European Commission

North Sea - Mediterranean

Fifth Work Plan of the European Coordinator

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Mobility and Transport

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Abbreviations

AFID	Alternative Fuels Infrastructure Directive
AFIR	Alternative Fuels Infrastructure Regulation
AGS	Annual Growth Strategy (for 2021)
Bn	Billion
CEF	Connecting Europe Facility
CEMT	Conférence Européenne des Ministres des Transport
CIG	Intergovernmental Commission
CO2	Carbon dioxide
CNC	Core Network Corridor
CNG	Compressed Natural Gas
DIP	Detailed Implementation Plan
EAFO	European Alternative Fuels Observatory
EDP	ERTMS deployment action plan
EEIG	European Economic Interest Group
EMS	European Maritime Space
ERDF	European Regional Development Fund
ERTMS	European Rail Traffic Management System
ETCS	European Train control System (component of ERTMS)
EU	European Union
GDP	Gross Domestic Product
GHG	Greenhouse gas emissions
GSM-R	Global System for Mobile communications (sub system of ERTMS)
ILB	Interoperability Issues Log Book
IMDO	Irish Maritime Development Office
IWW	Inland Waterways Transport
KPIs	Key Performance Indicators
LNG	Liquified Natural Gas
MFF	Multiannual Financial Framework
m	Million
MoS	Motorways of the Sea
MS	Member States
NSMED	North Sea-Mediterranean Corridor
RFF	Recovery and Resilience Facility Fund
RIS	River Information Systems
RORO	Roll on, Roll off (loading and discharging from vessels)

RRT	Rail-road terminals
RWG	Rotterdam World Gateway Terminal
SAF	Sustainable Aviation Fuels
SCSNE	Société du Canal Seine-Nord Europe
SSMS	Sustainable and Smart Mobility strategy
SSS	Short Sea Shipping
TEN-T	Trans-European Transport network
TEU	Twenty-foot Equivalent Unit (shipping container)
TGV	Train à grande vitesse
USA	United States of America

Country ISO Abbreviations

BE	Belgium
FR	France
IE	Ireland
LU	Luxembourg
NL	Netherlands
UK	United Kingdom

1 Towards the NSMED Corridor 5th Work Plan

In my quality of Coordinator for the North Sea – Mediterranean (NSMED) Core Network Corridor, I am hereby presenting an updated Work Plan, two years after the publication of its fourth version in 2020. This fifth version is the last under the current TEN-T Regulation.

The Work Plan will highlight the progress made since setting up the Corridor in 2014, including developments in the last two years, as well as the remaining challenges and critical points for completing the Corridor by 2030. In this regard, looking back to 2014, I am happy to see steady progress towards completing a truly cross-border, multimodal, well-integrated, operationally efficient and, above all, sustainable transport system along the whole Corridor – thereby achieving improved cohesion, accessibility and connectivity across the five Member States of the North Sea – Mediterranean Corridor.

However, a series of events and crises have affected the European Union in the past years. Let me mention the exit of the United Kingdom from the EU, the COVID-19 pandemic and more recently the Russian war of aggression against Ukraine with its manifold dramatic consequences, in a context where the immediate effects of climate change are more and more acute and geopolitical tensions are heightening on the global stage. They have both short-term and longer-term impacts on corridor transport flows as well as on the overall logic and role of the corridor system: they are changing the context within which the North Sea – Mediterranean Corridor is operating.

Policy developments

Against this background, the EU is demonstrating its capacity to act on many fronts, swiftly and with unity. Following the Green Deal in 2019, the European Climate Law[1] and the Sustainable and the Smart Mobility Strategy (SSMS) in December 2020, the legislative and policy framework is being adapted with a view to transform the transport system and meet the targets and ambitions set at EU level. Let me mention a few important examples from the past two years.

The Fit for 55 Package (July 2021) includes the proposal for a Regulation on alternative fuels transport infrastructure (AFIR), the proposal increasing the ambition of the EU Emissions Trading System as well as the ReFuelEU Aviation and FuelEU Maritime initiatives.

The Efficient and green Mobility package (December 2021), includes the proposal for the revised TEN-T Regulation, a new Urban Mobility Framework, a proposal for an update of the ITS Directive as well as an Action Plan on long-distance and cross-border rail.

Moreover, in May 2022, the Commission proposed the REPowerEU plan[2]. It sets out a series of measures to rapidly reduce dependence on Russian fossil fuels and fast

[1] Fixing a target for the reduction of greenhouse gases emissions of at least 55% by 2030, compared to 1990 levels, and climate-neutrality by 2050.

[2] https://eur-lex.europa.eu/resource.html?uri=cellar:fc930f14-d7ae-11ec-a95f-01aa75ed71a1.0001.02/DOC_1&format=PDF

forward the green transition, while increasing the resilience of the EU-wide energy system. It is based on: diversifying – saving - accelerating clean energy.

The adoption of the CEF 2 Regulation (Regulation (EU) 2021/1153) has not only established an ambitious Connecting Europe Facility programme for the period 2021 – 2027, but it had also the important effect of adapting the alignment of the North Sea – Mediterranean Corridor, in particular to cater for the exit of the UK from the EU and from the Corridor.

Let me also recall the Green Lanes initiative in 2020, which supported the continuous flow of goods across the Union, helping to keep internal borders open and the internal market functioning, at a time when the pandemic led to serious supply chain interruptions due to restrictions on movement and border closures.

The legislative proposal for a revised TEN-T Regulation is of course extremely relevant for our work. It results from a comprehensive evaluation of the existing legal framework, following extensive consultation of Member States and stakeholders, as well as an in-depth assessment of the impacts of the changes proposed. It aims to make the European transport infrastructure fit to play its part in the fulfilment of the targets and objectives of the Green Deal and SSMS, in particular to reinforce the overall TEN-T contribution to the decarbonisation and digitalisation of the transport system. To this end, it introduces a number of new or reinforced infrastructure requirements to promote sustainable forms of transport - some of them will be highlighted in the Work Plan. An intermediary deadline of 2040 is proposed for the new standards on the core network and for advancing the existing standards on the comprehensive network, notably the deployment of ERTMS. It also contains the integration of the CNCs and the RFCs into "European Transport Corridors", which will ensure geographical alignment and create synergies in various competence areas. In addition, it proposes the merge between the North Sea – Mediterranean and the Rhine Alpine Corridors, as well as light modifications of the current alignment of the NSMED corridor.

Developments and achievements along the Corridor

As highlighted above, significant progress has been made in the last seven years towards achieving the corridor objectives. The following chapters of the Work Plan give an overview of those progress and developments on the corridor projects and priorities. They also analyse the Corridor characteristics, compliance with the TEN-T requirements as well as the challenges and remaining critical points.

The Corridor project list now includes 505 projects, amounting to around €76.7 bn, of which 30% have been completed. Considering the estimation of the projects for which the cost is unknown (done by the consultants), the total amount would be €94 bn.[3]

Since the last Work Plan two years ago, according to the project list, 72 projects were completed. Let me mention a few of them:

- The new port of Calais was inaugurated in September 2021.
- The new Ringaskiddy container terminal in the Port of Cork was completed in 2022.
- The modernisation of the Serqueux-Gisors line, which provides an electrified alternative route for rail freight from and to the Port of Le Havre, was commissioned in March 2021.
- The construction of the Theemsweg railway section, improving the access to the Port of Rotterdam, was achieved in 2021.

[3] A cost estimate could not be provided for all projects with unknown costs.

- The completion in 2022 of an additional platform at the Lyon Part-Dieu station in the context of the long-term project of decongestion of the Lyon rail node.
- The modernisation of rail signalling equipment in Dublin was completed in 2021.
- The upgrade of rail access to the "Port du Rhin" in Strasbourg was concluded in 2021.
- The renovation of the multimodal terminal of the Port of Moerdijk was concluded end of 2021.
- The rolling motorway terminal (multimodal logistics platform) in the port of Marseille was completed in 2021.
- The upgrade of rail terminal "Greenport" in Venlo was completed in 2020.
- The project RIS COMEX that implemented and operated cross-border River Information Services based on operational exchange of RIS data was concluded in June 2022.
- The Arc Atlantique phase 3 on the deployment of ITS services on the North Sea-Mediterranean (Belgium, France, Ireland, Netherlands) and Atlantic was concluded in 2021
  The C-Roads projects in Belgium – Wallonia and Flanders on the deployment of C-ITS was completed in 2020 and 2021)
- The feasibility studies for deploying 42 LNG fuelling stations along six Corridors in nine Member States (Belgium, France, Netherlands), as part of the global project to establish EU wide LNG fuelling infrastructure for trucks, has been concluded in 2022

This list should not outshine many other projects and works, which are important for the North Sea-Mediterranean and which have significantly progressed or for which milestones have been achieved in the past two years – despite the pandemic. Those developments are described in the next chapters. This applies in particular to the different components of the Seine Scheldt project.

My corridor is the only one directly affected by the exit of the UK from the EU. Let me say a word on this, as transport connectivity between Ireland and the rest of the EU has been significantly impacted by the UK leaving both the EU Single Market and Customs Union on 1st January 2021. The corridor alignment has been modified with the addition of maritime connections from continental Europe to Ireland, thus reinforcing the integration of Ireland within the TEN-T network. In the same spirit, Ireland has also been included in the Atlantic corridor.
The European freight transport industry has been successful in the lead up to, and after 1st January 2021, in maintaining transport accessibility and economic cohesion between Ireland and continental Europe by providing the required maritime capacity on direct routes that avoid the traditional land bridge across Great Britain. Many importers and exporters have been able to adapt by reconfiguring their supply chains with the assistance of their transport providers and I would like to congratulate all the relevant parties for their flexibility and resilience in the face of significant changes in administrative rules and regulations. There may well be implications for capacity at some ports in Ireland and on the continental mainland as Ireland's economy becomes more integrated with the rest of the EU.
I will continue to participate actively in discussions on Ireland's connectivity in the framework of my corridor activities, cooperating with the Member states and all other stakeholders. In this regard, I met in June 2022 the Irish Transport Minister and the Irish authorities and paid a visit to the ports of Shannon-Foynes and Cork. In April 2021, I co-organised with my colleagues Prof. Secchi and Prof. Bodewig, Coordinators of the Atlantic Corridor and the Motorways of the Sea, a very successful online Workshop "Smart and Sustainable Maritime Transport in the Atlantic and North Sea Region Post-Brexit", as a follow-up to the Seminar held in Dublin in April 2019.

In the past two years, despite the restrictions due to the pandemic, the regular functioning of the Corridor activities has been maintained, notably using online tools, and I have carried on my mission as Coordinator with the same sense of responsibility. Let me mention my main public activities. In addition to the meetings with all the members of our Corridor Forum and a joint Workshop with the Rhine Alpine Corridor on the impact of the Covid-19 pandemic, we organised two working group meetings, one on the deployment of the TEN-T rail freight parameters and the other on the EuroCap-Rail project. I had my regular Hearing at the European Parliament and, with my colleagues Coordinators, we had a long series of Coordinators' Seminars - in particular to prepare the revision of the TEN-T Regulation. Besides punctual meetings on given projects and my participation in several transport-related conferences, my ride aboard the Connecting Europe Express (CEE) in September 2021 as well as the Connecting Europe Days in Lyon in June 2022 enabled me to hold a set of meetings on various corridor projects and with various stakeholders. I also made a series of online or onsite interventions in events related to some important Corridor projects (e.g. information events for the public or the transport sector regarding the canal Seine-Nord Europe, inauguration of the port of Calais, Etoile ferroviaires lyonnaise). On the occasion of the CEE train, a high-level meeting was dedicated to EuroCap-Rail and in June 2022 I met the Belgian Transport Minister to discuss its progress and completion horizon. In parallel, I continued to be active in the governance structure of the Seine-Scheldt project (Seine-Scheldt intergovernmental commission and supervisory board of the Seine-Nord canal) and visited works on the field (canal Seine-Nord, upper and lower Seine). Likewise, I continued my cooperation with the Rail Freight Corridor participating in an Executive Board meeting each year. I continued my visits to ports (Dunkerque, Lille, Cork, Shannon Foynes), whereby the quality and capacity of hinterland connections by rail and inland waterways, modal shift and port greening in general were in the focus. Finally, my visit to Ireland, besides ports and maritime connectivity with the Continent, focused on the untapped potential of rail both for passengers and freight.

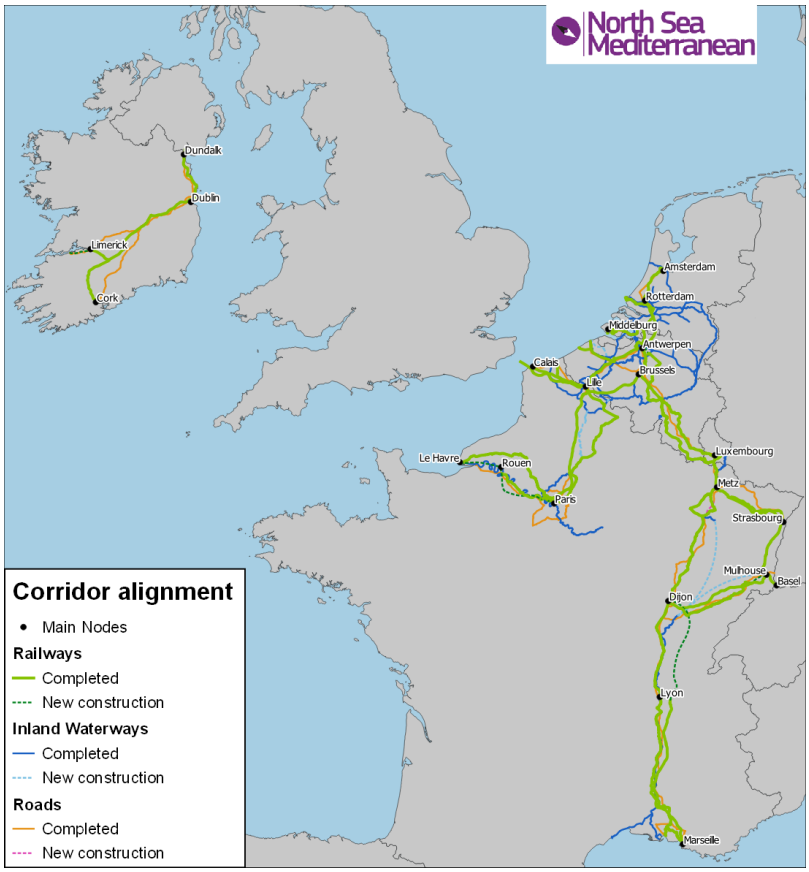
2 Characteristics of the NSMED Corridor

2.1 Alignment

The North Sea - Mediterranean (NSMED) Core Network Corridor stretches from Dublin, Limerick and Cork in the north-west to Lille, Paris and Strasbourg in the centre, Marseille in the south, and extends north-east to Benelux towards Amsterdam via Luxembourg and Brussels. It covers five countries, namely Belgium, Ireland, France, Luxembourg and the Netherlands. It includes some of the most significant economic and production centres in Europe, as well as key European ports (Northern Range ports, Marseille, Irish ports). It reaches the German and the Swiss borders, connecting to the Rhine Alpine Corridor with onward links through the Alpine region to Italy. It also connects to the Mediterranean, Atlantic, North Sea – Baltic and Rhine - Danube Corridors opening up to wide European regions.

It provides links to the land border with Northern Ireland and offers maritime connections with Great Britain. It consists of 5,452km of railways, 3,233km of roads and 4,019km of inland waterways[4].

