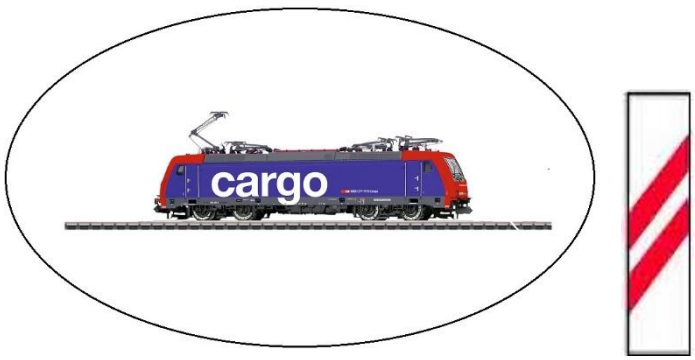
Towards an optimal (freight) train connection with Germany

Ir. J. de Goeijen Date:2023-March Version 1.0



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Chapter 1. Towards an optimal freight train connection with Germany

1.1 Background

During my research/report “Towards an optimal (passenger) train connection with Germany (1/3)” it emerges that the expected fast international trains to Germany compete with the large numbers of freight trains to Germany on the insufficient availability of rail capacity at/to the different border crossings. Without a good solution for freight traffic, there will be no good solution for fast international passenger traffic to Germany.

That is why this document in which a solution is proposed for goods routing by rail to Germany.

I will also combine the solutions for passenger and freight transport to Germany in the report “Combined Passenger + Freight Train Connection with Germany (3/3)”. This combination is necessary because both an optimal passenger connection and an optimal goods connection require a (too) large budget, which stands in the way of implementation/realisation. A more realistic/affordable solution can be implemented.

In this last (3/3) report I will also combine the wishes of Germany and the Netherlands with regard to both passenger and freight transport into this realization solution. For example, the German government wants to run the fast Berlin train via Hengelo, while the Dutch government wants to run the fast Berlin train via Arnhem. Of course that doesn't work.

Reports(See also Appendix 2 – the Reports):
“Towards an optimal (passenger) train connection with Germany” (1/3)
“Towards an optimal (freight) train connection with Germany” (2/3)
“Combined passenger + freight train connection with Germany” (3/3)

In this report, choices are made at a high level of abstraction. A choice made for eg the "Twente canal" route gives many possibilities how this line is exactly realized. By zooming in too much on the detail level, the broad outlines are lost. Broadly speaking, choices have to be made in order to take steps to solve the problems of rail freight transport to Germany.

1.2 Problem definition

Rail freight transport (to Germany) will grow strongly in the context of the model shift [1] and the EU green deal [2] . Three-quarters of the transport of goods by road must be moved to rail and waterways. By 2050: - rail freight traffic will double.

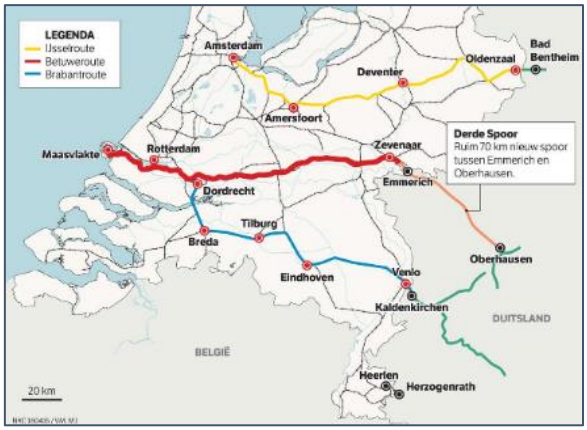

Figure 1: The border crossings for freight transport

In the Netherlands, 3 border crossings are involved in rail freight transport to Germany. These are Arnhem(Zevenaar-Emmerich), Hengelo(Oldenzaal-Bad-Bentheim) and Venlo(Venlo- Kaldenkirchen) as shown in the figure above.

