improve network interoperability or increase capacity by upgrading railway lines and nodes. Not all projects have been considered for future scenarios simulation purposes. First of all, projects have been selected which are assumed to be completed before or in 2030. Secondly, only major projects were considered which should be able to 'translate' into a time gain or cost reduction. This approach reflects the purpose of the study and nature of the model, limited to the freight market analysis and thus transport volumes and

modal share estimation by land transport mode, excluding network capacity simulation and assessment, and looking at the short-term time horizon.

- *Sensitivity scenario: the completion of the 11 RFCs network in line with TEN-T standards*: It provides an overview of what would happen if – in addition to the investments included in the Projects scenario - ERTMS is fully deployed, 740 meter long trains are allowed to operate anywhere on the whole network, 22.5 t axle load is achieved on the entire network, and if the track gauge in Spain and Portugal meets European standards (the Rail Baltica initiative, providing TEN-T standard interconnectivity to the three Baltic States with Europe – including European standard track gauge – is already considered in the *Projects scenario*). Additionally, the P400 intermodal gauge is also assumed to be in place. This scenario should be considered as a sensitivity analysis.

In the absence of a consistent historical series of data and information on the operations along the 11 RFCs – worth also considering that the RFCs were established and entered into operation in different years between 2013 and 2020, and their alignment adjusted over time to reflect market needs – an e-survey was conducted as part of the 2024 Joint TMS Update – *2023 11 RFCs Joint TMS Update Survey* – to assess the occurred and expected changes associated with their establishment on three main areas: occurred and expected impact of the RFCs, occurred and expected market developments along the RFCs, and market drivers. The survey involved the Railway undertaking Advisory Groups (RAGs) and Terminal Advisory Groups (TAGs) of the 11 RFCs.

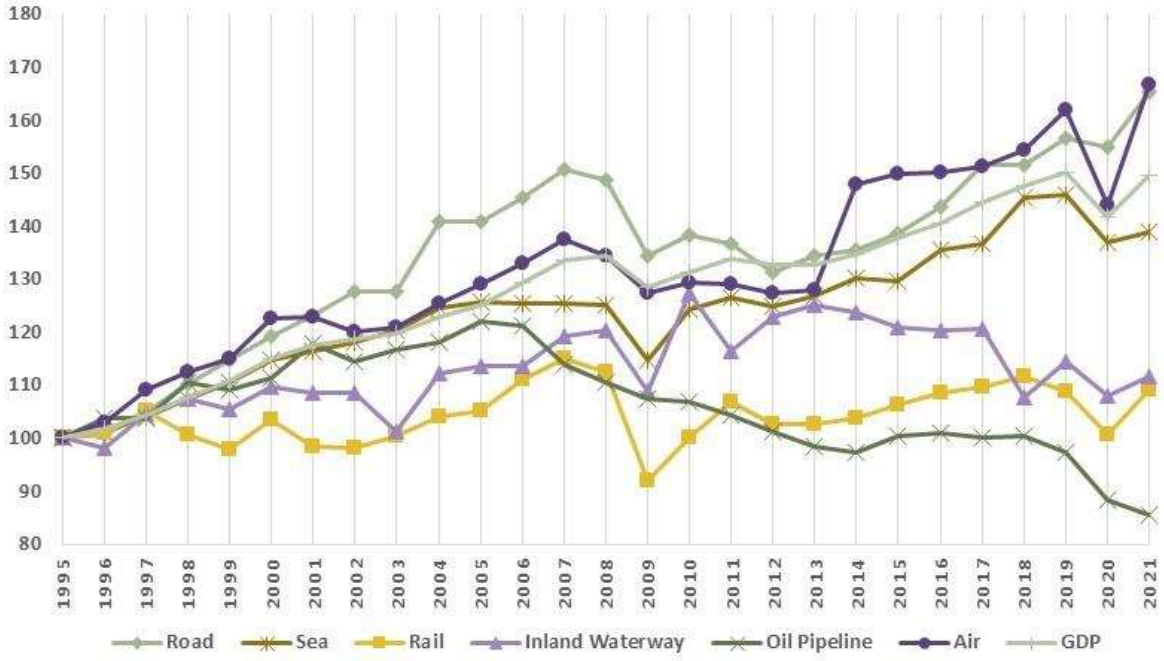
KEY FINDINGS OF THE STUDY ON THE RAIL FREIGHT MARKET ACROSS THE RFC NETWORK AND ALONG RFC NS-B

OVERALL MARKET TRENDS AND SECTOR DEVELOPMENTS

The data available from the EC DG MOVE/Eurostat (Statistical Pocketbook 2023 and Rail Market Monitoring Report) and from the Independent Regulators Group-Rail (IRG) (Rail Market Monitoring Reports) provide an overview of the development of the European rail freight sector since mid 1990s when the rail freight market liberalization started, allowing monitoring trends before and after the 2008 credit crunch, which is considered the second major financial crisis after the 1930s Great Depression, and which was followed by additional adverse events during the past 10-15 years when the 11 RFCs were gradually established and entered into operation. Key findings from the statistical analysis are as follows:

- The period between the entry into force of the Regulation (EU) 913/2010 has indeed been marked by a number of socio-economic, health and geopolitical events, which negatively impacted trade and transport flows at the global and European scale. The statistical review shows that the 2008 financial crisis basically altered the economic and transport developments experienced by Europe over the previous decades. EU27 long-term series over the past 30 years show that the effects of this crisis are persisting: albeit positive, the trend of GDP and most transport modes of the following period stands indeed at lower growth rates. Overall, the European rail freight market grew modestly over the last decade, contrasting with the strong development experienced between 2001 and 2008. The EU economy and transport markets were more recently further impacted by the 2020-2021 COVID-19 pandemic and by the current geopolitical crisis that started in 2022 with the Russian war of aggression against Ukraine and deteriorated with the Israel-Gaza conflict and the Red Sea crisis.