Figure 1: Alignment of the North Sea – Mediterranean Corridor, 2021[5]



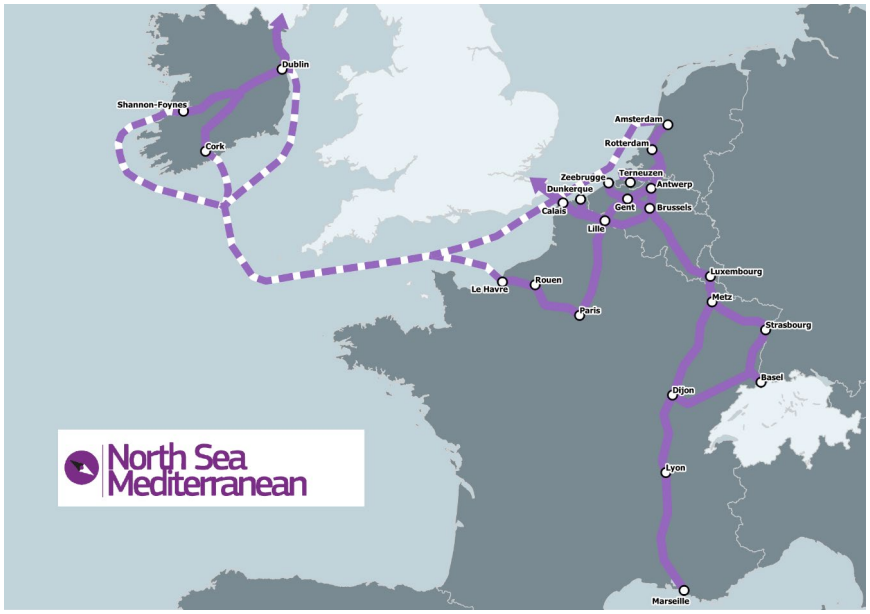
[4] Includes existing sections as well as sections still to be constructed/completed.

[5] Until the 31st January 2020 the United Kingdom was part of the North Sea-Mediterranean Corridor.

Regulation (EU) 2021/1153, establishing the Connecting Europe Facility for the period 2021 – 2027, adapted the alignment of the Corridor. The modification consists of:

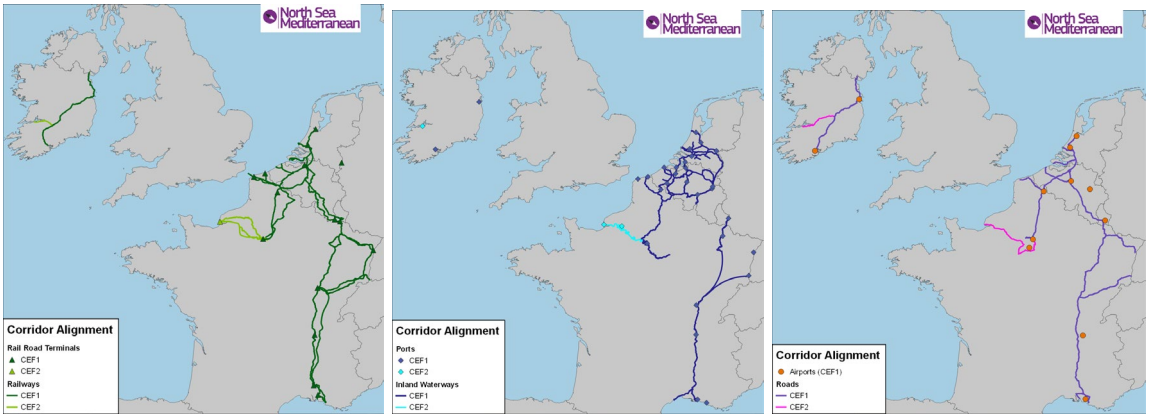
- the extension of the Corridor in Ireland westwards to connect the Port of Shannon-Foynes;
- the addition in France of the connection from Paris to Le Havre via Rouen following the Seine River;
- the addition of maritime links between the three Irish core ports of Dublin, Cork and Shannon Foynes, and core ports in the range from Le Havre to Amsterdam (Le Havre, Calais, Dunkerque, Zeebrugge, Antwerp, Ghent, and Terneuzen (North Sea Port), Rotterdam and Amsterdam).

Figure 2: NSMED alignment including maritime links



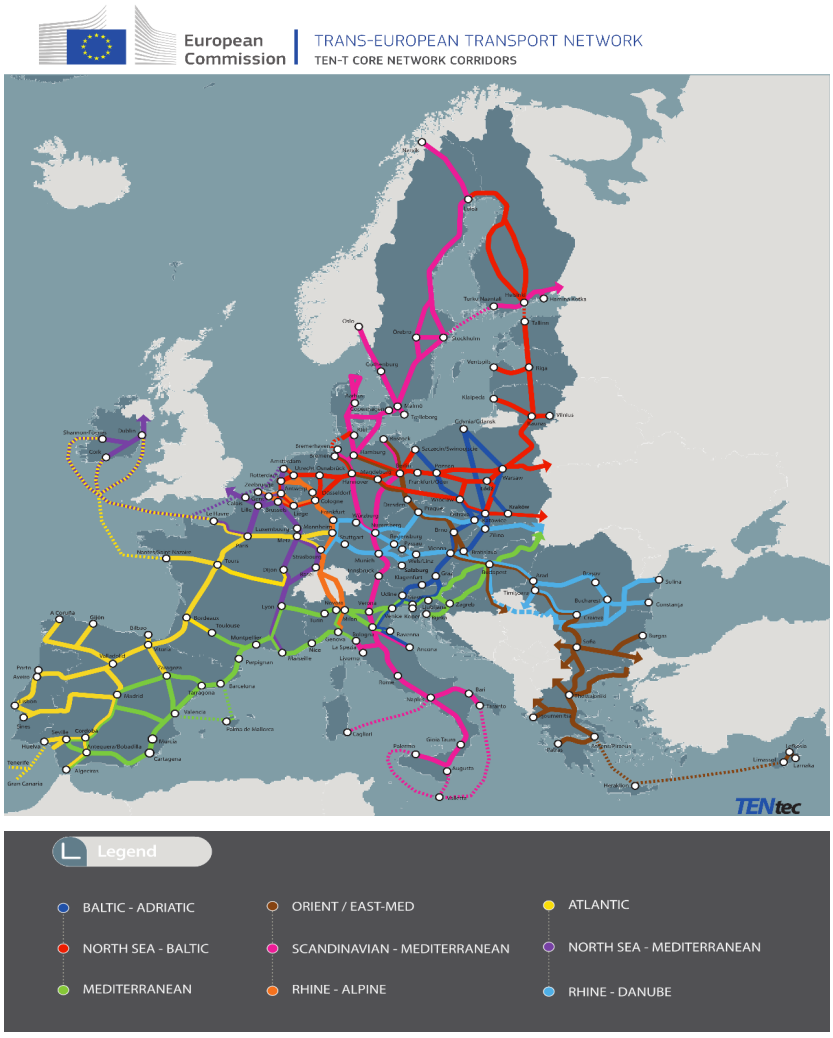
This new alignment reflects the exit of the United Kingdom from the EU and reinforces the connectivity of Ireland with the continent - putting emphasis upon direct maritime connections to important ports of the Northern range, therefore offering connectivity to the rest of the EU, as well access to global maritime connections. While the ports of Le Havre and Rouen are added to the Corridor, the River Seine, which is part of the Seine - Scheldt project, is now included in its entirety in the Corridor. This section in France is shared with the Atlantic Corridor. The addition of Shannon Foynes also means that all core ports in Ireland are now included.

Figure 3: NSMED alignment: additions through Regulation (EU) 2021/1153.



The NSMED is part of an EU-wide network and offers connectivity to the rest of the EU via its connections to other Corridors, as well as through its ports (see Figure 4).

Figure 4: TEN-T Core Network Corridors



2.2 Technical characteristics of the Corridor

In the following sections, each mode of transport is analysed in turn. Their technical characteristics, including the Key Performance Indicators (KPIs) showing the percentage of kilometres which meet the TEN-T requirements, will be presented, as well as considerations on the remaining bottlenecks and expected compliance by 2030.

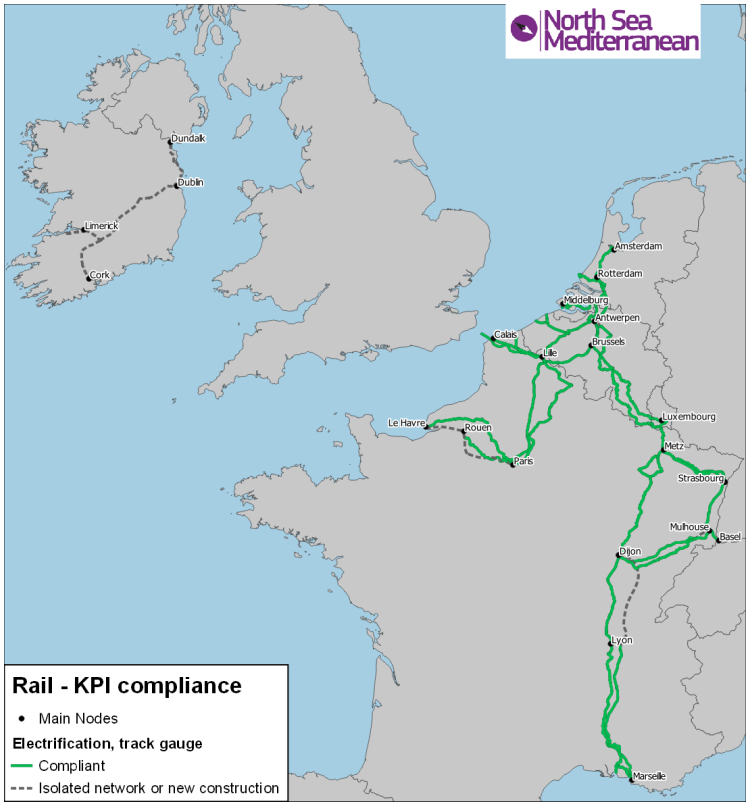
2.2.1 Rail

2.2.1.1 TEN-T requirements

The NSMED rail network can be understood as having three main categories of sections: isolated sections, conventional lines (carrying freight and/or passenger trains), and high-speed lines. Ireland, which has a non-standard track gauge, is considered to be an 'isolated network', and therefore not required to comply with the TEN-T requirements. Within the continental part of the Corridor, all sections use the standard track gauge. All non-isolated lines, including the high-speed passenger lines, in addition to standard track gauge, are required to offer electrification and European Rail Traffic Management System (ERTMS). Lines which are used for freight services, usually offering paths for both passenger and freight trains, are also required to achieve certain minimum standards relevant for freight trains, regarding train length, axle load and line speed.[6]

Electrification and track gauge

Figure 5: Electrification and track gauge



Rail network

Rail Network KPI	%
Electrification	100%
Track gauge 1435mm	100%

(2021 Basis)

KPIs apply to: all existing, non-isolated sections (conventional and high-speed)

All non-exempt sections are compliant regarding track gauge and electrification. However, the existing voltage standards used in the NSMED Corridor vary. The French network south of Dijon uses 1.5kV DC, whereas the northern part of the French network, as well as Luxembourg and a small part of the Belgium network, use 25 kV AC. The rest of the Belgian network uses 3kV DC. However, in the context of the

[6] Following Regulation 1315/2013, article 39, 2 (a) ii.

EuroCap-Rail project, the major part of the Brussels - Luxembourg axis will be equipped with 25kV, thus improving interoperability. The Netherlands uses 1.5 kV DC, apart from the high-speed lines, which use 25 kV AC. The difference in voltage systems is a potential barrier to interoperability, particularly at border crossings, requiring railway undertakings to use dedicated locomotives equipped with different voltage systems, or to change locomotives.

ERTMS

Overall, ETCS is in operation on 15% of the Corridor and GSM-R on 78%. In June 2022, 51% of the NSMED length planned in the ERTMS European Deployment Plan (EDP) by 2023 was in operation with ETCS.

According to the EDP, 1310km and 1565km are expected to be operational by 2021 and 2023 respectively. The following figures show the state of play and target/planned dates for the ERTMS deployment, considering the dates of the EDP:

Figure 6: State of play of ERTMS deployment

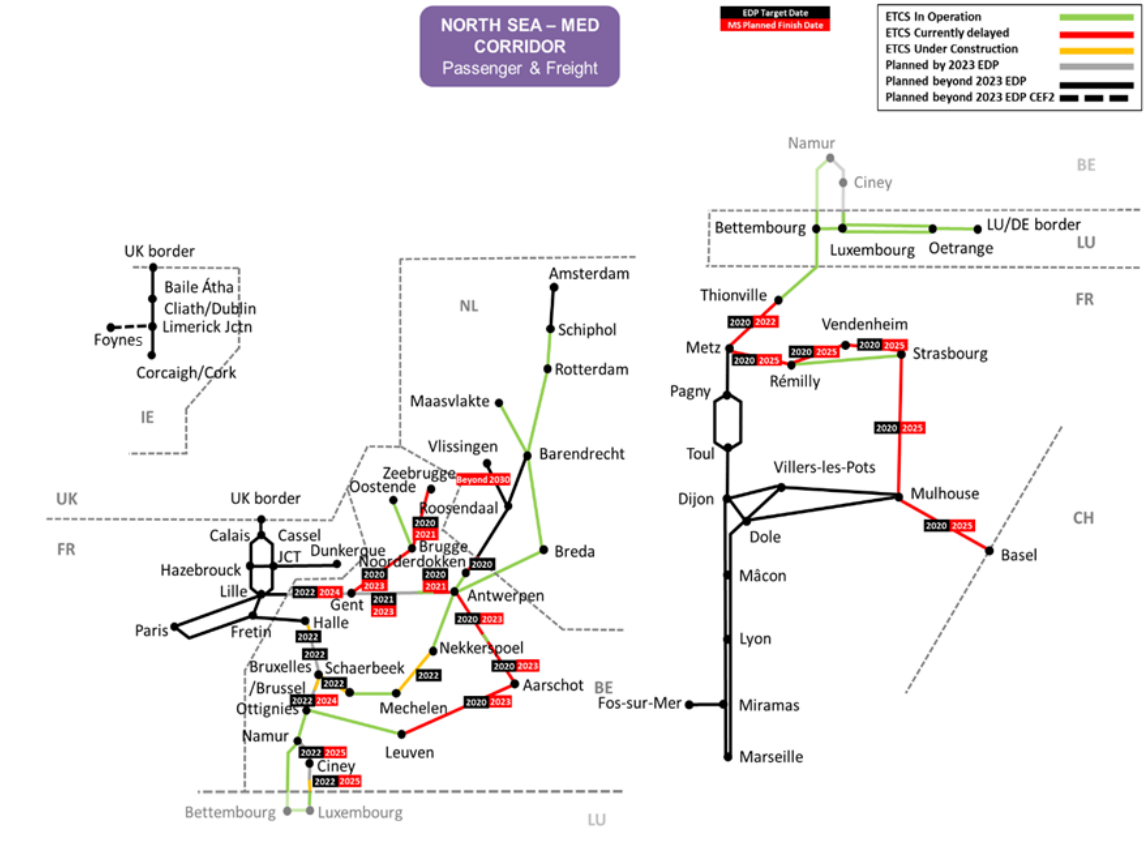
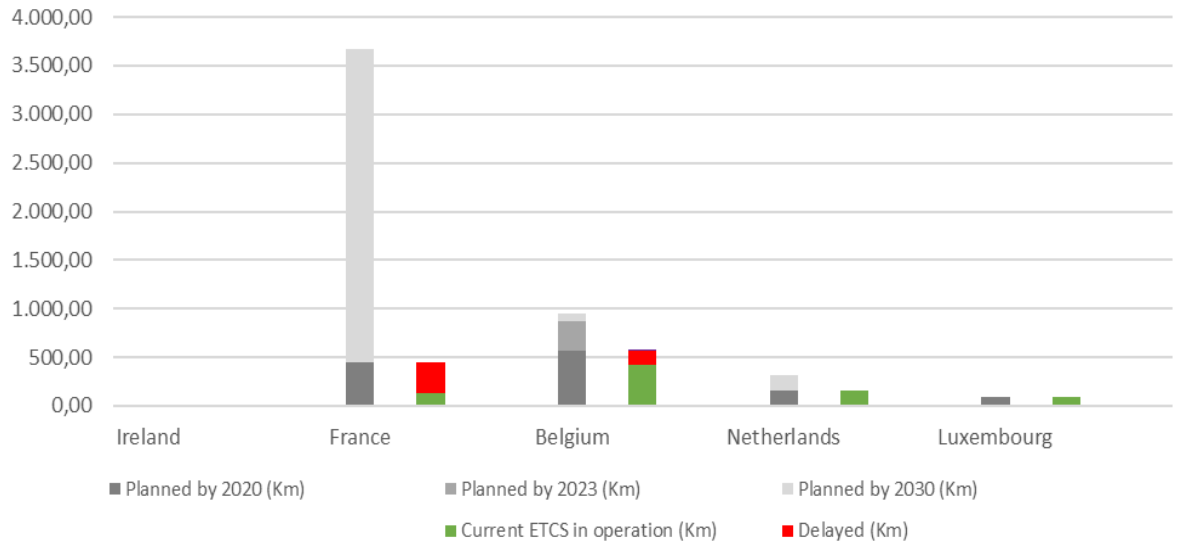


Figure 7: Deployment of ETCS on the NSMED Corridor



According to the national deployment plans, as of 2025 it should be possible to operate in a continuous manner with ERTMS from the ports on the North Sea to Basel via the NSMED, and beyond to Italy.