The most important argument for constructing the Betuweroute is to prevent (dangerous) goods transport from passing through cities. Another practical advantage of a special freight line is that passenger transport and freight transport do not interfere with each other, which means that the capacity of the Betuweroute for freight trains only is relatively high. This separate freight line will also lead to shorter travel times to Germany.

At the end of 1992, the Netherlands and Germany concluded the Treaty of Warnemünde [3] , in which the Netherlands and Germany coordinated the development of their railways. Germany undertook, among other things, to expand the connection via Emmerich – Oberhausen, while the Netherlands undertook to construct and improve connections between the Betuweroute and the Oldenzaal and Venlo border crossings (the North Branch and the South Branch).

The Betuweroute has been in use for more than 10 years. In Germany, work is still underway on the expansion of the 70 km route from Emmerich to Oberhausen, which is expected to be completed in 2026. From that moment on, a “state of the art” freight line is available from Rotterdam to Oberhausen. There is sufficient capacity available from Oberhausen to allow freight trains to continue to North, East and South Germany and further to the Alpine countries and Italy. The Betuweroute will be in order from 2026 and for this route/border crossing no choices/investments will have to be made for freight transport in the coming years.

What is explored in the report:

- The need for a North and/or South branch next to the Betuweroute
- Elaboration of any North and/or South branch.

1.3 Conclusion-Summary

1.3.1 The Betuweroute

When the 3rd track in Germany is completed, the Betuweroute will have sufficient capacity for the next 25 years to facilitate all freight transport to Germany by train.

In the event of calamities and/or maintenance on the Betuweroute, this freight transport will have to be (partially) diverted via the Hengelo and Venlo border crossings.

1.3.2 The North Branch

Extra track must be built because otherwise all freight transport will continue to run through the cities between Hengelo and Amersfoort across the Hengelo border crossing. This is not desirable and also causes capacity problems. Passenger trains and freight trains compete with each other on this route. Extra rail is needed in this part of the Netherlands in order to realize the European/Dutch ambitions for both (international) passenger transport and freight transport.

It has been decided to construct extra Capacity/Track between Hengelo and Zutphen, the “Twente Canal Line” so that freight trains can then run from Zutphen via Arnhem to the Betuweroute. It is not desirable to route this extra capacity through Zutphen. The solutions to the above problem are not elaborated in this report. In “Appendix 2 De Bosvariant” a number of solutions are shown that fit within the above solution.

The current Hengelo-Deventer-Amersfoort-Rotterdam freight route must also remain available because a limited number of freight trains will also run on this route on busy (freight train) days. This means that the above-mentioned route must also be made suitable for 740 meter long freight trains.

1.3.3 The South Branch

It is not necessary to construct a separate South Branch (Nijmegen-Venlo) because the existing sub-routes, Rotterdam-Breda-Boxtel and Betuweroute-Den Bosch-Boxtel, have sufficient capacity to facilitate the expected number of freight trains.

This is not an ideal solution. The construction of an extra South branch (60 km) will soon cost more than 2 billion euros. This is too large an investment for the 50 freight trains that would pass here per day. That's about 1 train per hour and direction.

In Germany, a track doubling must take place between Kaldenkirchen and Dülken to enable a good flow of freight trains on this route.

Chapter 2. The need for a North and/or South branch

2.1 Introduction

Rail freight transport is expected to grow by 42.1 million tonnes
in 2019 to 68.6 million tonnes in 2040 (high scenario):
– The largest flows are between the ports and the hinterland towards Germany. Rotterdam is the largest generator of rail freight transport, followed by transit transport (Belgium ↔ Germany via the Netherlands) and transport to and from the other port and industrial areas;
– More than half of the transport will be transported in containers. This is the segment with the highest growth. Coal transport is decreasing. The confrontation of the demanded capacity for freight traffic with the supply shows that:
– In the high scenarios, a bottleneck arises on the route from/to the Oldenzaal border;
– The freight paths on other routes to the border have a high degree of utilization, so that further growth will almost certainly lead to new bottlenecks.