Transport trends in billion tkm EU27 (1995=100)



Source: EC – DG MOVE – Statistical Pocketbook 2023

- Rail freight transport between 2013 and 2021 marginally grew in the EU27 from about 385 billion tkm to 410 billion tkm, i.e. 7%, which is only half the rate of growth of total transport volumes and GDP. However, over the same period, combined transport more than doubled from about 41 billion tkm to 100 billion tkm. Trends for the RFC NS-B concerned countries are similar to the EU ones, specifying that the growth of rail freight transport registered lower rates. In the RFC NS-B concerned countries rail freight transport grew indeed from about 228 to 233 billion tkm, i.e. 2%;
- Most RFC NS-B concerned countries register a high rail modal share in the EU. Four out of eight (Lithuania, Latvia, Czechia, Poland), are indeed positioned within the top 10 ranking EU countries for rail modal share in 2022. However, the Baltic States, as well as Czechia and Poland, are also among the ones that have registered a high decline in rail modal share over time. A general trend at the EU27 scale that is likely related to the change in the commodity basket trade. At both EU 27 and RFC NS-B concerned country level, there is an underlying stagnation or decline of dry and liquid bulk commodities (originating even from before the mid 1990s), associated with a growth of intermodal transport, a market segment that is apparently growing with the gradual opening of the rail freight market and greening of the logistics chains;

Share of rail in total freight transport in % (based on tkm)

	2008	2013	2015	2019	2022	Var. '19-'13	Var. '22-'13	Var. '22-'08
Lithuania	**64.5**	**57.2**	**56.4**	**56.8**	**37.2**	**-0.4**	**-20**	**-27.3**
Switzerland	35.3	36.0	37.2	34.1	33.4	-1.9	-2.6	-1.9
Slovakia	40.0	38.6	36.3	30.7	30.1	-7.9	-8.5	-9.9
Austria	33.3	31.9	32.3	30.6	30.0	-1.3	-1.9	-3.3
Slovenia	26.7	30.5	30.9	31.4	28.8	0.9	-1.7	2.1
Hungary	24.9	30.3	29.1	26	26.3	-4.3	-4.0	1.4
Latvia	**47.9**	**43.1**	**42.3**	**37.4**	**26.0**	**-5.7**	**-17.1**	**-21.9**
Czechia	**31.9**	**28.0**	**26.1**	**25.9**	**22.0**	**-2.1**	**-6.0**	**-9.9**
Romania	19.9	23.3	25.0	20.5	21.0	-2.8	-2.3	1.1
Poland	**30.5**	**24.2**	**23.3**	**21.5**	**20.8**	**-2.7**	**-3.4**	**-9.7**
Germany	**14.6**	**13.9**	**14.1**	**13.7**	**14.9**	**-0.2**	**1.0**	**0.3**
Bulgaria	10.3	7.5	8.7	8.5	11.2	1.0	3.7	0.9
Finland	13.1	12.7	10.9	11.8	10.8	-0.9	-1.9	-2.3
Sweden	10.3	9.6	8.6	9.4	10.5	-0.2	0.9	0.2
Belgium	**8.2**	**6.8**	**6.9**	**7.2**	**7.3**	**0.4**	**0.5**	**-0.9**
Luxembourg	9.8	7.2	7.0	6.8	6.1	-0.4	-1.1	-3.7
European Union - 27 countries (from 2020)	6.0	5.7	5.7	5.3	5.5	-0.4	-0.2	-0.5
Croatia	4.5	3.1	3.2	3.5	4.1	0.4	1.0	-0.4
France	4.2	3.6	4.1	3.5	3.7	-0.1	0.1	-0.5
Italy	2.6	2.4	2.6	2.3	2.7	-0.1	0.3	0.1
Estonia	**10.4**	**7.6**	**4.5**	**3.3**	**2.4**	**-4.3**	**-5.2**	**-8.0**
Norway	2.0	1.9	1.6	1.6	2.1	-0.3	0.2	0.1
Netherlands	**2.0**	**1.7**	**1.8**	**1.8**	**1.9**	**0.1**	**0.2**	**-0.1**
Denmark	1.4	1.8	1.9	1.7	1.6	-0.1	-0.2	0.2
Spain	0.8	0.8	0.9	0.8	0.8	0.0	0.0	0.0
Portugal	0.3	0.3	0.3	0.3	0.2	0.0	-0.1	-0.1
Ireland	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0
Greece	0.2	0.0	0.1	0.1	0.1	0.1	0.1	-0.1

Source: Eurostat [tran_hv_ms_frmod]

- At the EU27 level, the COVID-19 pandemic seems to have had a different impact on rail freight traffic measured in net tkm, with either increases or decreases in transport volumes between 2019 and 2021. The impact has been apparently significant in the Baltic States, Denmark, Luxembourg, Portugal, and Romania, whereas Bulgaria and Greece experienced about 20% growth. Along the RFC NS-B Germany experienced a growth of traffic operations during the COVID-19 pandemic, whereas Czechia, the Netherlands and Poland registered slight increases or null variations. Further to the Baltic States, also Belgium experienced declines in traffic during this period. Baltic States, in particular, also experienced a significant drop in traffic since the start of the Russian war of aggression against Ukraine in 2022. In fact, EU sanctions implemented with Belarus and Russia following the start of the Russian war of aggression against Ukraine impacted negatively on rail freight traffic in the Baltic States, whereas train traffic between Ukraine/Moldova and the EU has increased, particularly through Poland and Romania;
- The RFC NS-B is the most important RFC along the European-Sino trade line. Over the past decades, rail transport operations between Europe and China have grown significantly as they gradually became a reliable and competitive alternative to maritime transport. Such a potential market became more important under the Belt and Road Initiative promoted by the Chinese Government. According to

available data, the number of trains between geographic Europe and China has been constantly growing, from 17 in 2011 to over 17,000 in 2023. However, the provided figures also include trains between Russia and China. The number of TEUs actually transported between China and the European Union appears to have dropped since the start of the Russian war of aggression against Ukraine in 2022;