In Belgium, most of the NSMED lines are already in operation, including two cross-border sections, one with the Netherlands and one with Luxemburg. Although some sections planned in the EDP by 2023 will be delayed, the Belgian authorities still plan the entire Belgian network to be equipped by 2025.

There are two operational NSMED lines in France: the Rémilly – Strasbourg line (high-speed line) and Thionville – Luxembourg border line. According to the French plan, the Thionville – Metz – Strasbourg – Mulhouse – Basel conventional line, planned in the EDP by 2020, is delayed until 2025. When equipped, it will allow the continuous ERTMS connection from Benelux to Basel. Regarding sections scheduled in the EDP beyond 2023, the French plans do not suggest that those lines will be in operation by 2030.

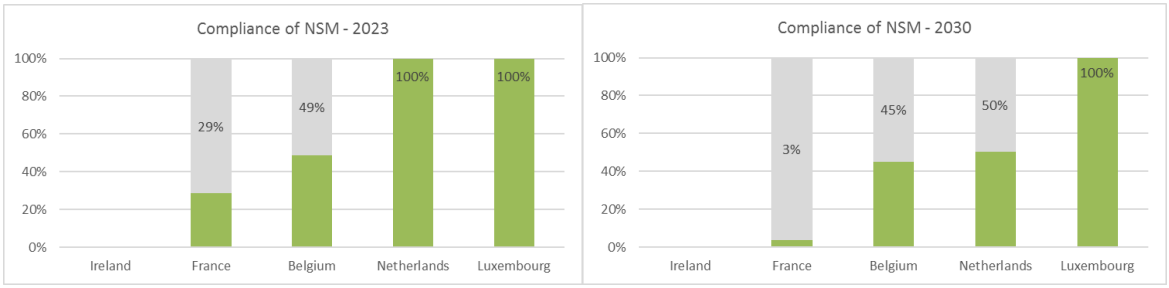
The entire Luxembourg network is already equipped.

The lines currently in operation in the Netherlands had been already commissioned when the EDP was published in 2017. According to the 2019 Dutch ERTMS programme decision, all remaining Dutch sections are planned by 2030, except for the Roosendaal – Vlissingen line.

The Irish network is exempt, but Irish authorities have plans to deploy Level 1 ETCS on the whole network by 2040. A GSM-R communication system is being rolled out to replace the existing analogue radio network by 2025.

Given the current deployment and considering that some Member States have notified delays in implementation, it will not be possible to meet the ERTMS EDP deadlines by 2023. The following graphs show the current status of ETCS deployment by Member States as a percentage of the 2023 and 2030 targets (Ireland is exempt from the obligation to deploy ERTMS).

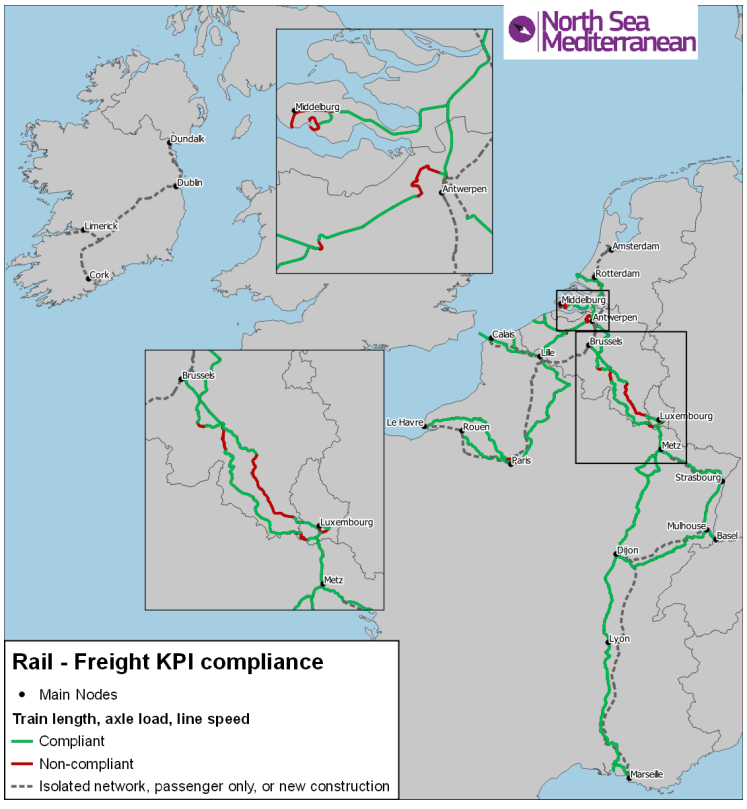
Figure 8: ERTMS Compliance 2023 and 2030



Rail freight requirements

Lines carrying freight trains are required to offer at least 100km/h line speed, 22.5 tonnes axle load and the possibility of running trains with a length of at least 740 metres by 2030.

Figure 9: Length, axle load and speed



Rail Freight Network

Rail Freight KPI	%
Line speed (>=100km/h)	96%
Axle load (>=22.5t)	99%
Train length (>=740m)	97%

(2021 Basis)

KPIs apply to all existing, non-isolated, conventional lines. They excludes high-speed lines, and new constructions.

Line speed and axle load are essentially fully compliant throughout the Corridor, with 96% and 99% of total network kilometres compliant respectively. However, the 740m train length requirement remains a challenge despite an equivalent compliance rate of 97%.

Speed limits below 100km/h affect around 173km on the Corridor, with the longest non-compliant section being the line between Motteville and Monterollier, north of Rouen. There are a number of shorter sections facing speed limits, especially in busy urban areas such as Antwerp, Paris or Namur, but also near the Luxembourg border with Belgium or the section leading to the Port of Vlissingen. Ireland is exempt from the requirement, but most of the Irish sections allow for speeds in excess of 100km/h.

For axle load, the Corridor is compliant on almost all sections (99%). In the Netherlands, the final section of the line into Vlissingen city allows for a 20t axle load. In France there is also a short non-compliant section between Calais Port and Fréthun. An additional concern that affects axle load in The Netherlands is the fact that the soil on which the train runs is getting more and more unstable due to climate effects (extreme drought or extreme rainfall).

The NSMED countries have all declared to allow 740m train length and the level of compliance is 97%. Additionally, France and Luxembourg have cleared a north-south axis (Luxembourg - Metz – Dijon - Marseille) permitting 850m trains. However, in practice, there are a few important operational restrictions[7] in Belgium and the Netherlands, where trains can be limited to 650m during peak (daytime) hours.

In Belgium, the section between Marloie and Arlon is currently limited to 700m train length excluding the locomotive (though the main line for freight trains is the parallel Athus-Meuse line). Except for this section, the length of freight trains can in principle reach 740m (including the locomotive). Yet, the infrastructure manager's agreement must always be sought for any train longer than 650m and restrictions apply. A study has recently been conducted by Infrabel and the investments needed to remove the operational restrictions are currently being examined. The goal of the Belgian authorities remains to reach full compliance by 2030.

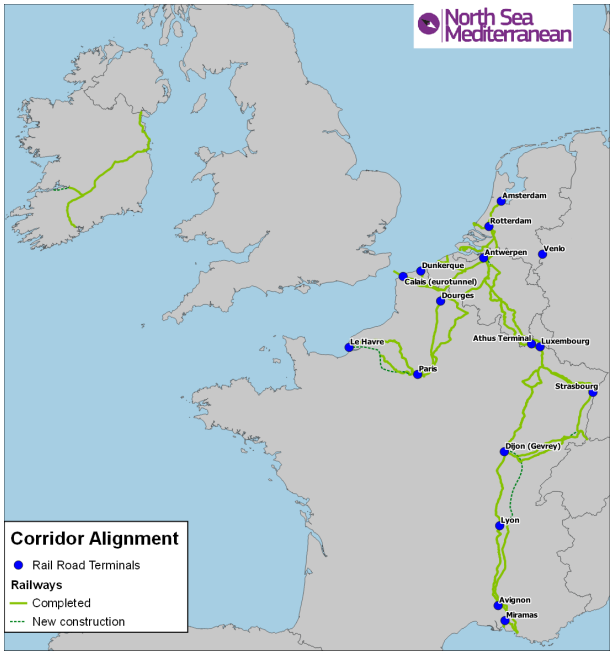
Likewise, the Dutch network is in principle suitable for running 740m trains. Yet, restrictions apply in practice. Sidings of sufficient length are lacking on certain routes, as indicated in the study Prorail carried out in 2019. On the NSMED, this mainly concerns the route Rotterdam – Venlo (Brabant route). The latter study therefore indicates that investments are needed to fully deploy the 740m train requirement. The follow-up is still ongoing, but the authorities doubt that the 2030 deadline to remove all restrictions can be met.

[7] Operational restrictions on train length are not indicated in the compliance map.

Rail Road terminals

The NSMED Corridor has seventeen TEN-T rail-road terminals (RRT) within the continental part of the Corridor.

Figure 10: Rail Road Terminals[8]



MS	Rail-road Terminal	Intermodal Capability	740m Train Access	Electric Access
BE	Antwerpen	●	●	●
BE	Athus	●	●	●
FR	Avignon	●	●	●
FR	Calais	●	●	●
FR	Dijon	●	●	●
FR	Dunkerque	●	●	●
FR	Le Havre	●	●	●
FR	Lille-Dourges	●	●	●
FR	Lyon	●	●	●
FR	Marseille/Fos Miramas	●	●	●
FR	Paris	●	●	●
FR	Strasbourg	●	●	●
LU	Luxemburg	●	●	●
NL	Amsterdam	●	●	●
NL	Rotterdam	●	●	●
NL	Venlo/Venray	●	●	●

In parallel to the modernisation of the railway network and the deployment of the TEN-T parameters, it is important to pay attention to multimodal terminals – which are an essential part of the rail freight system, without which no ambitious modal shift would be possible – in particular to their technical capabilities, as well as the need to develop additional terminal/transhipment capacity.[9]

As part of the corridor analysis, the following characteristics are monitored for the NSMED rail road terminals: intermodal capability (capacity for loading/unloading unit loads and transhipping them between modes), 740m train access and electrified train access. All terminals provide intermodal capability. A few terminals in France do not enable 740m train access, and Calais and Strasbourg do not have electrified access.

2.2.1.2 Missing links, capacity bottlenecks and traffic performance

There are five non-completed rail sections (missing links) in the Corridor, depicted in Figure 14:

- the reinstatement of the rail connection from Limerick to Foynes - ongoing, to be completed by 2030;

[8] The terminal capabilities (intermodal capability, 740m train access and electric access) have been analysed as corridor KPIs, but are not a requirement of the TEN-T Regulation.

[9] This is addressed by the Commission proposal for a revised TEN-T Regulation.

- the Antwerp bypass between Lier and the Port - ongoing;
- the new Paris-Le Havre line – sections to be started by 2030, but not completed before 2040;
- the second phase of the Eastern and Western branch of the Rhine-Rhône high-speed line (35km near Mulhouse, 15km Auxonne-Dijon) – not foreseen to be built by 2030;
- the Southern branch (Lyon-Dijon) of the Rhine-Rhône high-speed line – not to be built by 2030.

Deploying the TEN-T parameters and bridging missing links, while important, are not the sole infrastructure-related developments needed to boost rail. They will achieve capacity and productivity gains, but other functional and capacity bottlenecks will remain on the Corridor and removing them is equally as relevant for rail to absorb significant traffic increases.

Figure 11: EuroCap-Rail route (marked in yellow)

The cross-border rail link that remains to be completed in the Corridor is the so-called EuroCap-Rail route, initiated in the early 2000s and EU co-financed since 2006. It aims to modernise the Brussels–Luxembourg link, going further to Strasbourg, achieving a high-performance line connecting the three European capitals. It was already one of the 30 TEN-T priority projects defined in 2004. When completed, it will improve local, short-distance cross-border, national, and international traffic flows (potential for long-distance connections, e.g. from Benelux to Switzerland and Italy). Most remaining works are in Belgium ("axe 3"), where 190km are being upgraded: allowing line speed to increase to 160km/h, re-electrification of sections to 25 kV and various infrastructure upgrades. This also comprises building a third and a fourth track between Watermael and Ottignies, which is a component of the Brussels suburban rail network RER currently being implemented. The works in Belgium are expected to be completed between 2026 and 2029. In Luxembourg, the works on the Belgian border - Kleinbettingen line and on the axis Luxembourg – Bettembourg – French border (including the construction of a new line between Luxembourg and Bettembourg, as well as the transformation of the Bettembourg station and the construction of a new signal box), are to be concluded in 2026. In France, in addition to the Eastern high-speed line completed in 2016, improvements on the congested line between Metz and Luxembourg and in the node Strasbourg are necessary and ongoing/planned.

There are rail capacity bottlenecks around urban nodes, in particular in Lyon, Antwerp, Marseille, Brussels, Lille, Paris, Luxembourg, Amsterdam, Metz and Strasbourg. Ireland also faces traffic congestion in its largest nodes of Dublin and Cork and

enhancing their urban rail systems is part of the strategy to address it. Various projects are underway to address rail capacity constraints across the Corridor.

In Belgium, besides the works on the Brussels – Luxembourg axis, the construction of a 3rd and 4th track between Ghent and Bruges is ongoing, while the timeline for a 3rd track between Bruges and Zeebrugge is under discussion. Moreover, there are plans to remove level crossings on the Corridor, including an ongoing project to be finalised this year.

In France, the Lyon node is an essential crossing point of local, regional and long-distance passenger and freight traffic. The current saturation is expected to intensify in the future, notably with the opening of the Lyon-Turin link. A number of actions are ongoing or under planning to address this: while a new track has just been inaugurated at the Part-Dieu station, the long-term project studies the construction of additional 3rd and 4th tracks on sections within Lyon, the extension of the Part-Dieu station and the further development of the city bypass. Ambitious plans are also being implemented in and around Marseille (in particular the construction of an underground crossing of Marseille with a new underground station) and Strasbourg (e.g., 4th track between Vendenheim and Strasbourg), in addition to the improvements in Metz and on the line Metz-Luxembourg. The node of Lille is also close to saturation and measures to adapt the suburban rail system are currently under examination. Regarding the Southern Paris bypass, works are ongoing and are to be completed by 2028. Following the Southern bypass, a new high-speed station Orly - Pont de Rungis is planned between 2030 and 2035. In the north of Paris, a new 6 km link is going to be built by the 2025 horizon between Roissy Charles de Gaulle airport and the conventional line from Paris to Amiens and to Compiègne - Saint-Quentin. This will allow the airport to be directly reachable by train from the region Hauts-de-France and ease access to long-distance high-speed rail via the Roissy Charles de Gaulle airport station, which is a hub for high-speed services. In addition, the modernization of the Serqueux-Gisors line was commissioned in March 2021, providing an electrified alternative route for rail freight from and to the Port of Le Havre. To support rail freight from and to the Port of Marseille, the coast railway between Estaque and Miramas is planned to be upgraded (completion after 2030[10]), which will increase capacity and improve the connection between the Eastern and Western (Fos-sur-Mer) basins of the Port. Last but not least, France issued a Rail freight strategy in 2021, where the main goal is to double by 2030 the share of rail, from 9% to 18%, and to reach 25% by 2050.[11] The strategy includes several actions, in particular to develop rail terminals and to develop a network of rail motorways covering the whole country by 2030.