Figuur 5.2.1.1: Treinaantallen op de grens Nederland – Duitsland in 2019[16], 2030, 2040 en 2050

Aantal goederentreinen per dag (som beide richtingen)	Realisatie 2019	Lage scenario			Hoge scenario		
		2030	2040	2050	2030	2040	2050
Oldenzaal – Bentheim	23	51	55	62	63	73	86
Zevenaar – Emmerich	100	123	124	129	126	141	160
Venlo – Kaldenkirchen	52	62	66	70	71	77	86
NL – DE	**165**	**236**	**245**	**261**	**260**	**291**	**332**

Figure 2: Forecast number of freight trains to Germany

''In theory, the maximum capacity of the Betuweroute is eight trains per hour, in practice this may be slightly lower due to maintenance''. Eight trains per hour in each direction would add up to just over 300 trains per day for both directions. If the Betuweroute is in order on both the Dutch and German sections, the capacity of the Betuweroute will be sufficient until after 2040.
(See also: Routing High 2040 freight trains)

Hengelo	73
Venlo	77
Zevenaar	141
Total	291

Conclusion: With normal operations of the Betuweroute, the capacity of the Betuweroute will be sufficient to facilitate all freight transport to Germany until at least the year 2040.

There are situations in which the capacity of the Betuweroute will be much less:

- Malfunction
- Maintenance
- Any calamity due to a derailment of a train (for a longer period of time)

Conclusion: In the event of disruptions on the Betuweroute, the Hengelo and Venlo border crossings will have to contribute more to the number of freight trains that travel to Germany every day

2.2 the Betuweroute

Figure 3: Port line + Betuweroute

The Betuweroute (often referred to as the Betuwelijn, which may cause confusion with the railway line Elst - Dordrecht) is a 160-kilometer long Dutch freight railway from the Maasvlakte near Rotterdam to the border with Germany, a few kilometers beyond Zevenaar. About 108 kilometers between Kijfhoek and Zevenaar have been newly constructed, the rest of the Betuweroute consists of the Havenspoorlijn in Rotterdam.

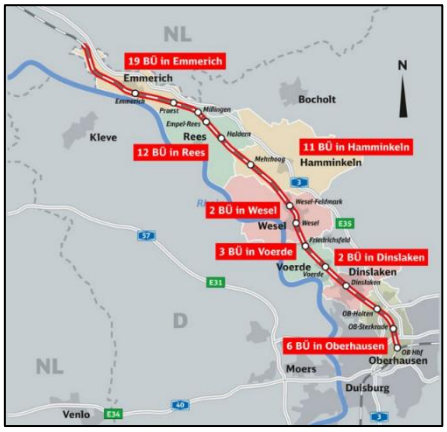

Figure 4: Emmerich-Oberhausen extension

Emmerich-Oberhausen[4] line HYPERLINK "https://www.emmerich-oberhausen.de/" is an important part of European rail freight traffic. Over a length of about 73 kilometres, it is an important puzzle piece in the freight corridor from Rotterdam to Genoa. Due to the increase in freight and passenger traffic in recent years, the line has reached its performance limit. To take this development into account, Deutsche Bahn will implement extensive structural changes to the line in the coming years. Different construction measures will be carried out in different phases. The three-track expansion of the line is central to increasing line capacity and optimizing operational processes.

Conclusion: If the extra 3 rd track between Zevenaar and Oberhausen is built around/before 2030, this line will have sufficient capacity to meet demand at least until 2040. In a number of places the track is already ready for the use of trains of 740 metres. These are the Maasvlakte railway yard and the Betuweroute. There is no longer any need to invest on this Betuweroute for the time being.