- Since the start of the rail freight liberalisation process late 1990's and 2000's, the market share of the domestic incumbent railway undertakings gradually declined in most EU Member States, whereas the market share of non-incumbents increased together with the operations of foreign incumbents. As a general pattern, common to the EU27 and RFC NS-B concerned countries, the trend of the market share by domestic incumbents continued to decline in the period 2013-2021. In the RFC NS-B concerned countries, the market share of the domestic incumbent in 2021 was about 50% on average, 60% considering national and international incumbents.

ANALYSIS OF THE CURRENT AND FUTURE FREIGHT TRANSPORT MARKET ALONG THE 11 RFCS NETWORK

The total volume of international freight transport over land for the 11 RFCs network catchment area amounts to 1,439 million tonnes. The volume of international rail freight transport is 265 million tonnes (about 442,000 international trains[1]), which is 18% of the total amount of transport to, from, and within the catchment area of the 11 RFCs network. The share and volume of inland shipping (IWW) is 17% (240 million tonnes), and the share of road transport is 65% (934 million tonnes).

Concerning the cargo types[2], the category *Other* (general cargo, including intermodal transport and container) dominates the international freight transport for the 11 RFCs network, by 845 million tonnes. This is about 59% of all international freight transport. This cargo type is mostly transported by road (about 69%). *Dry bulk* is the second largest cargo type at 32% (465 million tonnes). *Liquid bulk* has a share of 9% (128 million tonnes) in the total volume of international freight transport over all land modes.

Estimated volume (million tonnes) and share of international freight transport over land by mode and cargo type within the catchment area of the 11 RFCs network

Source: NEAC estimations

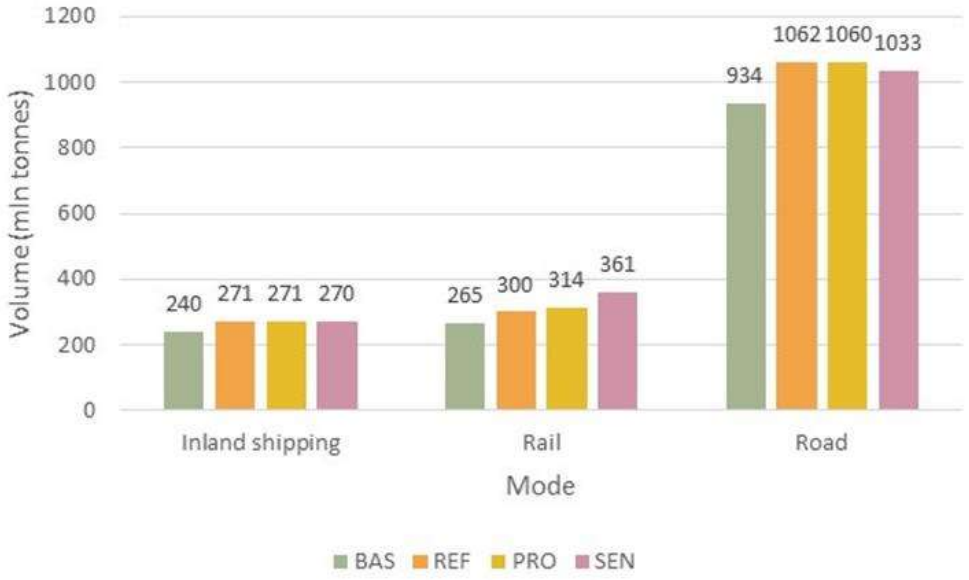
The three future scenarios (Reference, Projects and Sensitivity) show an increase in international freight transport in general. Within the 11 RFCs network catchment area, due to economic growth (EU Reference

[1] Using an average of 600 tonnes per train

[2] We distinguish dry bulk, liquid bulk, and other (general cargo and container). Dry bulk comprises commodities such as sand, ores and coal. Liquid bulk comprises mainly oil(products) and liquid chemicals. General cargo concerns a broad range of products such as cars, machinery, and electronics. Containers concern intermodal transport. The content is often unknown.

and IMF), the increase in general is about 13%. This is in line with the GDP growth for the EU27, which is 17%. Inland shipping shows a growth of 13% (from 240 to 271 million tonnes), road has a growth of 14% (from 934 to 1062 million tonnes) and rail transport of 13% (from 265 to 300 million tonnes) in the Reference scenario. In the absence of further developments, the rail freight market is expected to grow at a slower pace compared to GDP and to the overall transport sector, therefore losing market share. This is due to the changing trends in the basket of transported commodities and differentiated geographic demand growth distribution. For all land freight transport, the Projects scenario and the Sensitivity scenario have a limited impact on the overall growth of international freight transport.

Development of volume (in million tonnes) by mode and scenario for the 11 RFCs network catchment area



Source: NEAC estimations; Legend: BAS Base year scenario; REF Reference scenario, PRO Projects scenario; SEN: Sensitivity scenario

Focusing on international rail freight transport, the Reference scenario expects a growth of 13%, which is approximately 35 million tonnes extra compared to the 2022 Base year. Both the Projects scenario and the Sensitivity scenario show the impact of the different rail projects and rail measures. In the Projects scenario, rail transport grows an extra 4% compared to the Reference scenario (300 million tonnes to 314 million tonnes) due to projects. In total this is approximately 13 million tonnes of extra international rail freight transport.

