



Study on Capacity Improvement - SCI (Analysis of 740 Meter Long Trains)

Final report

March 2021

Figures and information from 2018 have been used in this presentation

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Scope of study



Study tasks and objectives

- i) With reference to the 740 meter train length standard set in the TEN-T Regulation (EU) 1315/2013, analyse the technical maximum train length and possible capacity constraints along the RFC NS-B lines, at handover stations and terminals in 2018
- ii) Assess the expected corridor infrastructure and operational characteristics by 2030, based on the review of the impact of ongoing and planned investments by 2030
- iii) Identify additional measures to improve the operation of 740 meter long trains under the technical and capacity points of view, to allow the smooth and seamless operation of 740 meter long trains along the RFC NS-B by 2030
- iv) Estimate the costs related to the additional measures

RFC NS-B infrastructure subject of analysis

- 7,330.0 km of railway lines crossing NL, BE, DE, CZ, PL, LT
- 89 handover stations/marshalling yards/waiting/buffer locations (25 NL, 13 BE, 27 DE, 5 CZ, 16 PL, 3 LT)
- 160 terminals* (76 NL, 19 BE, 41 DE, 5 CZ, 16 PL, 3 LT)

* A survey was performed involving 160 terminals. Due to the low responsiveness (20 questionnaires returned by the concerned operators/managers) the scope of the study was limited to the description of the characteristics of the terminals that participated in the survey. The study excludes however the identification and cost estimation of the measures required for their potential improvement/ expansion.



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*Characteristics of the corridor infrastructure in
2018 and by 2030*

Characterisation of the RFC NS-B by type of line and network in

2018 Type of line	Principal / Expected principal		Diversionary / Expected diversionary		Connecting		Total	
Type of network	Km	%	km	%	km	%	km	%
Core	3,675.2	50.1%	793.2	10.8%	231.7	3.2%	4,700.1	64.1%
Comprehensive	676.0	9.2%	935.3	12.8%	236.8	3.2%	1,848.1	25.2%
Off TEN-T	209.8	2.9%	446.4	6.1%	125.5	1.7%	781.8	10.7%
Total	4,561.0	62.2%	2,175.0	29.7%	594.0	8.1%	7,330.0	100.0%

Contractor based on consultation with the Infrastructure Managers

Corridor extent affected by technical/capacity constraints to

	2018		2030	
	km	%	km	%
Corridor lines affected by technical constraints	2,707.4	36.9%	513.5	7.0%
Corridor lines affected by capacity constraints	961.2	13.1%	792.3	10.8%
Corridor lines affected by technical or capacity constraints	3,668.6	50.0%	1,305.8	17.8%

Contractor based on consultation with the Infrastructure Managers

Technical/capacity constraints to operate 740 m long trains on the RFC NS-B in 2018 and by 2030 by Member State

Member State	Technical constraints		Capacity constraints	
	2018	2030	2018	2030
Netherlands	x	x	x	x
Belgium			x	x
Germany			x	
Poland	x	x		
Czech Republic	x			x
Lithuania				

Handover stations/marshalling yards/waiting-buffer locations affected by technical/capacity issues

- 33 in 2018 (16 NL, 3 BE, 7 DE, 2 CZ, 3 PL, 2 LT)
- 27 by 2030 (15 NL, 3 BE, 7 DE, 2 LT)

There is no unambiguous definition of technical - and capacity constraints.

Operation of 740 meter long trains across at least one BCP in 2018

- Technically possible between NL, BE, DE, PL (Wrocław), and between some destinations in PL and LT
- Technical and operational limitations in NL affected the interconnection between this country and the other countries along the RFC NS-B
- Technical restrictions in Poland hampered the interconnection between this country and LT, and the other countries along the RFC NS-B, as well as between the RFC NS-B countries and the border stations of Terespol and Medyka, towards Belarus and Ukraine, along the Eurasia Land Bridge
- Operational restrictions existed in BE during peak hours. Temporary limitations were also present on some sections in DE
- No 740 meter long trains were possible to be operated to/from CZ

Operation of 740 meter long trains across at least one BCP by 2030

- Technically possible between NL, BE, DE, CZ and most destinations in PL; as well as between these countries and Belarus via Terespol; and between some origins/destinations in PL and LT
- Limitations in NL will affect the interconnection between this country and the other countries along the RFC NS-B
- Restrictions in Poland will affect the interconnection between LT and the other countries along the RFC NS-B as well as between the RFC NS-B and Ukraine via Medyka
- Capacity limitations may affect operations in BE and CZ in the daytime/peak hours especially on lines used by passenger and freight trains in urban agglomerations. ~~Temporary limitations may also be present on some sections in DE~~



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Improvement measures

The review of the ongoing and planned initiatives shows that limited gaps will exist by 2030 to allow the operation of 740 meter long trains along the RFC NS-B. These will be solved by the following investments

- ***Modernisation/upgrading of corridor lines***

- **PL:** modernisation of 457.2 km of corridor lines and stations located therein, including 11.0 km of principal lines, 431.3 km of diversionary lines and 14.9 km of connecting lines
- **LT:** instalment of ERTMS/signalling equipment on the existing lines to further improve capacity
- **BE/CZ:** studies ongoing/foreseen to define possible investments to solve capacity limitations; additional investments are not official yet