2.3 North branch

Commodity forecasts

The IMA 2021 [5] includes the most recent goods forecasts. The starting point in this traffic forecast is that freight trains run from Rotterdam or Roosendaal to Northern and Eastern Europe via the Weesp – Amersfoort – Bentheim route. Figure 2 shows the expected number of trains in 2040 for the railway lines on the Amersfoort – German border corridor. The number of freight trains via the Amersfoort and Bentheim corridor and the Bentheim border crossing will increase from 22-26 trains per day in 2018 to 55-73 trains per day in 2040 (WLO Low-High). In the high WLO scenario of 2040, the growth on this corridor is a factor of 2.5 – 3 and higher than the national average.

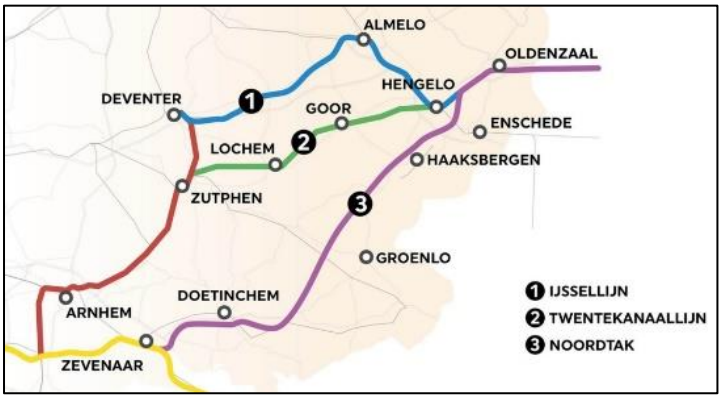

Figure 5: Possible routes for the freight route towards Hengelo

The figure above shows the possible routes for the freight trains that will run between the Betuweroute and Hengelo.

Variant 1 - IJssel line

In this variant, the freight trains on the Hengelo-Amersfoort route continue to run through all intermediate places. Within this variant, the (too) busy Hengelo-Almelo route will not be relieved, but will in fact be subjected to additional load. This is not a solution for the long term. More Track will be needed in the future, which this Variant does not offer.

Variant 2 - Twente Canal Line

This variant is the best solution. Costs of this Variant will be lower because less new track has to be laid than with Variant 3. The distance Zevenaar-Oldenzaal with Variant 3 is 80 km and the distance Zutphen-Hengelo with Variant 2 is 40 km. The residents between/in Arnhem and Brummen will not be happy with this choice. For these residents, extra soundproofing measures will have to be taken on this route to limit the (noise) nuisance.

Variant 3 - North branch

A study into the feasibility of the North branch has been postponed for the time being. This is what State Secretary Vivianne Heijnen (CDA) [6] of Infrastructure and Water Management says in a letter to the House of Representatives. According to Heijnen, we must first look at the broad problem of freight transport in the Netherlands

This expensive solution is also unnecessary because a full north branch has a capacity of around 300 freight trains per day (both directions added). The expected number of trains around 2040 will be between 50-70 (low-high) trains per day. Occupancy of this line will then be around 20% or even slightly less. That is not enough to justify the billions of investment required. The latest estimate indicates that the “North branch” will cost at least 2 billion euros.

Figure 6: No Noordtak action group

There is also great resistance in the Achterhoek against this variant of the freight railway united in the action group GeenNoordtak [7].

Duitsers: 'Maak met Noordtak niet opnieuw dezelfde fout'

OLDENZAAL/BAD BENTHEIM – De Duitse branchevereniging voor openbaar en spoorgoederenvervoer VDV vindt het onverstandig een Noordtak voor de Betuweroute te plannen, terwijl in Duitsland nog geen begin van een plan is voor een aansluiting met het Duitse spoor. „Maak niet opnieuw deze fout", waarschuwt vicevoorzitter Joachim Berends van de VDV.

Figure 7: The Germans are not enthusiastic either

Berends[8] refers to the fact that the Netherlands built the Betuweroute between 1999 and 2007 and that the Germans are still not ready with their connection at Zevenaar. According to Berends, the same is likely to happen with a possible Noordbranch.
We do not opt for Variant 3.