In Luxembourg, the enhancements needed are part of the EuroCap-Rail project and are described above.

In the Netherlands, to address capacity bottlenecks, the completion of the Venlo rail terminal in 2020 has been one important development, increasing the capacity and accessibility of the old terminal. Furthermore studies are ongoing to resolve remaining bottlenecks in Venlo. In addition, there is a set of railway upgrades taking place in the Amsterdam metropolitan area, including to increase capacity around Amsterdam Central station and the multimodal international passenger hub Amsterdam South (part of the Zuidasdok project).

[10] Section Estaque-Carry completed in 2021 and section Carry-Miramas foreseen after 2030.

[11] https://www.ecologie.gouv.fr/sites/default/files/210909_Strategie_developpement_fret_ferroviaire.pdf.

Ireland has launched the All-Island Strategic Rail Review, a study with an aim to unlock the potential of rail in Ireland, both for passengers and freight. This is an important development, the results of which are expected at the end of 2022 and will inform a new rail strategy for Ireland, enabling planning for future investments in Irish rail infrastructure and rolling stock. This is complementary to the existing Irish Rail Freight Strategy, which includes a plan to develop a network of intermodal freight facilities in collaboration with the freight and logistics industry, starting with strategic terminals to the west of Dublin and at Limerick Junction, extending over time with smaller tactical terminals in Cork, Galway and Sligo. In parallel, measures to alleviate traffic congestion around urban nodes are also ongoing. There has been a renewed investment programme in Dublin to make significant enhancements to public transport, such as the MetroLink project to connect the airport with the city centre by light rail (planning and design work are almost complete with an expected completion date by 2034) and the ongoing DART+ programme, which is planned to triple the length of the electrified commuter rail network in the Greater Dublin Area. In Cork, Ireland has been able to use funding from the EU Recovery and Resilience Fund to part-fund network capacity enhancements to Cork's commuter rail system (€185m of expenditure between 2022 and 2026). This is only the first phase of the investments needed to decarbonise and boost the use of rail in the Cork urban area.

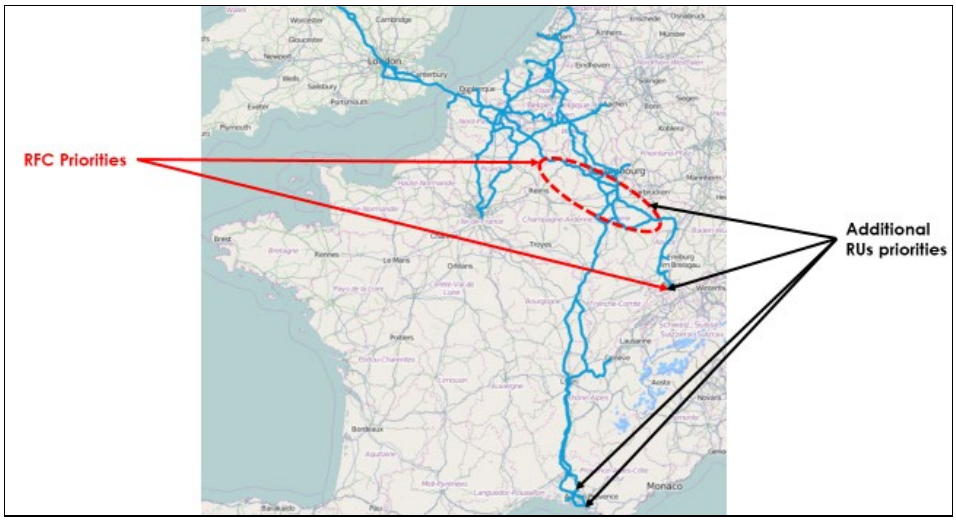
P400 Loading gauge

Although there is no minimum loading gauge (height and width parameters for freight wagons and trains) as TEN-T requirement, it does play a significant role in growing the market for combined transport. Under the current loading gauge situation on the network, the transport of maritime containers, typically from the major international gateway ports to and from logistics centres in the hinterland, is feasible along the NSMED Corridor. However, loading gauge restrictions, acting as a barrier for the transport of standard road trailers on rail wagons, have been identified. There is consensus in the market that greater potential for intermodal transport can be realised by enhancing infrastructure to allow rail services capable of carrying P400 (4 metre high) standard road trailers on pocket wagons of standard design (with standard 4-axle bogies).

P400 is considered to be the optimal target for the loading gauge profile, based on the fact that 4m is the usual height limit for road trailers in Europe. From the perspective of the combined road-rail operators, there is a strong incentive to develop services for standard, unmodified trailers, in order to serve the maximum possible market.

Along the NSMED Corridor, P400 loading gauge is currently feasible within the railway networks in Belgium, the Netherlands and Luxembourg, but there are issues in France, most notably between Metz and Strasbourg, creating an obstacle for the development of a P400 route along the NSMED Corridor towards Switzerland and Italy. Further loading gauge bottlenecks were identified close to Marseille.

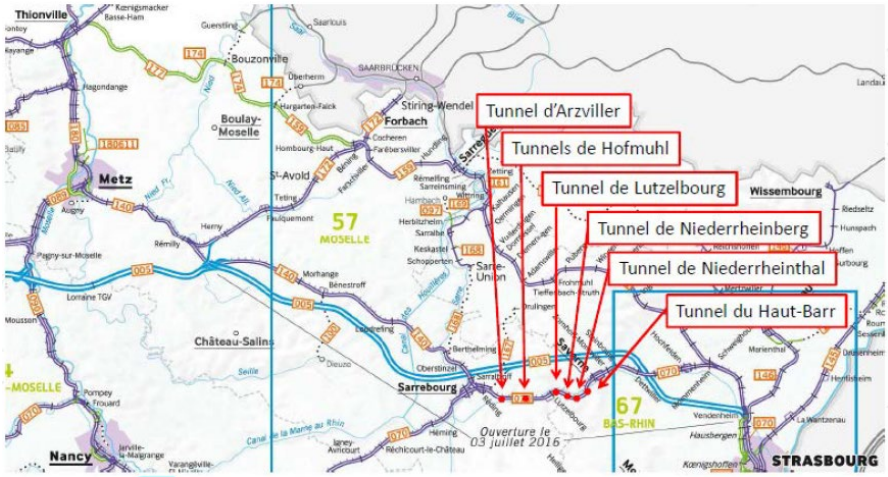
Figure 12: P400 loading gauge: NSMED overview



Source: RFC-NSMED Presentation, Corridor Forum 14.

Following investigations in France, works on six tunnels in the Vosges region (see map below) are required, as well as other enhancements on the Artère Nord-Est, in particular the Longuyon-Thionville section. This is complementary to the works needed in two tunnels in Basel[12].

Figure 13: Location of the tunnels between Metz and Strasbourg



Source: RFC North Sea- Mediterranean.

This is an ongoing topic at the centre of discussions in the Rail Freight Corridor governance since several years. Following an analysis by SNCF Réseau (in the framework of the French COOPERE) as well as an analysis performed by the rail

[12] Tunnel of Kannenfeld, tunnel of Schutzenmatt.

operators, progress is being made: detailed studies for enhancing the profile of the tunnels between Metz and Strasbourg are about to be launched by SNCF Réseau, with EU funding.

Operational barriers

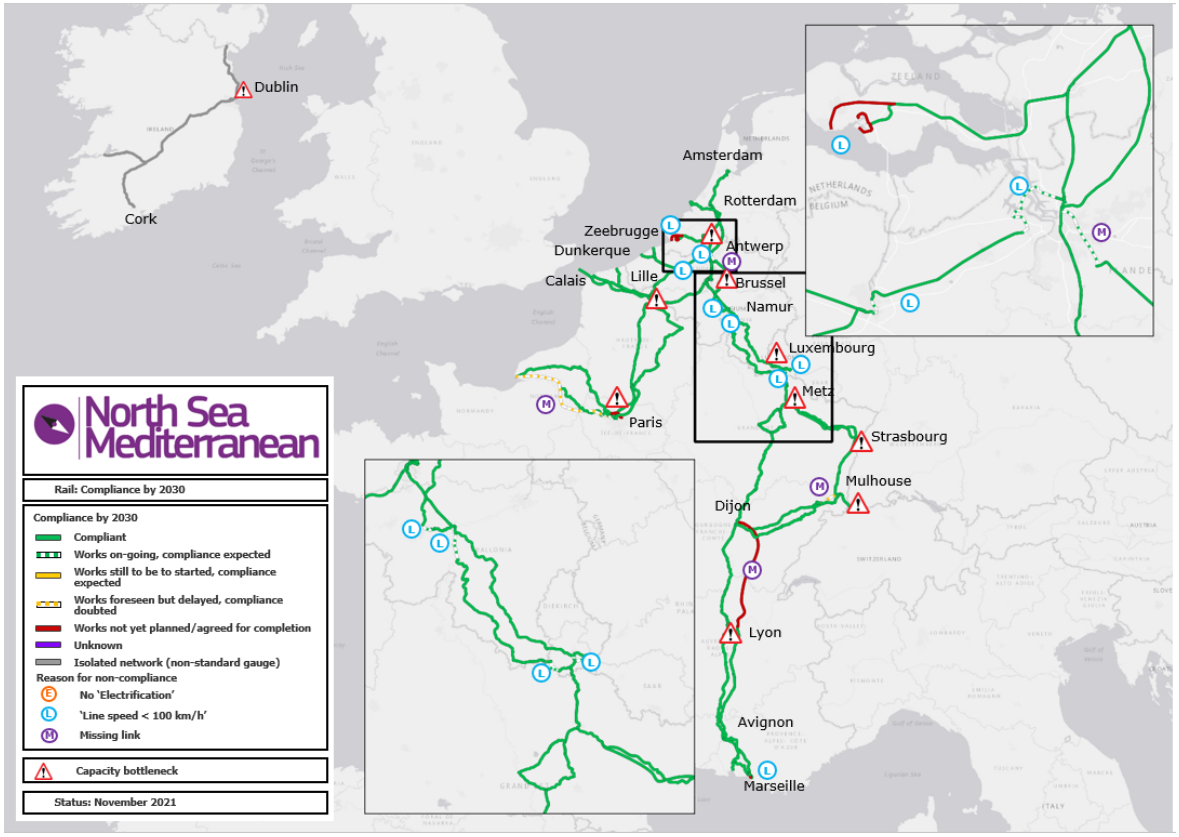
Operational barriers preventing trains to cross borders smoothly and efficiently remain. Historically founded interoperability issues between the national rail networks are one cause (e.g., differences in voltages, in signalling and safety systems). But there are also factors that are non-infrastructural in nature, such as the provision of enough high-quality paths coordinated across borders, digitization of processes, language requirements, coordination of traffic management, coordination of maintenance and construction works administrative and technical barriers or reliable exchange of real-time information. Eliminating operational barriers is therefore necessary to the development of rail freight services that are of quality, resource-efficient, reliable, punctual and competitive. It is also a prerequisite for reaping all the benefits from investments in infrastructure. Moreover, operational measures can generally be implemented much faster than large infrastructure projects.

In this area, the Rail Freight Corridor has an important role to play to achieve progress, by highlighting issues faced by the stakeholders and creating awareness on a national and European level. In some cases, the Rail Freight Corridor can also work directly on the field with the stakeholders to achieve best practices and to contribute solving issues, e.g., in the framework of dedicated working groups. Complementarily, operational bottlenecks are being identified and assessed in the context of the Interoperability Issues Log Book (ILB). With involvement of the infrastructure managers and other rail stakeholders, the goal is to define mitigation measures to identified barriers.

2.2.1.3 Expected railway compliance by 2030

Taking into account the above, the map below indicates the expected situation regarding completion of the Corridor railway network by 2030, with respect to three parameters (line speed, gauge and electrification), completion of the missing links and capacity bottlenecks.

Figure 14: Rail compliance by 2030 overview [13]



By 2030, it is expected that the majority of issues related to line speed will be solved, but full compliance on train length is still uncertain in the Netherlands and in Belgium and, as shown on the map, several capacity bottlenecks around urban nodes will subsist.

According to current plans, in particular the French law "Loi d'orientation des mobilités", the 2nd phase of the Eastern branch and the Western branch as well as the Southern branch (Dijon-Lyon) of the high-speed line Rhine-Rhône are not foreseen to be built by 2030. The completion of the modernization of the line Paris - Normandie is not foreseen to be completed by 2030 (in particular, works on the Paris – Mantes section are meant to be launched by the 2030 horizon, while works on the other sections beyond Rouen and between Mantes and Evreux will start in 2030.

In addition, P400 loading gauge restrictions in France are not expected to be solved by 2030, despite detailed studies concerning the eastern part of the Corridor about to be launched. Regarding ERTMS, according to information known today, ERTMS deployment by 2030 will be generally achieved, except for the French lines planned in the EDP beyond 2023 and the Dutch line from Roosendaal to Vlissingen.

[13] Isolated network is indicated in grey colour.

2.2.2 Inland Waterways

In accordance with Article 15 of the TEN-T Guidelines, inland waterways are required to offer capacity for CEMT class IV or higher vessels, allowing at least 2.5 metres water depth, and 5.25 metres minimum overhead clearance. River Information Systems (RIS) should be provided and good navigational status should be maintained.

Overall, the NSMED waterway network is steadily moving towards full compliance with the TEN-T parameters, with more than 90% of the Corridor being compliant.

Table 1: Inland Waterway KPIs – Share of Compliant Km per Member State (2021)[14]

Inland waterway KPI	BE	FR	LU	NL	All
CEMT Class IV	99%	98%	100%	100%	99%
Permissible Draught (min 2.5m) %	93%	99%	100%	99%	97%
Permissible Height under bridges (min 5.25m)	85%	93%	100%	100%	92%
RIS Implementation	100%	99%	100%	100%	100%

2021 Basis: indicates the proportion of corridor km meeting the criterion.

Regarding CEMT Class IV, only 40km of existing infrastructure remains non-compliant, mainly located in Belgium and France. The Corridor is almost compliant for permissible draught (97%), with 106km not compliant, including 71.5km in Belgium on the Boven Zeeschelde, (which is tidal) and on the Dorsale Wallonne, including the Condé-Pommeroeul (due to sedimentation). The main remaining issue relates to bridge height, with a total of 269km of waterway sections being non-compliant in Belgium and France (for example bridges near Brussels, Mons, Bocholt, Avignon, Nancy and on the Petite Seine). Navigational problems can occur under conditions of high water along the Seine in Paris due to the height of certain bridges.