The hypothetical Sensitivity scenario shows that compared to the Reference scenario, there is a potential of 61 million tonnes extra rail freight transport due to longer trains, intermodal loading gauge, ERTMS, and European standard track gauge along the RFCs network. The total expected rail freight transport volumes in this scenario reaches 361 million tonnes, corresponding to a 20% growth compared to the Reference scenario.

The Sensitivity scenario can be regarded as the potential maximum growth for rail transport across the 11 RFCs network. Compared to the 2022 Base year, transport volumes would increase from 265 to 361 million tonnes i.e. by 36%, out of which around 1/3 is due to economic development and 2/3 to infrastructure investments.

As a result of the analysis performed, it is possible to conclude that the major planned projects along the 11 RFCs network assumed to be completed by 2030, and the modernisation of railway lines and cross-border sections in the Eastern European corridor countries, are fundamental to removing infrastructure bottlenecks and reducing travel times and transport costs. Such initiatives are expected to increase the competitiveness of rail transport on the 11 RFCs network, and thus on each RFC, including the RFC NS-B. Further to these projects, completing the 11 RFCs network in line with the TEN-T requirements is key to increase the rail market share.

With reference to the 50% growth set in the EU policies for the period 2015-2030, the combined observed growth for the period 2015-2022 and expected for the time frame 2023-2030 (+36%) still lags below the target. Therefore, the development of a high-quality and interoperable network does not seem to be sufficient to achieve the ambitious targets set in the relevant European transport policies, an outcome that would hardly change even assuming additional mega cross-border projects would be completed like Brenner and Turin-Lyon.

Such targets remain challenging to meet in the absence of a significant change in the structure of the costs of road and rail transport. Internalising external costs of road transport, and or incentives to reduce the costs of rail transport might be needed. The potentially negative impacts on rail market share of measures such as improving the efficiency of road transport shall also be considered, as also reported in a recent study by the Community of European Railway and Infrastructure Companies (CER) – *Study on Weights and Dimensions: Impacts of the Proposed Amendments to the Weights and Dimensions Directive on Combined Transport and Rail Freight Transport*[3]. Market opening appears also to be relevant in increasing the competitiveness of rail transport. A recent study by the European Rail Freight Association (ERFA) – *The European Rail Freight Market; Competitive Analysis and Recommendations*[4] – considers how non-incumbent operators, focussing on the fast-growing intermodal and logistics train segments, are likely to experience further growth in market share in the 2020s. According to the study, competition among railway undertakings has made rail more attractive compared with road, which can be partially explained by the business model of non-incumbents, more focused (i.e., intermodal and logistics, block trains, and international traffic), lean and agile, and cost competitive, able to offer better service levels consistently.

ANALYSIS OF THE CURRENT AND FUTURE FREIGHT TRANSPORT MARKET ALONG THE RFC NS-B

International freight transport across all modes in the catchment area of the RFC NS-B amounts to 729 million tonnes in 2022. Overall, most transport concerns both cargo type *Other* (48%) and *Dry bulk* (34%). The cargo type *Other* is mostly transported by road, while rail has a large share in the international transport of dry bulk.

[3] https://www.cer.be/cer-reports/study-on-weights-and-dimensions
[4] https://erfarail.eu/news/the-european-rail-freight-market-competitive-analysis-and-recommendations

Estimated volume (million tonnes) and share of *all* international freight transport over land by mode and cargo type in the *catchment* area of RFC NS-B

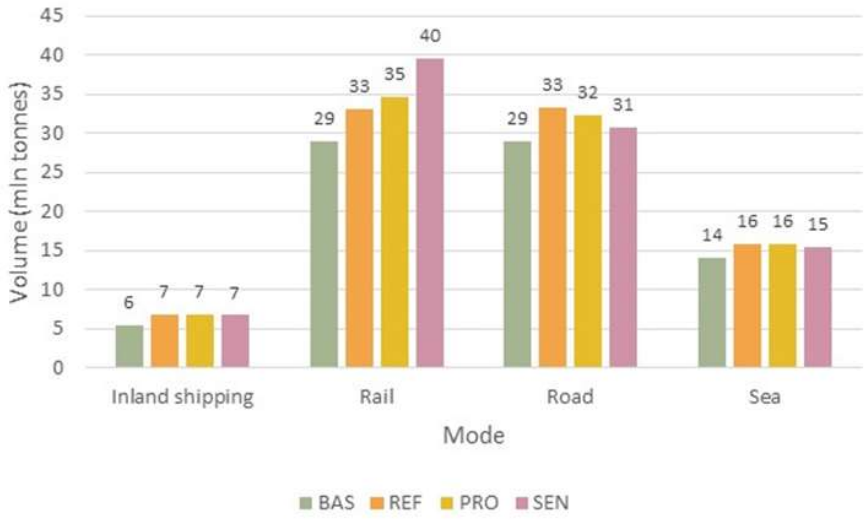
Source: NEAC estimations

On relations within the catchment area of RFC NS-B, rail freight transport has a share of 13% in the total amount of international freight transport. This is a volume of 93 million tonnes. The total amount of international rail freight transport of 93 million tonnes relates to approximately 86,000 trains within the corridor area of RFC NS-B.

The most important rail transport origins and destinations can be found in the Netherlands, Germany, and Belgium, in locations such as Rotterdam, Amsterdam, Hamburg, Antwerp, and Ghent. These locations serve as a gateway to the hinterland (Rhine-Ruhr area) in the RFC NS-B. The most important relation is between Rotterdam and the Rhine-Ruhr area.