Conclusion

Additional track is needed to facilitate the expected number of freight trains around 2040 across the Hengelo/Oldenzaal border crossing. Variant 2 is the best because it requires the least amount of new track to be built and can handle the amount of freight trains. If the Betuweroute is not available or partially available, more freight trains must be routed past Hengelo/Oldenzaal. This can be done via this Variant 2, but the old freight route Hengelo-Deventer-Amersfoort-Rotterdam will also have to contribute to this task. This means that the old freight route must also be adapted for the use of 740-metre long freight trains.

Figure 8: The route variant Twentekanaallijn is projected here in the current landscape

variant[9] the freight trains are almost an hour and a half faster from Rotterdam to the border than over the route via the Randstad; the energy consumption is therefore also lower

2.4 South branch

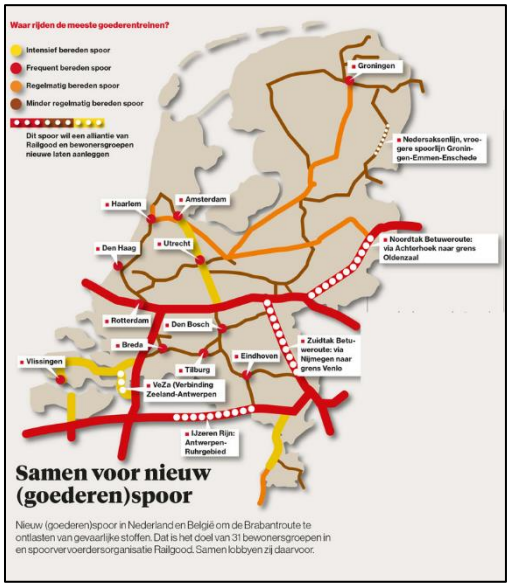

Figure 9: Rail freight transport, the South branch

The Betuwe Line will not have a branch towards Venlo. Minister Netelenbos (traffic) [10] has informed the House of Representatives that the so-called southern branch (Elst-Nijmegen-Venlo) will not be necessary until at least around 2020. The growth of freight transport by rail can be accommodated in other ways.

Railned concludes that the capacity problems (particularly on the Brabant route Roosendaal-Tilburg-Eindhoven-Venlo) affecting passenger transport and freight transport will be resolved when the Betuwelijn (Rotterdam-German border) is completed in 2005. The bottleneck for freight transport via the Venlo clayey crossing is located on the German section on the single track Kaldenkirchen - Dülken [11] .

Figure 10: Route Kaldenkirchen – Dülken

This single track route has often been designated as a route where the track should be doubled. So far it has not happened, despite the fact that both the Netherlands and Germany support the doubling of this trajectory. In order to take further steps in improving freight transport across this border crossing, this doubling must be carried out quickly. The municipalities involved remain afraid of nuisance from the extra freight trains.

Figure 11: Bottleneck Kaldenkirchen - Dülken

Between Kaldenkirchen and Dülken , the line has been constructed as a single track over a length of 12 kilometres. Due to the increasing traffic on this line and the desire to set up an IC connection Eindhoven-Cologne, this route section was declared overloaded by DB Netz at the end of 2018. Reason enough for the German government to expand the Kaldenkirchen-Dülken railway line to double track before 2030.

The mayors of Breda, Tilburg and Eindhoven[12] (12-December-2022) want 'as few toxic trains as possible to run on our tracks and that the risk ceilings remain intact, and where possible tightened'. They also urge the House of Representatives and the cabinet to consider alternatives, such as **making greater use of the Betuwelijn** , which passes through less densely populated cities.

The Ministry of Infrastructure and Water Management must limit the risks of hazardous substances on the railway[13] .
According to legislation, the Ministry of Infrastructure and Water Management must intervene to limit the risks associated with hazardous substances on the railways. This is evident from legal research commissioned by the province of South Holland. In some cases, such an intervention is even mandatory. The province also states on its website: “The maximum risks that rail transport may cause have been exceeded on the Brabant route for years. Freight trains travel largely through urban areas on this route, including Dordrecht, Breda, Tilburg and Eindhoven.” With this, the province of South Holland stands up for fellow province of North Brabant.