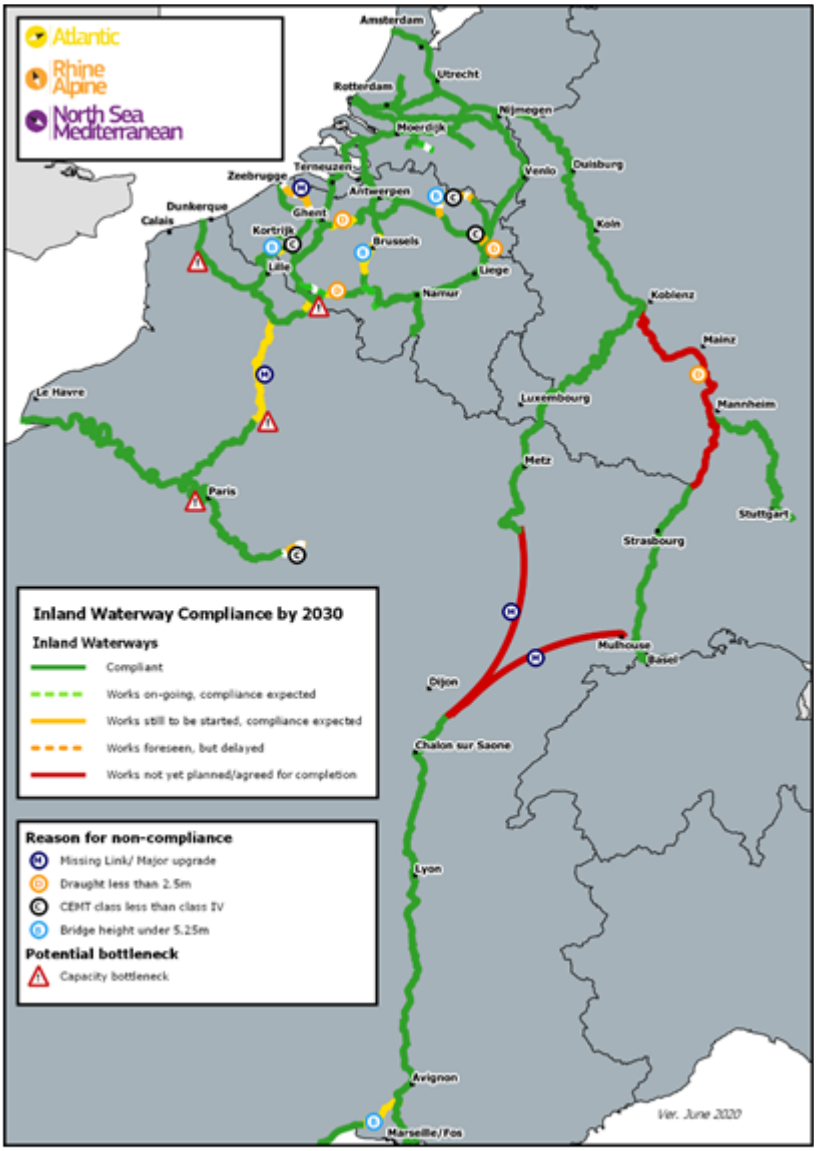
Regarding RIS, there is only one minor exception close to the Port of Fos (the section is directly managed by the Port). However, discrepancies still exists between the national systems. RIS has helped to standardise practices within the EU, but not to the full extent possible.[15]

The map below indicates the expected situation regarding compliance and completion of the inland waterway network by 2030.

[14] Based on the infrastructure in operation (excluding the future canal Seine-Nord Europe and other new constructions).

[15] "Study supporting the evaluation of Directive 2005/44/EC on Harmonised River Information Services (RIS)", 2020.

Figure 15: Inland Waterway compliance by 2030



Several of the issues related to CEMT Class IV and depth issues in Belgium and France are currently being addressed as part of the Seine-Scheldt, and by 2030 most of them are expected to be solved. In addition, the TEN-T Regulation foresees the construction of four canals by 2030: the Seine-Nord Europe canal, a new canal bypassing Brugge between Ghent and Zeebrugge, as well as the Saône-Rhine and Saône-Moselle canals. The two latter missing connections in Eastern France will not be built by 2030. The Seine-Nord Europe canal is planned to be completed by 2030. The canal between Ghent and Zeebrugge bypassing Brugge is under study and is expected to be completed only after 2030. However, the inland waterway connection to Zeebrugge will be improved in the short to mid-term through an upgrade of the existing waterways as well as through the facilitation of the navigation of estuary vessels via the Western Scheldt River.

Although the Corridor is close to full compliance for CEMT Class IV, one of the aims of the Work Plan is to develop efficient high-capacity waterways, of CEMT Class V or higher and with higher bridge heights on certain itineraries, generally to allow for 3

layers of containers, in some cases even 4 layers. This is needed to be competitive with other transport modes. Moreover to maintain the depth with the increasing drought periods is a challenge.

Table 2: NSMED Corridor Specific parameters – Share of Km per Member State (2021)

Specific parameters	BE	FR	LU	NL	%
CEMT Class V or higher	63%	89%	100%	93%	83%
CEMT Class VI	34%	4%		62%	20%
Bridge height up to 7m	54%	27%	31%	96	51%
Bridge height up to 9.1m	22%	10%	0%	79%	30%

2021 Basis: indicates the proportion of corridor km meeting the criterion

In general, the Corridor waterways are already exceeding TEN-T requirements: currently, 83% of the Corridor waterways achieves CEMT Class V class or higher and around half (51%) offers 7m bridge clearance allowing three container layers and 30% goes above 9.1m[16].

This objective of a CEMT class Va/Vb is the background to the Seine-Scheldt project[17], for which the Implementing Decision[18] lists the upgrades and constructions to be realised per section, along with an implementation timetable. It will open up high capacity routes, linking the Seine basin to the Scheldt basin, and onwards to the Maas and Rhine basins. In addition to investments in physical infrastructure (e.g., waterway dredging and widening, bridge-lifting, lock modernisation, environmental measures). The project foresees the co-ordinated deployment of alternative fuels, RIS, as well as the development of multimodal platforms. The central component is the construction of the 107km long Seine-Nord Europe canal, which will be CEMT class Vb and will offer a minimum height of 7 metres at maximum water level. The implementation of this package in a coordinated way, supported by strong cooperation of the parties in the framework of a governance made of an Intergovernmental Commission (CIG) and an EEIG, will enable a set of network benefits to be realised from 2030.

[16] A ship carrying two layers of containers requires 5.25m clearance. Three layers require 7.0m, and four layers require 9.1m.

[17] www.seine-scheldt.eu.

[18] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32019D1118.

Figure 16: Seine-Scheldt project

Decisive milestones have been achieved for the Seine-Nord canal. In the follow up of the financing agreement end of 2019, the teams of the company in charge of the construction, SCSNE, have now reached full operational capacity; for the first sector, the environmental authorization was obtained in 2021, some contracts have been awarded and preparatory works have started; for the other sectors, the environmental authorization file was submitted in March 2022 and public consultation on the canal bridge of more than 1.3km, which will be a technical challenge and unique in Europe, has been launched. Regarding the complementary widening of the gauge on the Oise between Creil and Compiègne (MAGEO), preparatory steps are right on track and the goal is a simultaneous entry into service with the Seine-Nord canal. In parallel, upgrades (such as the modernization of locks and implementation of remote management) on the lower Seine, the upper Seine and on the axis Dunkerque-Scheldt, are ongoing. The completion of the upgrade between Bray-sur-Seine and Nogent-sur-Seine on the upper Seine is expected in 2032. The reopening of the cross-border Condé-Pommeroeul canal is slightly delayed (due to a protected species onsite) but should take place by mid-2023.

In parallel, the recalibration of the upper Scheldt to Class Va is completed, notably with the removal of the bottleneck in Tournai inaugurated in January 2020. In the follow-up of already completed infrastructure, such as the Harelbeke and Sint-Baafs-Vijve locks, the recalibration of the Lys to Class Vb, including all locks, is to be completed mid-2023. Moreover, progress is being made on the Lys section jointly managed by Belgium and France (Lys mitoyenne), while the related convention between France and Belgium has been ratified in July 2021. In complementarity with the Seine-Scheldt project, the new Terneuzen lock, which will open in 2023, will improve inland waterway traffic from the Western Scheldt to Ghent and further to the Lys/upper Scheldt.

Modernizations and investments are necessary on other parts of the Belgian and Dutch networks to increase capacity or ensure good navigability, as well as to better integrate the Seine-Scheldt network towards the Maas and the Rhine basins. In Belgium we can mention the continuation of the lifting of the bridges along the Albert canal (final stage), which will allow for 4 container layers, or the works along the Maas which is being upgraded Class Vb/VIb (the capacity increase of the Ampsin-Neuville lock should be completed in 2023. In the Netherlands, there are also major upgrades which are ongoing. The upgrade of the IJmuiden lock and Beatrix lock is completed and works are progressing on the Maas, the River Waal, and also the Terneuzen lock. On the cross-border Canal Gent-Terneuzen the Vessel Traffic Services are being significantly improved, with a view to accommodate an expected increase from currently 60.000 vessel movements per year to more than 85.000 by 2040. Furthermore, a study is preparing a multimodal infrastructure agenda to upgrade the Rhine-Scheldt connection Amsterdam-Rotterdam-Antwerp.

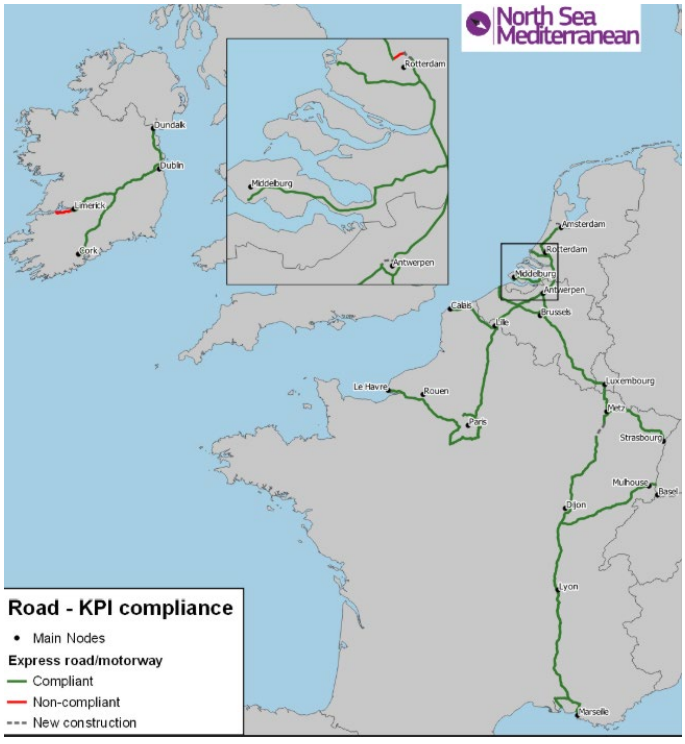
In France, the Marseille-Rhône-Saône axis benefits from a wide-gauge waterway infrastructure up to close to Dijon, serving Marseille (Port of Fos), Lyon and several cities and inland ports along the way. However, it still has a low share of river freight traffic. For example, the hinterland transport modal share of the largest French

maritime Port (Marseille Fos) to the Rhône River is of around 7%. With large unused capacity, the prospects for traffic growth are significant, with a potential doubling at the 2030 horizon, both for traditional sectors (construction materials, agri-food, energy, etc.) and for specific sectors (heavy parcels, ultimate waste, urban logistics, circular economy, hazardous materials). At the Port of Fos, the river traffic could reasonably reach 9 million tons in 2030, i.e., a 50% growth and a tripling of the share of river containers. Finally, climate change has been testing the resilience of the Corridor waterways and challenging the maintenance of good navigation. The drought periods have been posing issues, creating transport restrictions and supply chain disruptions. There are initiatives to address this problem. For example, the Netherlands is initiating a series of climate change adaptation measures in order to prepare for periods of low water. This drought package is an example of a set of interventions meant to improve waterways in terms of their robustness, sustainability and climate adaptation. It consists of measures such as increasing the capacity of locks, also for a more flexible and sustainable network function, so that they ensure good navigability (i.e. ensuring that the water depth criteria are met throughout the year, including periods of drought and low water) - e.g. at Grave and Weurt on the River Maas. Similar initiatives are adopted for Belgium, where water-powered pumping stations have been built along locks of the Albert canal, to be used to overcome low water during dry periods, and capable of generating electricity.

2.2.3 Road

For road, the TEN-T guidelines focus on achieving either motorway or express-way standards, as well as the provision of safe and secure parking, and the availability of alternative clean fuels.

Figure 17: Road network characteristics, 2021



Road Network

Key Performance Indicators

Road Network KPI	%
Express road/ motorway	99%
Availability of alternative clean fuels	100%

(2021 Basis)

Only two sections are classified as non-motorway or expressway:

- The N69 between Limerick and Foynes, which is a mainly single-carriageway road with open junction. This will be addressed by 2030 through the construction of a new section.
- The N209 close to Rotterdam-The Hague Airport, which is also a single-carriageway road. The upgrading of this section to a motorway is part of the ongoing construction of the A16 bypass, which will be ready in 2025.

Safe and Secure Parking

TEN-T requires the development of rest areas on motorways approximately every 100 km with an appropriate level of safety and security. In 2022, the EU adopted a Commission Delegated Act supplementing Regulation (EC) N°561/2006 which sets out the minimum level of service which safe and secure parking areas need to offer to professional drivers and the procedures for their certification, as an outcome of the Commission study done in 2019[19].

Figure 18: Road network - Safe Truck Parking[20]

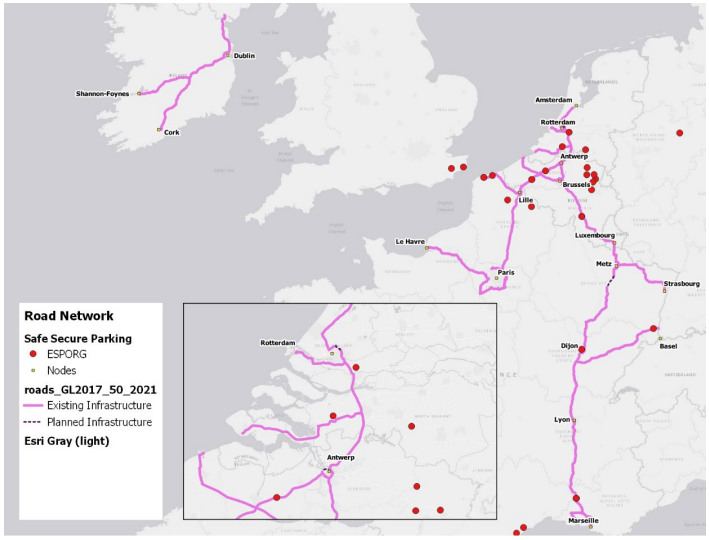


Figure 18 shows the number of certified sites. Considering the two conditions to be met, the Netherlands and Belgium are compliant, France is partially compliant and Ireland and Luxembourg are not compliant. In general, there are shortages in terms of number of facilities and the capacity they offer. However, progress is being made, especially in the central part of the Corridor between Calais, Brussels, Antwerp, and the south of the Netherlands.

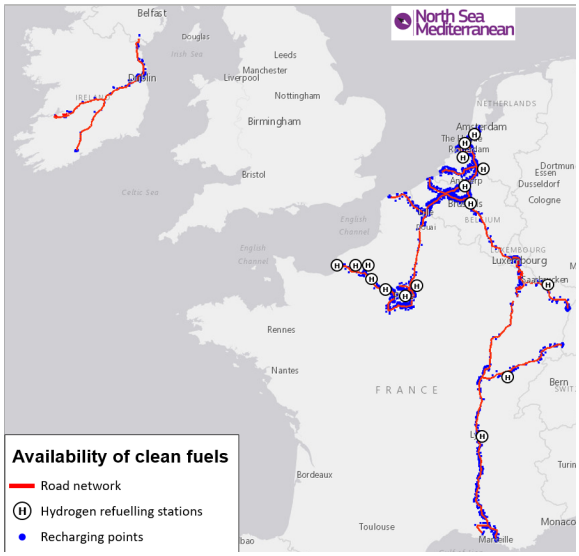
Availability of alternative clean fuels

TEN-T requires alternative clean fuels to be made available across the network for road transport, backed up by the 2014 Alternative Fuels Infrastructure Directive (AFID), the Green Deal, the SSMS and the forthcoming Alternative Fuels Infrastructure Regulation (AFIR).

[19] Commission Study on safe and secure parking places for trucks (2019). Available at: https://sstpa.eu-study.eu/download/19/final-report/1188/final-report-sstpa-28022019-isbn.pdf

[20] The map shows the ESPORG list of sites which have either achieved certification or which are applying (status 2019).

Figure 19: Electric recharging (blue dots) and hydrogen refuelling stations (H symbol)



The roll-out of a sufficiently dense, widespread network of alternative fuels infrastructure is one important element of the transition to low- and zero-emission alternative fuels. However, interoperability issues need to be considered and attention must be paid to developing long distance routes in combination with clusters near urban areas. The current situation (2021) for electric charging and hydrogen refuelling stations is shown in Figure 19 . Table 3 presents the ratio of the number of vehicles per station[21].

Source: TENtec, 2022.