- ***Measures to accommodate 740 m long trains at handover stations/marshalling yards/waiting-buffer locations***

- **NL:** Maasvlakte Oost, Botlek, Pernis, Waalhaven Zuid, Kijfhoek, Amersfoort, Rotterdam Noord Goederen, Almelo
- **BE:** Antwerpen Haven - Bundel B3, Antwerpen Haven - Bundel Oorderen, Antwerpen Haven - Bundel Angola
- **DE:** Duisburg Ruhrort Hafen, Duisburg Hafen, Duisburg Hochfeld Süd, Braunschweig, Magdeburg, Berlin Hamburger und Lehrter Bf, Frankfurt (Oder) Pbf

- ***Measures to solve capacity limitations at handover stations/marshalling yards/waiting-buffer locations***

- **NL:** Crailoo, 's Hertogenbosch and Tilburg Goederen
- **LT:** Kaunas and Mockava (including investments at the respective terminals)

The total cost of the measures identified as part of this study amounts to about € 3.1 billion

NL	€ 355-660 million to accommodate 740 meter long trains and improve capacity at handover stations/marshalling yards/waiting-buffer locations. Such investments will also improve operability of 740 meter long trains on the corridor lines
BE	€ 1 million to accommodate 740 meter long trains at handover stations. Studies are ongoing by the concerned infrastructure manager that may result in the identification of capacity improvement measures on the corridor lines and additional investments are not official yet
DE	€ 13 million to accommodate 740 meter long trains at handover stations
PL	€ 2,342 million to modernise 457.2 km of corridor railway lines and the handover stations located therein, which will allow accommodating 740 meter long trains
CZ	Studies are under consideration by the concerned infrastructure manager that may result in the identification of capacity improvement measures on the corridor lines and additional investments are not official yet
LT	€ 44 million to improve capacity on the existing corridor lines and handover stations

The above estimates do not include potential additional costs for the following measures:

- Solutions to solve technical limitations in NL at some Rotterdam Harbour handover stations and at the Amersfoort handover station, as well as capacity and time restrictions at the Rotterdam Harbour handover stations and along the Kijfhoek - Weesp and Roosendaal - Bad Bentheim routes
- Capacity improvement investments in BE/CZ to be confirmed upon completion of the ongoing studies
- Upgrading of terminals along the RFC NS-B



Modernisation of one or more of the following sections in PL, interconnecting the RFC NS-B with LT

- Krusze - Tłuszcz (4.1 km long, expected principal/Off TEN-T line); € 153 million
- Legionowo - Krusze (32.7 km long, expected diversionary/ Off TEN-T line); € 233 million
- Kobylnica - Mogilno (63.9 km long, diversionary/ TEN-T comprehensive line); € 221 million

Modernisation of the “triangular connection” starting at Długoszyn via Sosnowiec Maczki to Jaworzno Szczakowa (6.9 km long, principal/Off TEN-T line) and particularly the 1.9 km long section Jaworzno Szczakowa – Długoszyn, interconnecting the RFC NS-B with Ukraine; € 163 million

Modernisation of the 14.9 km long connecting line Sosnowiec Maczki - Dąbrowa Górnicza Towarowa to provide adequate connection to the intermodal terminals located along this line; € 116 million

Capacity expansion investments at the handover stations/marshalling yards/waiting/buffer locations in the NL, BE, DE, LT; € 373-678 million

- The initiatives in NL (cost range €355-660 million) are of specific relevance also considering that the Dutch corridor lines are involved in the most relevant trade/transport relations along the RFC NS-B

The total estimated cost of these measures ranges between € 1,1-1,4 billion



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Concluding considerations



The measures identified within the scope of this study together with the ones ongoing and planned are expected to technically allow the operation of 740 meter long trains on all lines of the RFC NS-B by 2030

- Some technical restrictions may persist at Amersfoort and some Rotterdam Harbour handover stations
- Capacity and time limitations may also still exist
 - ⌚ At the Rotterdam Harbour handover stations and along the Kijfhoek - Weesp and Roosendaal - Bad Bentheim routes
 - ⌚ In BE and CZ, particularly in the daytime/peak hours on sections used by passenger and freight traffic and/or located in urban areas

The ambitious modernisation programme of the railway lines in PL might be affected by implementation delays, also due to the different technical/financial maturity of the required investments

- This emphasises the opportunity to financially and administratively support the development of a stable and mature pipeline of projects in Poland to mitigate the risk of persistency of technical constraints towards the operation of 740 meter long trains along the RFC NS-B by 2030

Further to infrastructure investments, operational measures (i.e. scheduling and timetable planning, blocking the use of stations with short tracks and/or detouring) are already in use by the concerned infrastructure managers, which could be also adopted in the future

- The effectiveness and cost-benefit ratio of their applicability reduce with an increasing density of traffic on the lines and mixed use of the corridor sections by passenger and freight transport
- For a market-oriented quality approach and in light of an increased use of the corridor lines, infrastructure solutions are ultimately more effective and efficient