The three future scenarios (Reference, Projects and Sensitivity) show an increase in international freight transport in the RFC NS-B in line with what expected at the European level. Mainly due to autonomous economic growth, the increase in general is about 13%, in the RFC NS-B slightly more at 14%. This is in line with the GDP growth for the EU27 which is 17%. In the RFC NS-B, rail has a growth of 12%, inland shipping shows a growth of 13%, road has a growth of 13%, and sea shipping 17%. In the absence of further developments, the rail freight market is expected to grow at the same pace compared to GDP and to the overall transport sector, therefore slightly losing market share. For all land freight transport, the Projects scenario and the Sensitivity scenario have an impact on the overall growth of international freight transport, especially in the RFC NS-B.

Development of volume (in million tonnes) by mode and scenario for the corridor area of RFC NS-B



Source: NEAC estimations; Legend: BAS Base year scenario; REF Reference scenario, PRO Projects scenario; SEN: Sensitivity scenario

In the RFC NS-B, for the Reference scenario, a growth of international rail transport is expected at 12%, which is approximately 11 million tonnes extra compared to the 2022 situation. This would be (rounded) 10,000 extra international freight trains in the RFC NS-B, from 86,000 to 96,000 trains in the Reference scenario.

Both the Projects scenario and the Sensitivity scenario show the impact of the different rail projects and rail measures. In the Projects scenario, rail transport grows an extra 1% compared to the reference scenario. In total it is estimated that this is approximately 1 million tonnes of extra international rail freight transport. This gives (rounded) 1,000 extra trains in the RFC NS-B. Together with the Reference scenario results, this would be approximately 97,000 trains for the RFC NS-B.

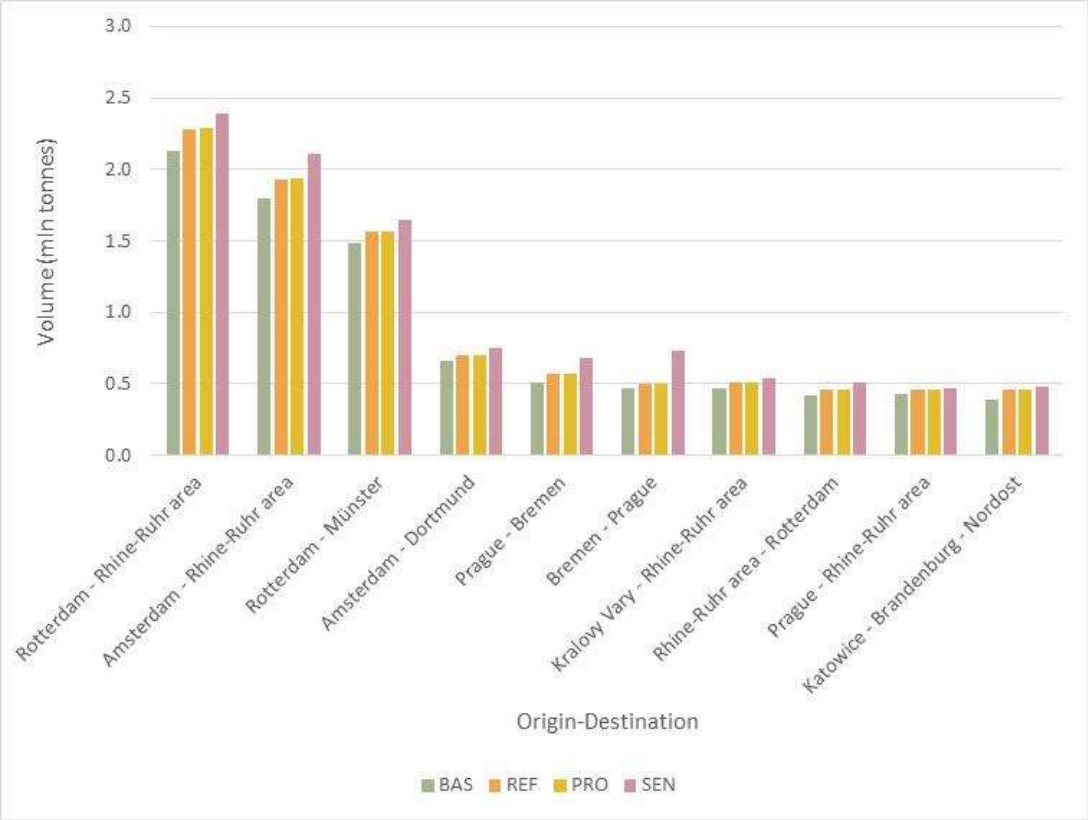
The hypothetical Sensitivity scenario shows that there is another potential of 16 million tonnes extra rail freight transport. The total number of unique international freight trains would then be around 99,000. Compared to the 86,000 unique trains in 2022, this is a growth of around 15%. This figure can be regarded as a potential maximum growth.

Overall, the Sensitivity scenario can be regarded as a potential maximum growth for rail, considering both economic and infrastructure developments. Compared to the 2022 base year, transport volumes would increase from 93 to 124 million tonnes i.e. by 33%.

The figure below shows the top 10 international rail freight transport relations within the corridor area of the RFC NS-B[5]. The main relation is between Rotterdam and Rhine-Ruhr area. This relation is important for dry bulk transport.

[5] The analysis focusses on the international trains, i.e. those trains crossing at least one BCP. In this respect, it is noticed that in national train databases and in the TIS dataset, trains logged as national ones might actually operate along international itineraries. The use of the NEAC model made it possible to partially overcome the limitations of the current structure of the datasets. Nonetheless, the results presented in this report might be conservative in the estimation of the international flows along the RFCs.