Table 3: Hydrogen refuelling and electric charging infrastructure available – vehicles per station (2021)

Scope	BE	FR	IE	LU	NL
Electric charging infrastructure (BEV per station)	4	14	14	5	3
H2 refuelling infrastructure (fuel cell all types of vehicle per station)	45	134			72

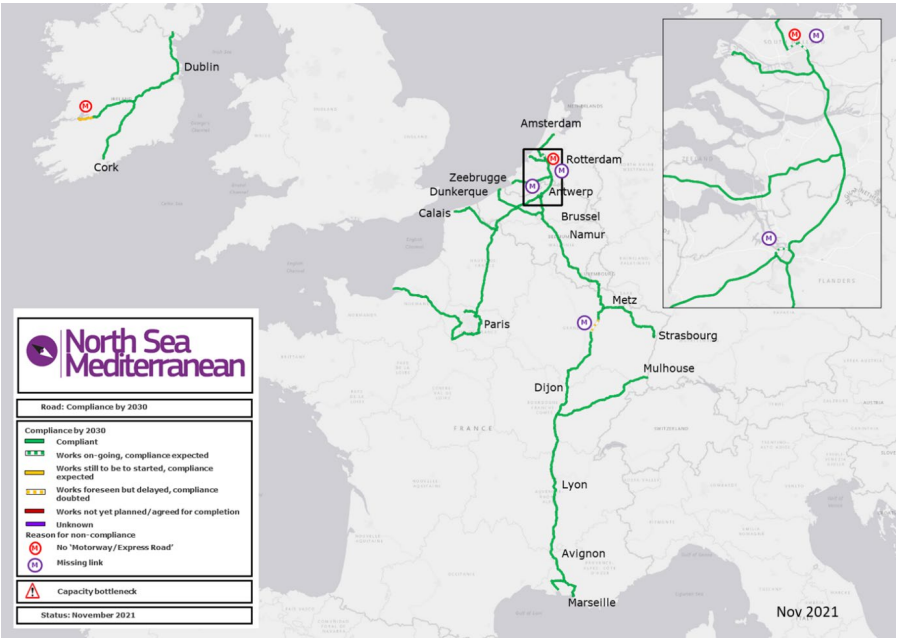
2021 Basis, Source: EAFO (data from 2021)

Availability of alternative clean fuels has increased substantially across the Corridor in the last years. There are now over 140,000 public electric recharging points within the five Member States, with over 850,000 vehicles registered (fully electric), being the largest category of alternative clean fuel, both in terms of infrastructure and vehicle stock. In addition, there are fairly widespread supplies of CNG, and to a lesser extent LNG. For hydrogen, both infrastructure and vehicle stocks are very low, but new clusters are appearing (e.g., between Paris and Le Havre), and fuel cell vehicle stocks are starting to grow.

[21] The data shows the number of registered vehicles in a Member State divided by the number of recharging/refuelling points publicly available, according to EAFO definitions. The higher the number of vehicles per station is, the higher is the need to increase the number of points.

Missing links and capacity bottlenecks

Figure 20: Road compliance by 2030



As shown on the 2030 compliance map above, the NSMED road network has three missing links:

- The A31 Bypass around Nancy (Dijon-Metz section). There is a project foreseen to relieve traffic on the Toul-Nancy-Metz-Luxembourg axis, however this is not expected to be built before 2030.
- The A16-A13 bypass around Rotterdam (Rotterdam node). It will be completed before 2030.
- The north-west section of the R1 Oosterweel ring-road in Antwerp. It will be completed by 2030.

The construction of missing links addresses road congestion in given areas, but congestion needs to be tackled further, in particular around urban areas. Cork, Amsterdam, Rotterdam, Antwerp, Brussels, the Luxembourg-Metz stretch, Paris, Strasbourg, Lille, Lyon and Marseille can be mentioned. A significant share of the projects of the NSMED project list (amounting to €24 bn) addresses road congestion issues in urban nodes through road modernisations and improvements.

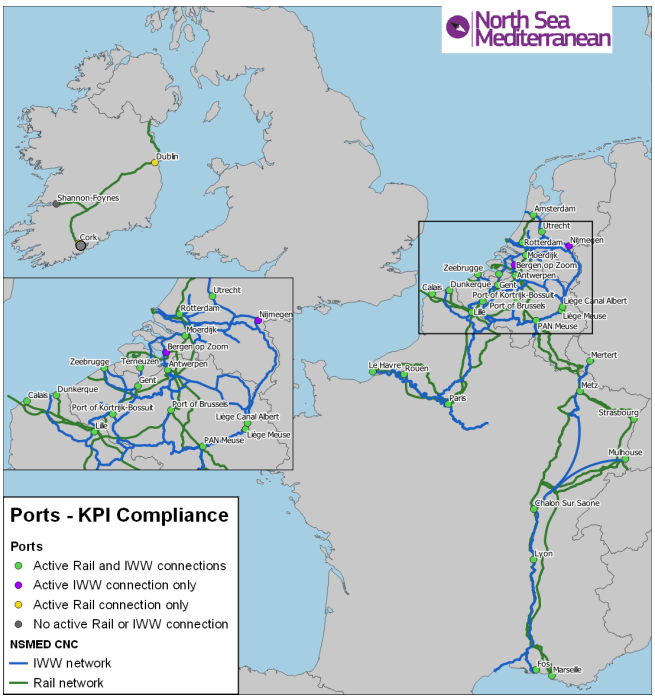
Intelligent Transport Systems (ITS) deployment

ITS refers to the use of electronics, information processing and communications technologies to deliver transport improvements. They are relevant to improve safety, interoperability, network management and to reduce traffic congestion and emissions. Across the Corridor there are a few projects deploying ITS. An example are the C-ROADS platform pilots, involving Belgium, France and Ireland, that have been and are testing the deployment of Cooperative Intelligent Transport Systems (C-ITS) services. Another example is the now concluded ITS project Arc-Atlantique III, covering NSMED and Atlantic Corridors, focused on improving real-time traffic information services and cross-border traffic management, as well as on creating national access points.

2.2.4 Ports

The table presents maritime and inland ports TEN-T characteristics.

Figure 21: Port characteristics



Maritime Ports:

Maritime Port KPI	%
Connection to rail	88%
Connection to IWW CEMT IV	100%
Availability of alternative clean fuels[22]	69%
Facilities for ship generated waste	100%

Inland Ports:

Inland Port KPI	%
Class IV waterway connection	100%
Connection to rail	100%
Availability of alternative clean fuels[23]	29%
Facilities for ship generated waste	100%

2021 basis. KPIs apply to all corridor maritime and inland ports.

Maritime ports

The Corridor includes three of the top 5 seaports in Europe, Rotterdam, Antwerp-Bruges[24]and Amsterdam - both in terms of tonnes and containers handled - along with

[22] The TEN-T Regulation does not distinguish between different types of alternative fuels. Neither does it define the term availability. Therefore the notion "available" does not necessarily mean that the demand for a particular type of alternative fuel is met.

[23] The TEN-T Regulation does not distinguish between different types of alternative fuels. Neither does it define the term availability. Therefore the notion "available" does not necessarily mean that the demand for a particular type of alternative fuel is met.

[24] As of 22/04/2022, the Port of Antwerp and the Port of Zeebrugge are merged.

other major ports on the continent such as Marseille, Le Havre, Dunkerque, Zeebrugge and North Sea Port. The ports of the North Sea - Mediterranean Corridor provide the greatest concentration of port capacity and traffic in Europe, with hinterlands extending into Western, Southern, Central and Eastern Europe, and forelands that encompass the whole of the rest of the world. These ports have extensive rail and waterway networks linking them to their hinterlands. The Corridor includes the three most important Irish ports: Dublin, Cork and Shannon Foynes. The RORO ports on the Channel and North Sea coast provide important short sea connections to Ireland.

Following Article 41 of the TEN-T Guidelines, maritime ports in the core network are required to be connected with both rail and waterway by 2030 (provided there are no physical constraints). Additionally, ports need to offer alternative clean fuels and waste reception facilities.

With respect to rail connectivity, all of the continental ports offer an active rail connection. In Ireland, however, the ports of Shannon Foynes and Cork do not offer an active rail connection. Re-establishing rail connections to Shannon Foynes Port and Marino Point in the Port of Cork are key elements of Iarnród Éireann's Rail Freight Strategy. Studies are ongoing to reinstate a rail connection to Shannon-Foynes, which is to be completed before 2030. As for Marino Point in Cork, it sits alongside the active Cobh to Cork railway line and Iarnród Eireann plans to reinstate the rail connection for freight to allow for the movement of bulk commodities by rail to and from the port. Its reinstatement by 2030 is considered as part of a broader redevelopment project. While new deep water berths have been developed at Ringaskiddy in Cork, along with road connections, there are no existing plans to connect the new container terminal to the rail network.

With respect to waterway access, all non-exempt maritime ports have the required connection of CEMT class IV or higher. Calais is accessed via the CEMT class I Calais-St-Omer canal (this waterway is not part of the TEN-T network) and given the traffic profile of the port, which is mainly trucks and cars from the UK, there is no case for upgrade. Marseille, the Eastern part of the Marseille/Fos Port area, does not have direct inland waterway access, but logistics activities mainly take place in Fos-sur-Mer, which has access to the Rhône. There is a project ongoing to develop the sea-river port from Fos to Lyon. Zeebrugge has a compliant class IV connection but its capacity between the port and Ghent will be increased as part of the Seine-Scheldt project, to reach at least CEMT class Va.

There are, however, rail or waterway capacity shortages and/or a need to modernize infrastructure in and around certain ports. For instance, building a second rail freight access to the Port of Antwerp is a priority. The Port of Zeebrugge will develop its railway infrastructure and build new tracks. For the cross-border North Sea Port, improving the rail connection between Ghent and Terneuzen has been the subject of a feasibility study and the implementation of the project has now the support of both Belgium and the Netherlands. The rail freight access to the Port of Rotterdam has been improved with the Theemswegtracé railway section and several works are being prepared to alleviate congestion of inland waterways and rail through an overflow hub.

In parallel, there is a major investment being carried out to improve maritime and inland waterway access at Terneuzen through a new lock, which is to open in 2023. Moreover, infrastructure upgrades to allow 740m trains are foreseen for the Belgian and Dutch seaports.

Only 69% of the seaports offer alternative clean fuels.

As for port capacity, most NSMED ports have developed mid- to long-term plans to increase port capacity. For example, in Ireland, the Port of Cork has increased its capacity with the opening of the Ringaskiddy Container Terminal, the Port of Dublin has an on-going project to increase its capacity for unit load traffic (Alexandra Basin Redevelopment Project) and Shannon-Foynes plans additional capacity to cater for

new traffic. Other examples are Dunkerque, which has a major project to increase handling capacities, or the new Port of Calais, inaugurated in September 2021. In addition, there is a general effort being undertaken by the Channel ports to meet the challenges posed by Brexit, for example by expanding the waiting areas for RORO traffic. The HAROPA Port strategy plan up to 2025 also foresees the rehabilitation and development of port areas and, this year, the Port of Antwerp and the Port of Zeebrugge agreed to merge, with a development strategy focused on containers, breakbulk, RoRo traffic and chemicals. The Port of Rotterdam is planning to upgrade combined transport facilities, which currently have almost reached their maximum handling capacity.

Inland ports

With the most extensive network of inland waterways, the NSMED Corridor also has the most extensive network of inland ports.

According to Article 15 of the TEN-T Guidelines, inland ports should be connected with the road or rail infrastructure. Even if not formally required, the rail connection is an important TEN-T parameter. As for maritime ports, inland ports need to offer alternative clean fuels and waste reception facilities.

Currently, 26 of the 28 inland ports in the Corridor have a rail connection to the port, all have CEMT Class IV waterway connections (or higher). Bergen-op-Zoom and Nijmegen have no freight rail connection, but the latter has a rail freight terminal (Park15) on the opposite side of the River Waal.

Only 29% of the inland ports offer alternative clean fuels (all inland ports offering clean fuels are also maritime ports).

Availability of alternative clean fuels

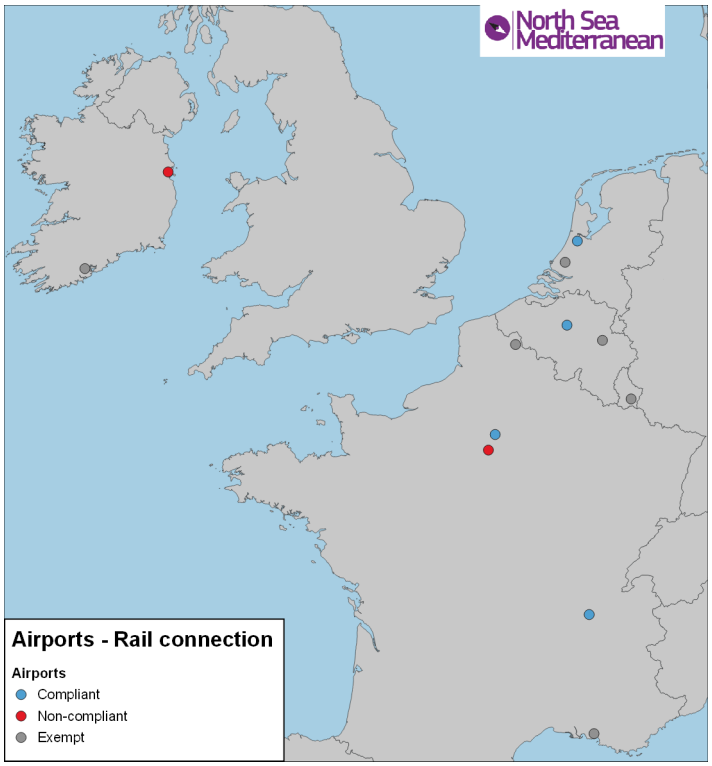
When considering the availability of alternative clean fuels, there is no clear definition about what availability means; if it has to be via fixed or mobile facilities. As mentioned, 69% and 29% of the maritime and inland ports, respectively, offer any type of alternative clean fuels for shipping (e.g., CNG, (bio) LNG, onshore electricity, hydrogen). If the availability of e.g., (bio) LNG bunkering ships was considered, the percentages would go up.

Regarding the production or storage of alternative clean fuels inside the ports, there are initiatives underway, in Dunkerque, Antwerp, Zeebrugge, Amsterdam, North Sea Port, Rotterdam and Marseille, to develop hydrogen production and storage facilities, including green hydrogen. In Ireland, there are plans for significant future development of the offshore wind sector and this may provide opportunities for some of the ports to develop the production of alternative fuels, such as hydrogen based on a relatively low-cost source of zero carbon electricity.

2.2.5 Airports

The "main" TEN-T airports, following Article 41 of the TEN-T Guidelines, are required to have rail connections by 2050, except where there are physical constraints. In general, to promote air-rail connectivity, TEN-T airports should be integrated into the rail network wherever possible. Additionally, airports are required to make available alternative clean fuels.

Figure 22: Airports - Rail Connection



As depicted in Figure 22, out of a total of twelve airports, six are exempt (grey colour – none of them has a connection to rail), four are compliant (Amsterdam, Brussels, Paris CDG and Lyon St-Exupéry) and two are considered non-compliant:

- Paris-Orly has a light rail connection of limited capacity. The extension of the metro line 14 to Orly airport, for which works are ongoing and are to be finished in 2024, will connect the airport to the new rail station Pont de Rungis. The new high speed station will not be directly located in the airport.

- Dublin airport has no rail connection yet, but a light rail connection, which will interchange with the existing light and heavy rail networks in Dublin city centre, MetroLink, is under development. It is expected to be completed by 2034.

To address capacity constraints, Amsterdam airport Schiphol is increasing public transport access by providing new metro connections and railway solutions (Airport Sprinter).

The use of alternatives to conventional aviation fuels is still in its infancy, and currently policy is directed towards the use of sustainable aviation fuel (SAF), in practice blended biofuels, as well as schemes for offsetting CO2 emissions. This is supported by the "ReFuelEU" Aviation initiative launched in 2020, which also sets minimum targets for the proportion of SAF mixed with fossil fuels as a way to initiate the transition.

2.2.6 Summary by Member State

The North Sea - Mediterranean Corridor has made important progress since 2014. The following section presents a short summary, per Member State, of the above detailed analysis. It highlights evolution of progress over time, whenever applicable, and the important issues still to be addressed.