Figure 12: Chemical train through Breda station

Conclusion: The Betuweroute is the first option to run freight trains from the Netherlands to Germany. Only a limited capacity is needed for the number of freight trains via the Venlo border crossing. Extensions are only necessary on the Kaldenkirchen and Dülken section .

Appendix 1 Urls

[1] https://modalshiftprogramma.nl/
[2] https://www.freightwaves.com/news/the-european-green-deal-and-what-it-means-for-the-rail-freight-industry
[3] http://www.wedebruch.de/gesetze/inter/betuwevertrag.htm
[4] https://www.emmerich-oberhausen.de/
[5] https://www.rijksoverheid.nl/documenten/rapporten/2021/06/29/bijlage-3-backgroundrapport-2-spoor-en-btm
[6] https://www.1twente.nl/artikel/1640998/staatssecretaris-trapt-op-rem-noordtak-tegenstanders-opgelucht-maar-blijven-alert
[7] https://www.geennoordtak.nl
[8] https://www.gelderlander.nl/home/duitsers-maak-met-noordtak-niet-again-the same-error~a22f77bc/
[9] https://www.prorail.nl/siteassets/homepage/projecten/documenten/effects-routevarianten-zutphen-hengelo.pdf
[10]https://www.trouw.nl/nieuws/zuidtak-betuwelijn-geschrapt~b1c1051b/
[11]https://fahrweg.dbnetze.com/resource/blob/4596548/01c63cab08ea9e462e31ac068c48396d/pek_strecke_2510-data.pdf
[12] https://www.omroepbrabant.nl/nieuws/4193480/burgemeesters-vrezen-grotere-kans-op-schadeken-met-gifttreinen
[13] https://www.spoorpro.nl/goederenvervoer/2023/03/08/ministerie-ienw-moet-risks- dangerous-stoffen-op-spoor-beperken/?utm_source=newsletter&utm_medium=email&utm_campaign=Newsletter%20week%202023-10
[14] http://www.bosvariant.nl/infra-ruimte/betuwelijn-noordtak/
[15] https://politicsrheden.blogspot.com/2008/11/goederenspoor-om-de-zuid.html?m=1

Appendix 2 The Bosvariant

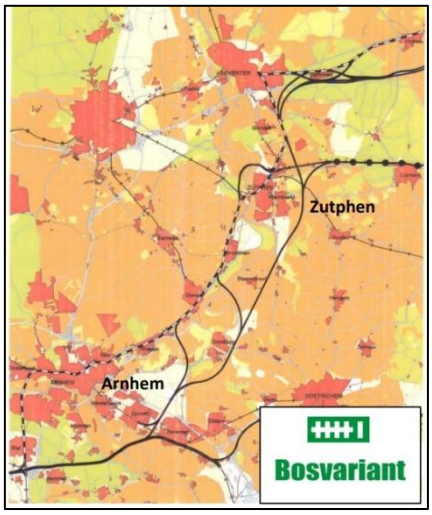

Figure 13: Some Bosvarianten

At the request of municipalities and residents' organisations, Bosvariant[14] has conducted research into alternative routes and other options for the Betuwelijn Noordtak.

These Bosvariants are an addition to the choice made in this report to allow freight transport between the Betuweroute and Hengelo to run via Zutphen and the Twente Canal route.