Development of volume (in million tonnes) of all international rail freight transport by the top 10 relations within the corridor area of RFC NS-B

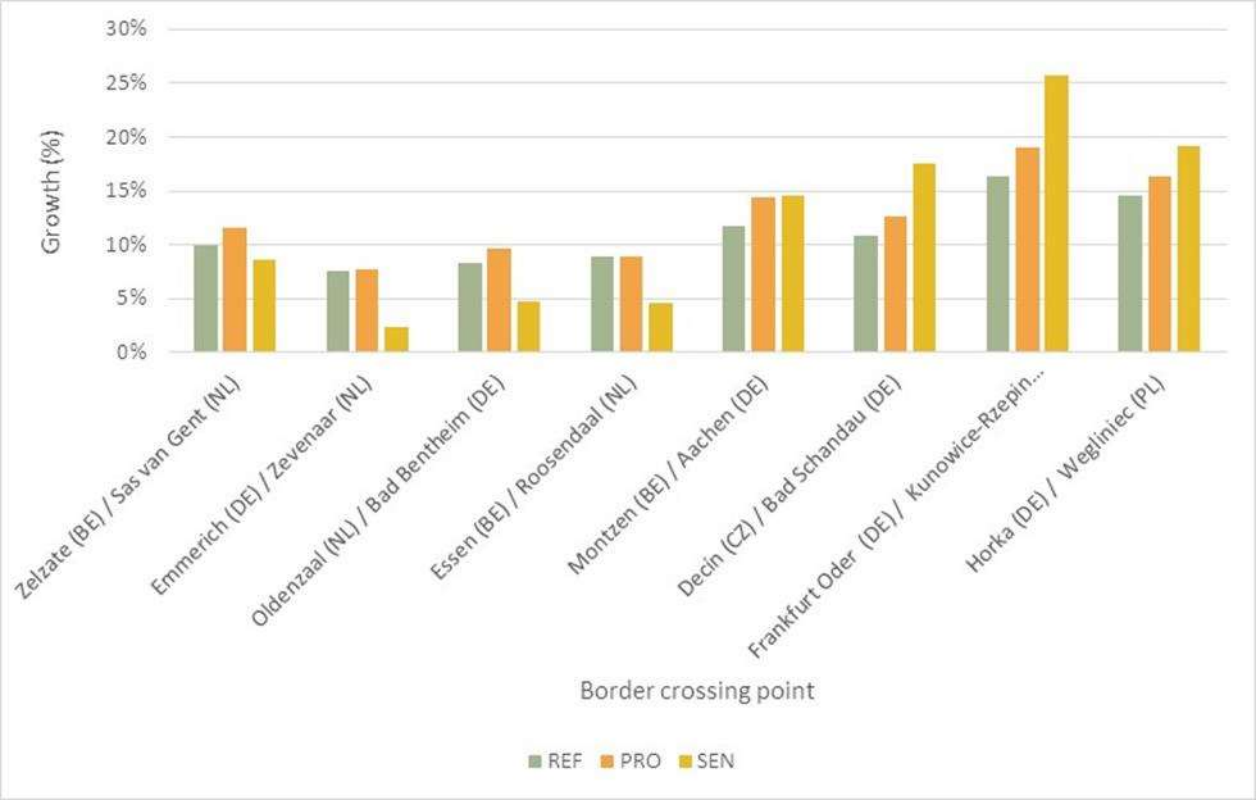


Source: NEAC estimations; Legend: BAS Base year scenario; REF Reference scenario, PRO Projects scenario; SEN: Sensitivity scenario

The different Border Crossing Points on RFC NS-B each show different growth between the 2022 Base year and 2030 Reference, Projects and Sensitivity scenarios. The total amount of unique trains on the BCPs in 2022 in the graph below is estimated at 86.000 trains. In the Reference scenario this would be approximately 96,000. In the Projects scenario, this is 97,000 trains, while in the Sensitivity scenario, this is 99,000 trains (due to extra volume per train, slightly higher than the Projects scenario).

The BCPs presented here are similar for all other RFCs which overlap with these BCPs. We carried out the study at European level and retrieved results for each specific corridor. As the BCPs form an important point in making the results consistent at European level, the results for overlapping BCPs do not differ.

Development of volume (in million tonnes) of international rail freight transport on important Border Crossing Points of the RFC NS-B



Source: NEAC estimations; Legend: BAS Base year scenario; REF Reference scenario, PRO Projects scenario; SEN: Sensitivity scenario

OCCURRED AND EXPECTED CHANGES DUE TO THE ESTABLISHMENT OF THE RFCS

The e-survey conducted to collect the opinion of the 11 RFCs RAG and TAG members on the occurred and expected impact of the establishment of the RFCs, involved 42 representatives of the RAGs and 30 members of the TAGs, who submitted valid questionnaires between September 2023 and January 2024. Whereas the overall number of responses makes the survey outcome meaningful for the analysis of the occurred and expected changes at the 11 RFCs network scale, an analysis specific to each individual RFC would not be statistically significant. The survey results are accordingly used in the 2024 11 RFCs Joint TMS Update for the 11 RFCs network. It is worth noticing that the survey responses reflect the views of the respondents at the time of submission of the questionnaire (Autumn 2023/January 2024). They furthermore represent a partial view of the market as the sample of the respondents is not representative of the market universe, and may contrast with the findings from the statistical review presented in the previous section above, as the opinions relate to the RFCs and international freight trains, whereas national statistics refer to the whole country network and to national as well as international traffic. The main findings from the survey are summarised in the following bullet points for each of the three investigated areas.