2.2.6.1 Belgium

The TEN-T network in Belgium is largely compliant and the remaining issues are being resolved. Progress has been observed on rail (electrification, ERTMS and 740m train length, rail connections to seaports, capacity increases), inland waterways (upgrades completed or progressing - on the Seine-Scheldt network but also outside - as well as RIS implementation) and road (availability of clean fuels charging/refuelling infrastructure, removal of capacity bottlenecks). However, a few issues are still present.

Regarding rail, further investments are needed for the full implementation of the 740m trains requirement, but according to the Belgian plans the 2030 deadline should be respected. Moreover, most remaining works in the context of EuroCap-Rail, a key cross-border project of the Corridor aiming to modernise the link from Brussels to Luxembourg and Strasbourg, has to be carried out on Belgian territory.
The inland waterway network is not yet fully compliant with respect to either CEMT class, water draught, or bridge height but many of these issues are currently being addressed as part of the Seine-Scheldt project and are to be completed by 2030. Several other infrastructure investments outside the Seine-Scheldt project are also being made to modernize the network and address capacity constraints, in particular along the Albert Canal and the River Maas (e.g. the Ampsin-Neuville lock).
Serious road traffic congestion still occurs around Brussels and Antwerp, and projects to optimise both rings are in place.
Finally, Belgian seaports and inland ports are largely compliant but there is still a need to increase the availability of alternative clean fuels, in particular for inland ports. Efforts to develop alternative fuels charging/refuelling facilities are ongoing at the Port of Antwerp-Bruges(project Bio2Bunker) and studies are being developed in the Port of Namur and the Port of Liège. In addition, projects are underway to increase currently limited rail and waterway connection capacity (e.g. development of a second rail freight access to the port of Antwerp, a high-gauge waterway connection to the Port of Zeebrugge.

2.2.6.2 France

The French network is largely compliant with the TEN-T requirements and most non-compliance aspects are expected to be solved by 2030. Progress has been made to enable capacity increases and remove bottlenecks, in particular for rail and inland waterways, but also concerning the deployment of alternative fuels for road and ports and availability of safe and secure truck parking.

With regards to rail, a few issues remain. In particular, by 2030, ERTMS is not expected to be deployed on the corridor lines, except in Eastern France, and P400 limitations are not expected to be removed (despite progress on the topic). Various projects are, however, underway or completed, including: important works to decongest the node of Lyon, but also the nodes of Marseille, Metz and Strasbourg; the implementation of the Paris Southern bypass; the recent completion of an alternative reliable route to the Port of Le Havre (via Serqueux-Gisors).

The French inland waterway network is not yet fully compliant with respect to either CEMT class, water draught or bridge height. However, the completion of the Seine-Scheldt project will solve most issues. It includes the construction and entry into operation by 2030 of the Seine-Nord Europe canal, the recalibration of the Oise between Creil and Compiègne (MAGEO), as well as modernizations along the Seine and on the network in Northern France. This will achieve a continuous high-gauge waterway linking the Seine basin to the Scheldt basin.

Several road enhancements are ongoing and planned to ease traffic around major metropolitan areas (e.g. in Paris, Strasbourg, Lille, Lyon and Marseille).

Maritime and inland ports in France are largely compliant. A few projects are ongoing to improve rail and waterways connection of maritime ports, for example in Marseille (upgrade of rail hinterland connections and development of a sea-river port from Fos to Lyon). The availability of clean fuels is limited, particularly among the inland ports. There are initiatives at the ports of Dunkerque and Marseille to develop hydrogen production and storage facilities, as well as LNG bunkering.

2.2.6.3 Ireland

The TEN-T network in Ireland is overall largely compliant, although a few issues remain to be resolved by 2030. As an island its connectivity with continental EU is of utmost importance for the Corridor (see chapter 5.1)

The Irish railway network is exempt from the TEN-T requirements. Ireland has launched the All-island strategic rail review, a study with a view to unlock the potential of rail in Ireland, both for passengers and freight. The results are expected by the end of 2022 and will inform a new rail strategy for Ireland, which will enable planning for future investments in Irish rail infrastructure and rolling stock. This is complementary to the existing Irish Rail Freight Strategy, which includes a plan to develop a network of intermodal freight facilities in collaboration with the freight and logistics industry, starting with strategic terminals to the west of Dublin and at Limerick Junction, extending over time with smaller tactical terminals in Cork, Galway and Sligo.
In parallel, Ireland is planning to significantly enhance the capacity of its public transport network to alleviate traffic congestion around urban nodes. There has been a renewed investment programme in Dublin, such as the ongoing DART+ programme which is planned to triple the length of the electrified commuter rail network in the Greater Dublin Area. In addition, the MetroLink project seeks to connect the airport with the city centre by light rail. In Cork, capacity enhancements are being implemented in the commuter rail system, using RRF funding, as part of a longer-term development project. Complementarily, in both cities, the Busconnects project will provide dedicated bus lanes and cycle tracks on the busiest axis.
Regarding the road network, besides the new road section to be built by 2030 between Limerick and Foynes, there is a lack of supply of alternative fuels and safe and secure truck parking on the network.
For ports, the ports of Shannon Foynes and Cork do not offer an active rail connection. Studies are ongoing to reinstate a rail connection to Shannon-Foynes, which is to be completed before 2030. As for Cork, there is an inactive connection at Marino point and its reinstatement is considered as part of a broader redevelopment project (but there is no plan to connect the new Ringaskiddy container terminal to rail). There is a lack of supply of alternative fuels in the Irish corridor ports. However, Ireland has ambitious plans to develop offshore renewable energy, whereby ports will have an important role to play for the installation, assembly, operation and maintenance of offshore wind farms.

2.2.6.4 Luxembourg

The TEN-T network in Luxembourg is largely compliant. Since 2014, progress has been made, especially as regards rail electrification, ERTMS (the network is fully deployed) and availability of alternative clean fuels for road.

The availability of clean alternative fuels and of safe and secure truck parking still needs to be increased and a few issues related to rail line speed are still present. The latter are partly addressed by the EuroCap-Rail project, to be completed in 2026. The works concerns the Belgian border - Kleinbettingen line, the axis Luxembourg – Bettembourg – French border (including the construction of a new line between Luxembourg and Bettembourg, the transformation of the Bettembourg station and the

construction of a new signal box). The ongoing upgrade of the railway line Rodange – Bettembourg will address the remaining line speed constraints.

2.2.6.5 Netherlands

The TEN-T network in the Netherlands is largely compliant, with a few remaining issues being resolved. In particular, progress has been done regarding the availability of alternative clean fuels for road and maritime/inland ports and regarding capacity bottlenecks for all modes in the past years.

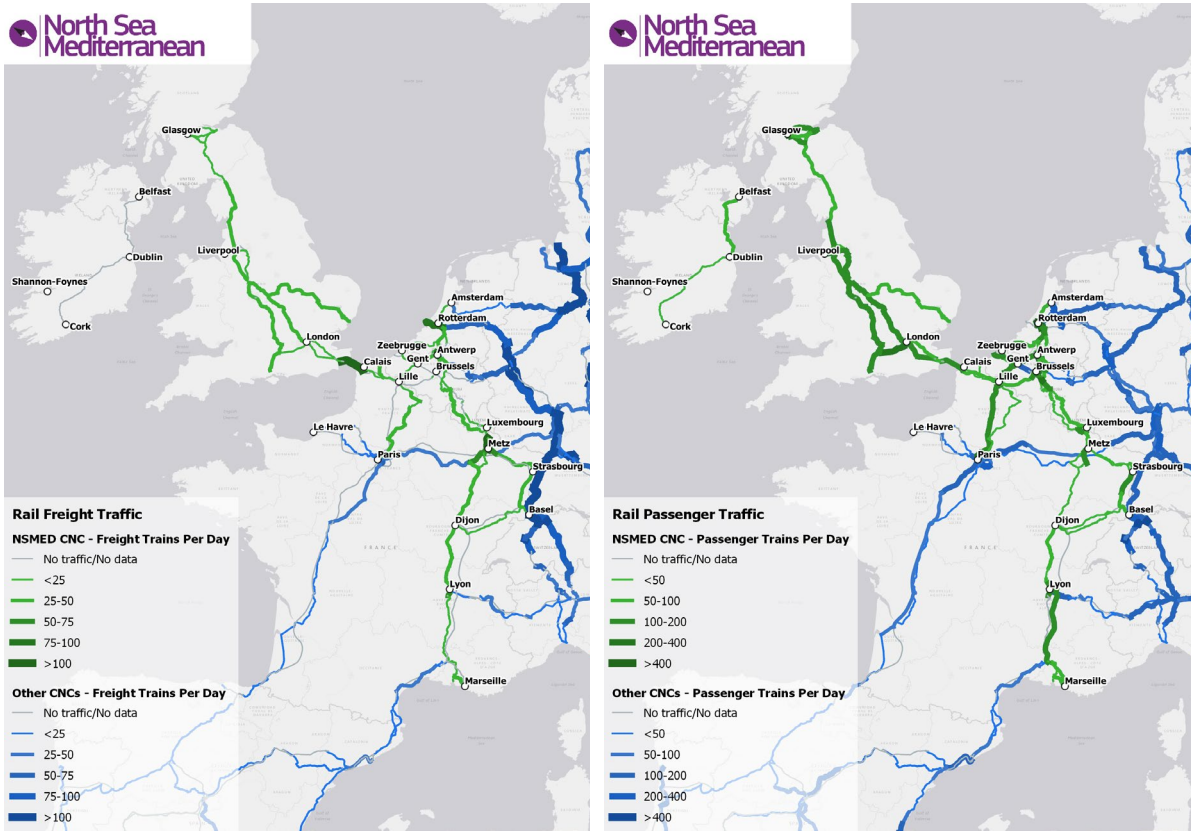
When considering rail, the full implementation of the 740m trains requirement is still a challenge. The follow-up of a dedicated study to assess investments needed is still ongoing. Regarding ERTMS, it is expected that all remaining non-equipped sections will be equipped by 2030, except for the Roosendaal – Vlissingen line. Several projects completed have mainly led to capacity expansions or have been of an operational nature. The Netherlands has also undertaken initiatives to remove level crossings on all Corridors which is a long-lasting effort.
Almost the entire inland waterway Corridor network meets the TEN-T requirements. Various projects are taking place to further improve existing infrastructure, such as upgrades along the Wilhelmina canal, the Weurt – Grave locks in the Maas, the River Waal or to the Beatrix lock (completed), Volkerak lock, Kreekrak lock (not started yet). Moreover, the new Lock of Terneuzen should be completed by 2023. The Netherlands has moreover started to develop climate adaptation measures to mitigate periods of low water or heavy rainfall.
Several infrastructure projects were completed and are underway to address congestion on existing motorways. The completion of different projects has increased the availability of alternative fuels, with an increased number of charging/refuelling points for electric/LNG/CNG vehicles and safe and secure truck parking.
Maritime ports are fully compliant, except for the provision of alternative fuels, although the latter has increased in recent years. Only the Port of Terneuzen does not yet offer alternative fuels, but plans are underway to provide them. As for rail connectivity, the rail access to the Port of Rotterdam has been recently improved by upgrading the infrastructural node at Caland Bridge and rerouting rail freight transport via an alternative route: the Theemsweg railway section. Alternative fuels are not yet available in all Dutch inland ports.

3 Corridor traffic flows and market development

The maps below show the traffic flows for rail, road and inland waterway on the Corridor sections in 2015/2016[25] (these sections are highlighted in green).

Road is the dominant mode of transport. Around 64% of all freight volumes on the Corridor sections[26] are carried by road, 25% by inland waterways and 11% by rail. For passenger transport, the modal split for surface modes is 80% for road vehicles and 20% for passenger trains. By comparing the traffic flows (volumes) on the NSMED Corridor with the neighbouring Rhine Alpine Corridor, it can be seen that road freight, road passenger and rail passenger have comparable levels, but that rail freight and inland waterway freight are lower on NSMED. In future, with the completion of the Corridor, the potential exists to achieve a more equal balance across transport modes.

Figure 23: Rail traffic – average daily trains, 2015.



[25] Traffic flows with this level of detail are not yearly updated.

[26] TRUST Model baseline, tonne-kms on corridor macro-sections in 2016.

Figure 24: Road traffic – average daily vehicles, 2016.

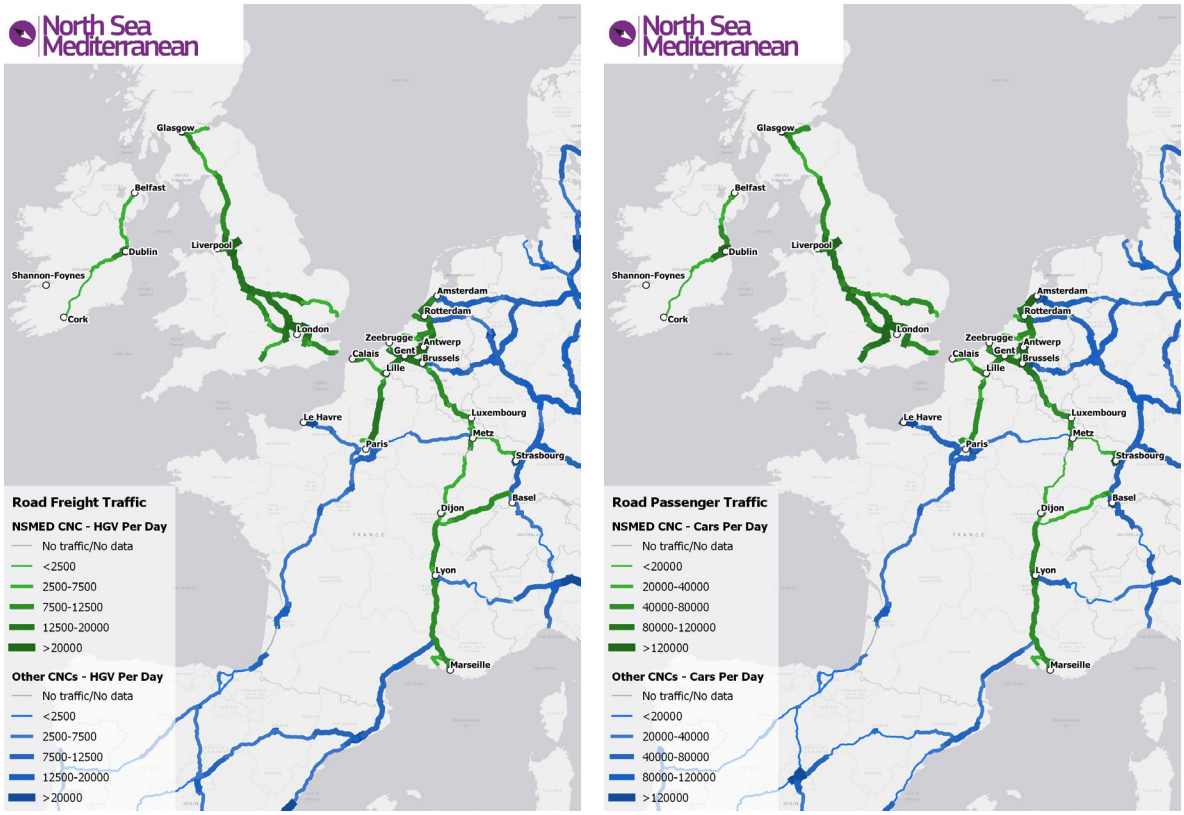
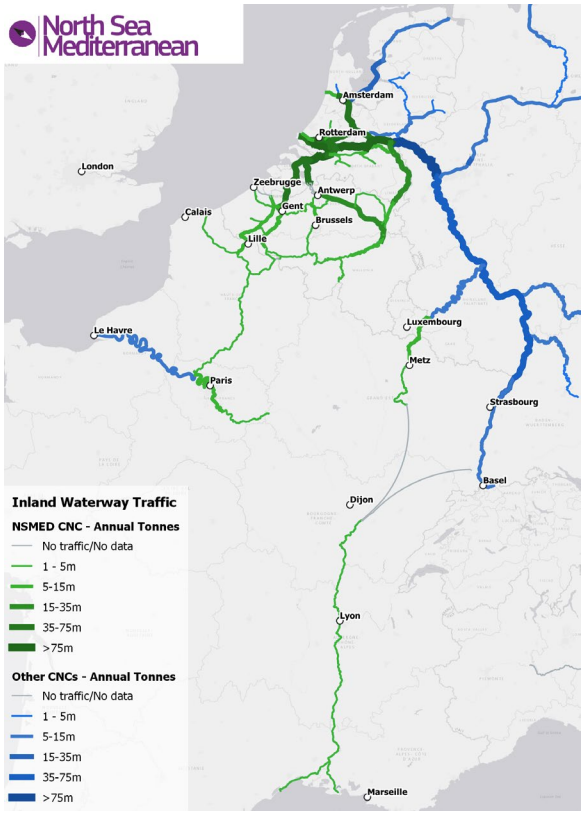


Figure 25: Inland waterway traffic – million tonnes per annum, 2015.