Figure 14: Arnhem around the South

On SATURDAY 15 NOVEMBER 2008, the Arnhem-West Noise Pollution Foundation launched that new plan. The aim is to reduce the pressure of freight trains on the Arnhem railway. The plan provides for a diversion around the south side [15] of Arnhem and around the south side of Velp. Coming from the Betuwe line, that freight track would run between Duiven and Zevenaar and then connect to the existing line via the route A12, Velperbroek , A348 between Velp and Rheden. On the attached image you can see how this south tangent develops

Appendix 3 The Reports

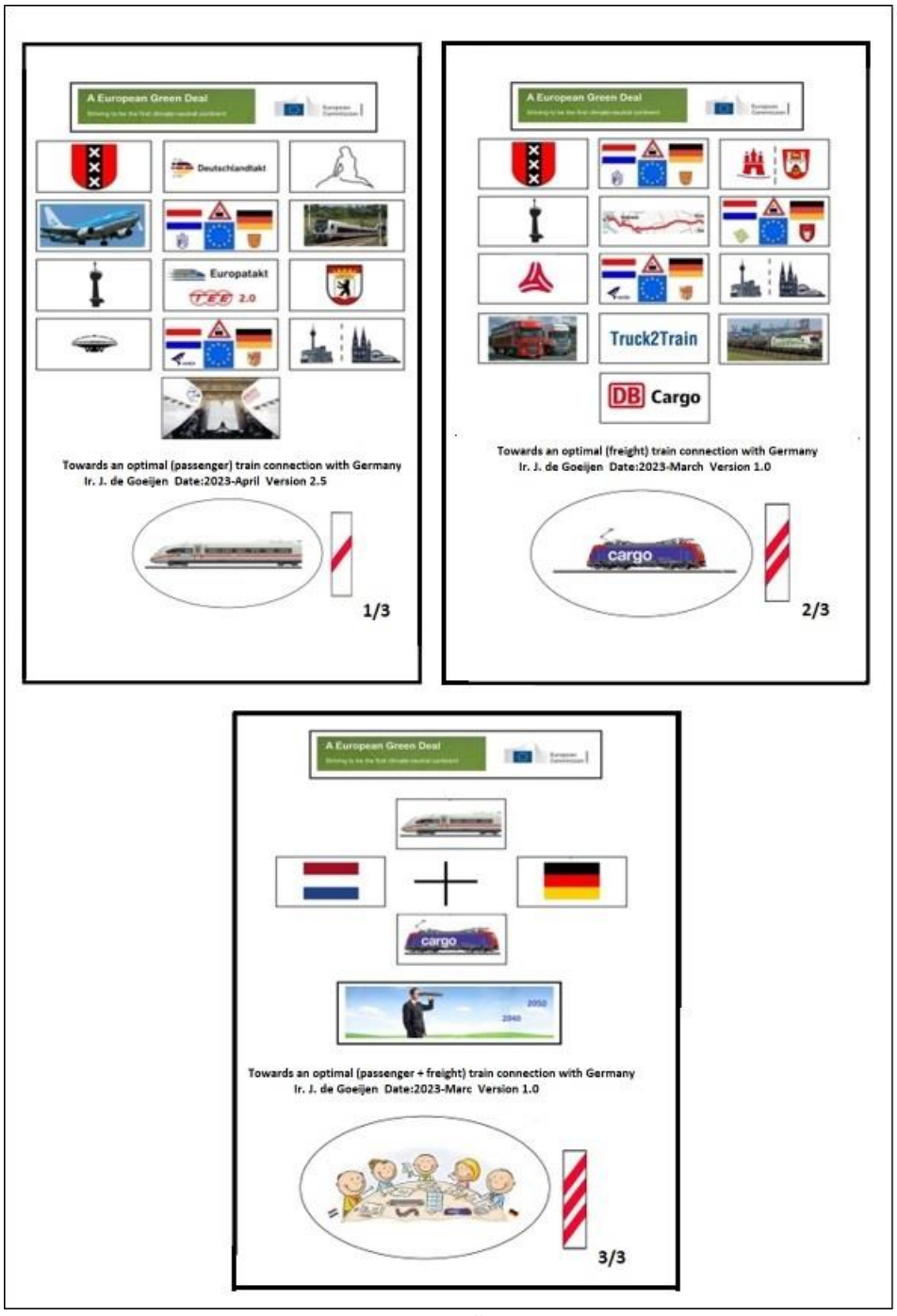

Figure 15: All reports