Occurred and expected impact of RFCs, in the areas of governance, operational efficiency and capacity management

- The opinion of the 11 RFCs RAG and TAG members about the changes within the governance area is positive, especially in terms of cooperation with the market, including but not limited to RUs and terminal

operators, as well as concerning facilitation of discussion among Member States about the issues affecting the competitiveness of international rail freight transport. The opinion about the progress made regarding cooperation between RFCs and Core Network Corridors (CNCs)/ERTMS horizontal priority is less favourable. The market opinion is unfavourable about the progress made on harmonising international freight rail services' legislative, regulatory, procedural and operational aspects. The expectations of the market players concerning the future impact of the programmes and activities of the RFCs are relatively positive concerning all aspects. Respondents consider the cooperation between RFCs and an EU Network of IMs as assumed in the proposal for the new capacity regulation, to be the best governance solution for bringing issues forward.

- The stakeholders' opinion about the changes that occurred within the operational efficiency area is also generally positive, except for the progress made in the promotion of technical and operational harmonisation of the European railway transport system towards its interoperability. The respondents' expectations concerning the future impact of the programmes and activities of the RFCs are relatively positive concerning all the assessed issues related to operational efficiency. Cooperation between RFCs and an EU Network of IMs is also considered the best fitting governance solution to bring operational efficiency issues forward.
- The respondents' opinions about the changes that occurred within the capacity management area are predominantly unfavourable. Notwithstanding the market's negative opinion of the progress made since the establishment of the RFCs in this area, the expectations on the future impact of the programmes and activities by the RFCs are rather positive with regard to all the investigated aspects related to capacity management. The best governance solution for capacity management improvements is deemed to be the cooperation between RFCs and an EU Network of IMs.

Occurred and expected market developments

- The vast majority of the e-survey respondents operated or still operate rail services or manage/operate terminals serving trains across at least one border crossing point on any of the RFCs. Most of them also operated or served international rail freight transport before the establishment of the RFCs. The majority of the respondents declare they experienced an increase in their operations since 2013, and most of them also have a positive expectation about the future, expecting overall market growth.
- The variation in traffic experienced by RUs and terminal operators since 2013 is positive for RFC NS-B. The majority of the respondents declare they experienced market growth along the corridor.
- The prevailing type of international trains operated on the 11 RFCs network consists of intermodal trains, followed by conventional block trains and single-wagon load trains. Most RUs and terminal operators experienced growth in intermodal train operations in the past years, whereas the trend for conventional block and single-wagon load trains is predominantly stable. Most respondents have a positive expectation for the future in terms of traffic growth for all market segments.
- Concerning traffic between logistics nodes, most operations relate to Port to Rail-Road Terminal (RRT) transport, followed by RRT to RRT services and Port to Port operations. Experienced variations by RUs were mostly positive for the Port to RRT or RRT to RRT segments and stable for the Port to Port one. Terminal operators have predominantly experienced growing trends in all market segments in the past years. The vast majority of RUs and terminal operators are expecting positive future trends for the three market segments.
- Regarding service distances, most operations cover distances between 300 km and 900 km, followed by services covering distances longer than 900 km and below 300 km. RUs experienced mostly positive

variations for services covering distances longer than 300 km and declared the market is stable for operations below 300 km. Terminal operators have predominantly experienced growing trends in all market segments in the past years. The vast majority of RUs and terminal operators are expecting positive future trends for the three market segments.

Market drivers

- RUs and terminal operators have very similar views about the effects of the main market drivers on the growth of international rail freight transport in the short term, i.e. until 2030. Most identified drivers are expected to have positive effects as they are assumed to improve rail transport's competitiveness. At the same time, the geopolitical context and socio-economic outlook, as well as the shortfall of the labour force, are perceived as threats.
- The socio-economic outlook is ranked first by the market, followed by "infrastructure development for interoperability", "policy and economic incentives to promote shift to rail". "Increased performance of rail freight services" and "harmonisation of procedures and national legislation to improve cross-border operations" are the two most relevant market drivers, according to the respondents, if considering both first and second-ranking selected options.
- Although indicated as having a potential negative impact on the market, labour shortages and geopolitical context are not ranked among the most critical market drivers. Finally, "technological improvements for better integration and increased efficiency of multimodal logistics chains", "better integrated RFCs and Terminals capacity management" do not seem to be considered priority issues by the RUs and terminal operators.

RECOMMENDATIONS ON FACILITATING AND STRENGTHENING THE RAIL FREIGHT MARKET ALONG THE 11 RFCS AND RFC NS-B

In line with the overall study approach aimed at conducting the 2024 RFC NS-B TMS Update as part of the 11 RFCs Joint TMS Update, study recommendations are primarily formulated focussing on the short-term development of the 11 RFCs belonging to the European rail network for competitive freight. RFCs share indeed both infrastructure and market, and more importantly a same EU policy background and overall socio-economic and geopolitical challenges despite some differences between Eastern and Western as well as Northern and Southern European countries. The 2024 11 RFCs Joint TMS Update allows for an estimation of the current market with reference to the RFCs catchment areas based on a common approach and tool, and for an overall assessment of the impact of the development of the 11 RFCs network towards the development and completion of the TEN-T network at standard. In line with the methodology decided to be adopted for the 2024 11 RFCs Joint TMS Update, no assessment of the current and future capacity was performed as part of the study and no detailed quantitative assessment of the current and future market operations by the operators along the individual RFCs and with reference to the expansion or new construction of individual projects and logistics nodes. The adopted approach albeit appropriate for an assessment of the market and modal share of the individual RFC as part of the 11 RFCs network, does not allow capturing RFCs specific market elements, especially the ones related to operational aspects. Study recommendations have been formulated around three main areas:

- Market developments and targets;
- Institutional and operational developments; and
- Enhance interconnectivity in the Baltic States.

MARKET DEVELOPMENTS AND TARGETS

The simulations made in the study demonstrate that major projects, and particularly the availability of an 11 RFCs network in line with TEN-T standards, would significantly increase the competitiveness of rail freight transport. The post-COVID-19 recovery and the recent geopolitical crises caused delays in the implementation and completion of the projects needed to complete a high-quality 11 RFCs network in line with TEN-T standards. Price increases and shortages of construction materials particularly affected the advancement of ongoing and planned projects. A high-quality and interoperable network might, furthermore, not be sufficient to achieve the ambitious targets set in the relevant European transport policies, in the absence of a significant change in the structure of the costs of road and rail transport. The following recommendations are proposed to support market development towards the achievement of the EU policy targets:

- *Timely complete the development of a high-quality 11 RFCs network in line with TEN-T standards:*
  - *Building missing links and removing infrastructure bottlenecks* increasing infrastructure capacity by adding new tracks and lines where needed, increasing their speed and improving their gradient, can solve congestion problems, save energy and reduce transport costs as well as improve travel times. Such developments are relevant at the network level, but produce effects also at the individual corridor scale;
  - *Achieving the requirements set in the TEN-T Regulation towards an 11 RFCs network in line with TEN-T standards*, i.e. 740 meter long trains, ERTMS, 22.5 t axle load, intermodal loading gauge, European standard track gauge, electrification, is fundamental to support the development of a Single European Railway Area;
  - *Support intermodal and combined transport*. The intermodal market is the most promising international rail freight market segment, requiring improvement of interconnectivity between main railway lines and terminals, increasing the capacity of the existing terminal infrastructure, investing in technologies to facilitate and speed up transport and transhipment operations, and tracking and making more reliable the transport of intermodal units along logistics chains and within logistics clusters.
  - *Stronger cooperation between all involved parties for better effectiveness in the availability and use of funds and the definition of investment implementation strategies focussed on those sections of the network with higher market* potential. For over a decade, the sector has benefited from a stronger TEN-T policy with a dedicated Connecting Europe Facility Fund. Among the different transport modes involved in the TEN-T network, rail and rail cross-border initiatives are treated as a priority. However, the available financial resources are limited overall compared to the financial needs that would be necessary to complete all projects. Investing in infrastructure might not be sufficient, e.g. to be operational, ERTMS also requires rolling stock to be equipped with onboard units.
- *Introduce market regulatory and policy measures to increase the competitiveness of rail freight transport*. Although not a specific subject of this study, regulatory and policy measures might be necessary to facilitate and foster the rail freight market in Europe towards the achievement of higher market shares and EU policy targets. Rail freight transport is generally more expensive and less flexible compared to road transport. Internalising external costs of road transport, and/or creating incentives to reduce the costs of rail transport would increase its competitiveness and support the achievement of the ambitious

EU policy targets. In this respect, policymakers shall also consider the potential effects on the modal share of measures improving the efficiency of road transport. As emphasised in the above-mentioned study by ERFA[6] regulatory measures facilitating market opening appear also to be relevant in increasing the competitiveness of rail transport (e.g. enforcement of antitrust regulations; unbundling of subsidised public service operations from open market business; and ending direct subsidies to or recapitalization of state-owned freight railway undertakings).

INSTITUTIONAL AND OPERATIONAL DEVELOPMENTS

Recommendations on institutional and operational developments are formulated as follows, according to the findings from the market consultation (2023 11 RFCs Joint TMS Update Survey), conducted as part of the 2024 11 RFCS Joint TMS Update:

- *Improve capacity management*. Capacity management is considered by the market and also by the analyses and studies at the basis of the proposal for the new capacity regulation, a key area for improvement. Progress was made in the management of Temporary Capacity Restrictions; however capacity planning remains an issue. Digital Capacity Management as an integral part of the European program "Timetable Redesign (TTR) for Smart Capacity Management" is at the core of the proposal for the new capacity regulation, and it is paramount for reaching the Green Deal targets for the transport sector and the rail freight segment within it.
- *Monitor operational performance*. The revised TEN-T Regulation (EU) 1679/2024 identifies new operational requirements, related to punctuality and dwell times at borders. Furthermore, some infrastructure requirements also depend on operations, such as 740 meter long trains. Investing in infrastructure, albeit needed, is long-lasting and capital-intensive. The competitiveness of international rail freight transport also depends on the improvement of cross-border operations and coordinated planning and management of the rail network at European scale. An RFCs common KPI framework is already in place, and RNE is also already monitoring infrastructure KPIs. Such activities might be continued in light of the new set of requirements foreseen in the revised TEN-T Regulation (EU) 1679/2024 and RFC governance structure, also defined in the Art. 67 of this regulation.
- *Balance network and corridor governance approach*. The analysis of the RFC catchment areas shows that international trains using at least one corridor BCP may actually use more than one RFC. A network approach is more fitting to the planning and management of the network capacity. Geographical specificities and logistics clusters and chains exist that still make the corridor concept useful, especially to support discussion and coordination among IMs and Member States and for a customer-oriented approach aimed at involving RUs and Terminal Operators. This consideration also seems to be in line with the opinions expressed by the 11 RFCs RAG and TAG members in the survey conducted as part of this study.

Enhance interconnectivity in the Baltic States

Further to the above recommendations, the following specific strategies are proposed to enhance interconnectivity in the Baltic States, making their transport networks more efficient, integrated, and sustainable, strengthening the region's position as a key logistics hub connecting Eastern and Western Europe:

[6] https://erfarail.eu/news/the-european-rail-freight-market-competitive-analysis-and-recommendations

- Develop infrastructure that seamlessly connects rail with sea and road networks, especially at key ports. This will enhance connectivity and reduce dependency on any single mode of transport;
- Encourage the use of intermodal transport units like containers to streamline cargo transfers and reduce costs;
- Implement advanced tracking systems and automated handling across the supply chain to improve scheduling and reduce delays;
- Develop contingency plans to diversify trade routes and ensure network resilience against geopolitical risks.