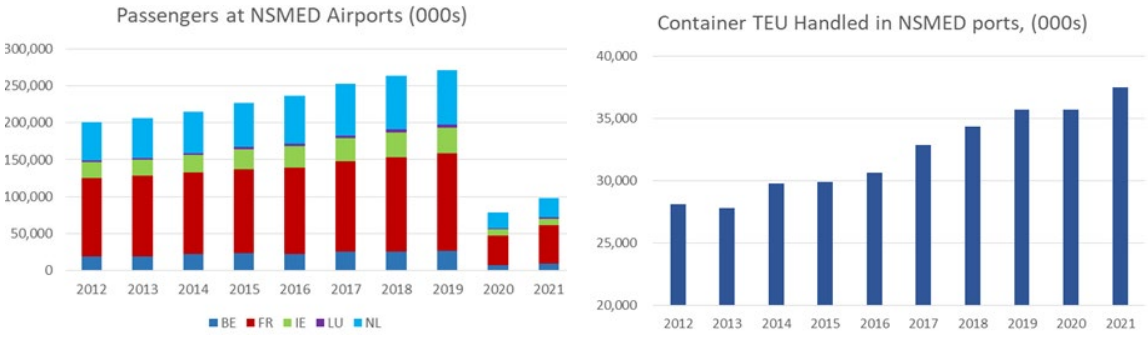
The relatively high traffic volumes across the NSMED Corridor are heavily influenced by the fact that it covers many of the most economically active cities and regions in Europe and includes many of Europe's largest gateway ports, airports and logistical "hotspots". Freight volumes transported across the Corridor amount to 170 billion tonnes-kilometres annually, together with around 180 billion passenger kilometres across all land modes of transport, growing roughly in line with GDP growth rates[27]. These flows are also heavily concentrated within the central part of the Corridor, North and East France, Belgium and the Netherlands. During the last decade, traffic volumes have been growing but the shares of road freight and road passengers have remained static.

One of the main drivers for growth has been the expansion of long distance, intercontinental freight and passenger traffic arriving at the main international gateways. Maritime freight transport (especially deep-sea containers) and air passenger transport are both very important within NSMED, and these sectors have been experiencing consistent growth between 2012 and 2019.

The attractiveness of the major cities of the Corridor and the increase in inter-continental container traffic with East Asia entering Europe through the gateway ports located on the Corridor has resulted in above-average growth in transport volumes. Parallels can be found with air transport, where European long-haul passenger volumes are heavily concentrated in Paris Charles de Gaulle and Amsterdam Schiphol airports. Inland transport from these international gateways within the NSMED Corridor relies to a large degree on road transport, but multimodal services also play an important role, for example in moving containers via rail and inland waterways to alleviate pressure on roads. It is important to ensure that in future all seaports and airports have multimodal access comparable with the best examples in the Corridor. A notable development in this regard is the Seine-Scheldt project which increases the number of Corridor regions which can be connected via inland waterway services, as well as the range of projects being planned to improve last mile rail access.

When looking at Figure 26, it is possible to observe the impact of COVID-19 pandemic on aviation with 80% less passengers transported in 2020, compared to 2019. The impact on TEU transported was visibly smaller.

Figure 26: Passengers at NSMED core airports (000s) – left side. Container TEU handled in NSMED core seaports (000s) – right side



[27] Figures from 2015.

4 What has still to be realised by 2030

For the NSMED Corridor, a list of 505 projects was compiled in 2021 detailing the relevant ongoing, completed or future investments to complete the Corridor. Overall, 24% of them were completed by the end of 2020. 40% are due for completion by 2025 and 15% by 2030, the target date of the TEN-T Regulation. A further 4% projects are expected to be completed after that 2030 target year[28]. In terms of known costs, these 505 projects amount to a combined investment of some €76.7 bn. Considering the estimation of some projects for which the cost is unknown (done by the consultants), the total amount would be €94 bn.

Figure 27: Projects by completion year (2021)

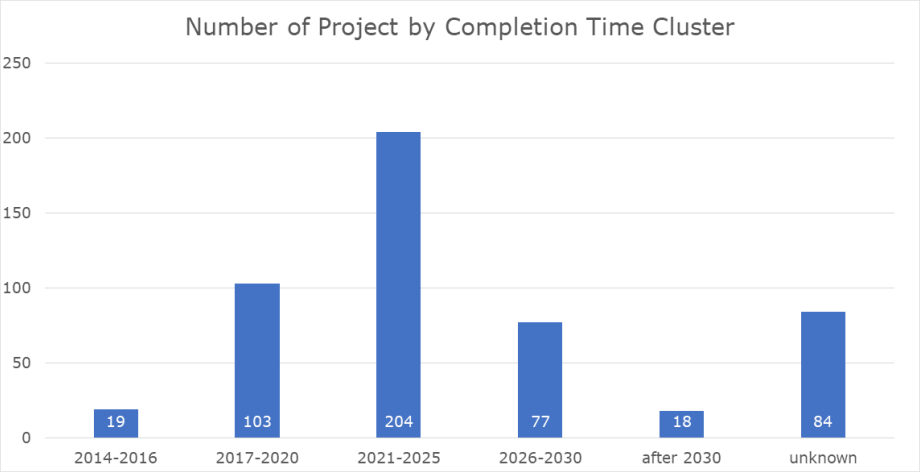
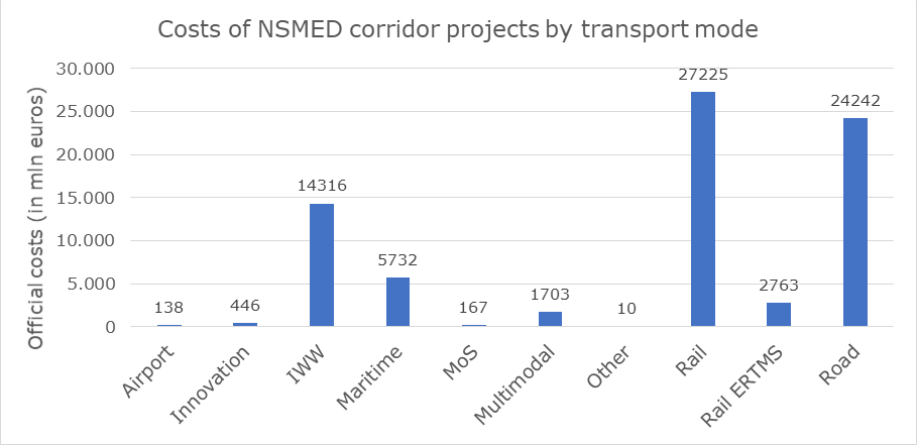


Figure 28: Total costs of Corridor projects, by transport mode / category



[28] The end date of the remaining projects is unknown.

The division of the project costs (Figure 28) shows that the bulk of the costs are in inland waterways (€14.3 bn or 18.7% of total costs), rail (€27.2 bn or 35.5% of total costs) and road (€24.2 bn or 31.6% of total costs). Most of the investments for IWW is going to the different components of the Seine-Scheldt project (around €9.7 bn), but around €2 bn is also going to the new locks in IJmuiden and in Terneuzen. Regarding rail, the largest projects in terms of costs are the decongestion of the Lyon railway node, of the Marseille node, and the Amsterdam-South station (€3 bn). The largest road projects are mostly in the Netherlands and Belgium.

Compared to other Corridors, the NSMED is investing heavily in inland waterway transport, especially in France and Belgium due to the Seine-Scheldt project, as well as related upgrades in the wider network.

Table 4: Total official costs of the Corridor projects, by transport mode and country (million euros)

	BE	FR	IE[29]	LU	NL	Other / multiple countries	Total
Airport	91	3.6	-	-	41	1.7	138
Innovation	36	58	74	-	151	127	446
IWW	3,945	7,168	-	-	2,818	386	14,316
Maritime	989	2,077	1,373	-	66	1,254	5,759
MoS	-	-	-	-	-	167	167
Multimodal	133	842	-	-	365	363	1,703
Other	-	10	-	-	-	-	10
Rail	1,537	16,454	281	1,725	3,742	3,678	27,419
Rail ERTMS	181	1.3	-	-	2,478[30]	103	2,763
Road	7,373	2,076	990	-	11,615	3,104	25,158
Total	*14,284*	*28,689*	*2,718*	*1,725*	*21,276*	*9,184*	*77878*

4.1 Rail

Rail is the mode of transport attracting the largest aggregate investment (€27 bn, or 35% of the total costs, excluding ERTMS). Much of this is geared to solving capacity bottlenecks in urban and port nodes.

44 rail projects contribute to achieve or improve one of the rail parameters (€10.3 bn) and from these, 14 also tackle bottlenecks. 36 are still to be completed, with more than half of them (19) set to be completed before 2026 (total budget: €1.2 bn) and 11 projects between 2026 and 2030. Among these is the modernization of the railway between Brussels and Luxembourg (EuroCap-Rail, budget: €638 m, according to the project list)[31].

[29] This table shows the costs from the project list of October 2021. Regarding Ireland, several projects had no cost figures provided and therefore a few estimates were included in this table. Those estimates are not reflected in the other analysis of this document. The figures for Ireland are still an underestimation.

[30] This amount concerns all the TEN-T Core Network Corridors in the Netherlands.

[31] This project also addresses capacity bottlenecks.

60 projects contribute to eliminate a current or a potential future capacity bottleneck (€23.1 bn) and from these, 18 also contribute to implement TEN-T parameters. 34 have an expected end date in or before 2030 (€5 bn). The remaining 14 projects are set to be completed beyond 2030 or have an unknown end date (€11 bn), with the majority of the costs coming from two rail projects in southern France, around Lyon and Marseille. Overall, the decongestion of the Lyon node entails an investment of €8.5 bn[32].

There are 16 projects targeting ERTMS (€2.7 bn)[33].

Table 5: Number of completed or ongoing projects by rail KPI

Rail	Completed projects	Ongoing/Future projects	
		End date by 2030	End date after 2030
Electrification	6	8	2
Loading gauge	0	3	2
ERTMS implementation	2	14	4
Line speed >= 100 km/h	2	7	1
Axle load >= 22.5 tonnes	0	2	1
Train length >= 740m	1	7	2
Elimination of capacity bottleneck	12	34	14

4.2 Inland waterways

Inland waterway projects account for over €14 bn within the project list (especially in France and Belgium due to the Seine-Scheldt project and upgrades in the wider network), representing over 48% of the total investment in inland waterways across all nine Corridors, as well as around 19% of all NSMED investments. This is in line with the clear aim of making a step-change in extending the network of high capacity waterways across the Corridor and shifting traffic to this mode.

There are 35 inland waterways projects on the project list that contribute to at least one IWW parameter, and the majority of them contributing to multiple. Their budget is €11 bn, of which around €5 bn comes from the Seine-Nord Europe Canal. There are 16 more projects on the Seine-Scheldt connection that contribute to a parameter.

In the area of RIS and traffic management, an ambitious CEF project "RIS-COMEX" is underway to establish RIS and interoperability along navigation corridors and across

[32] Including a multimodal terminal.

[33] The investment needed to deploy ERTMS in France is unknown.

borders, including on the NSMED Corridor. The PEREX 4.0 project in Wallonia will additionally deliver in this area, offering infrastructure and traffic management services.

4.3 Road transport and ITS deployment

Although road investments are less critical in terms of achieving TEN-T standards, they represent a high share of the project list with a combined cost of €24 bn, mainly in the Netherlands and Belgium, with major projects being planned to relieve road congestion in the cities of Amsterdam, Rotterdam, Antwerp, Brussels, and between Metz and Luxembourg. There are 29 road projects that contribute to improve or achieve a road KPI. Their budget is around €11.3 bn (€2.7 bn thereof is an estimation from the consultants).

There are 13 projects which aim to deploy telematics application. They have a combined budget of €254 m[34]. Among these ongoing projects are the EU ITS Platform (€13 m), and C-Roads in France (€14 m) and Ireland (€10 m). The recently co-financed CEF project NAPCORE was launched as a coordination mechanism to improve the interoperability of national access points as the backbone of European mobility data exchange.

Regarding specific projects for safe and secure truck parking, investment amounts to €76 m, with projects in Flanders and the Netherlands.

4.4 Maritime and inland Ports

The investments in maritime projects correspond to 7% of the total of the Corridor and relate to infrastructure works in the ports/terminals as well as their hinterland connections.

32 maritime projects contribute to one or multiple seaport parameters for example, as several projects taking place in the Marseille node (combined budget: €127 m)), the rail connection to the Maasvlakte 2 in the Netherlands (€227 m) and also Shannon Foynes capacity extension works(€22,4 m).

Other projects address capacity bottlenecks, for example the second rail access to the Port of Antwerp[35] (€165 m), which could start in 2022.

Regarding inland ports, there are 22 projects contributing to one or multiple inland port parameters. The majority of these are located in France, including a couple of projects part of the Seine-Scheldt project and some smaller projects within the ports of Paris, Metz, Lyon and Strasbourg. In the other Member States, examples of projects are: zero emissions at berth in the Port of Antwerp for maritime and inland shipping (€50 m) and the BENEFIC project that aims to advance a coordinated approach for the deployment of alternative fuel infrastructure in Flanders, Brussels and the Netherlands through a grant scheme (€32 m).

[34] Several projects entail ITS applications but the majority of the budget is likely to be allocated to construction and/or upgrades, however the project do not allow to make that disaggregation.

4.5 Airports

There are relatively few projects targeting air transport, but there are measures/projects to improve multimodal connectivity at airports and in the field of air traffic control. Investments in projects include the MetroLink that connect the city centre to Dublin airport (with a current central cost estimate of €9.5bn and delivery expected by 2034), the construction of the TGV station at Orly – Pont de Rungis (cost unknown, expected in 2032), the light rail connecting Amsterdam to Schiphol Airport (cost unknown, expected date unknown).

5 Motorways of the Sea (MoS), alternative fuels and development of urban nodes

5.1 Deployment plan of Motorways of the Sea (MoS)

Maritime transport plays a key role for the European economy, transporting about 75% of its external trade and approximately 31% of its internal trade. Specifically, short sea shipping (SSS) makes up a majority (up to 60%) of the total maritime transport of goods to and from the main EU ports. With its large network of maritime ports on the trans-European transport network (TEN-T), the European maritime sector forms an important part of the intra-European transport system. The Motorways of the Sea (MoS) programme is a key instrument in this setting, working towards the ultimate vision of a European Maritime Space (EMS) that is Sustainable, Seamless, Smart and Resilient.

In the Detailed Implementation Plan (DIP) for MoS, the aim is to provide a sound analysis of priority investment needs to achieve the EMS, centred on four thematic pillars:

1. Sustainable: reducing GHG emissions and air, noise and water pollution;
2. Seamless: enhancing the connectivity with the rest of the TEN-T (the CNCs in particular), other transport modes, peripheral and outermost regions, islands and European neighbourhood countries;
3. Smart: aligning maritime transport with the European digital agenda;
4. Resilient: ensuring the EMS is capable of facing exogenous shocks.

Maritime ports and their hinterland connections play a key role in achieving these goals. The port infrastructure and the hinterland connections must facilitate the transfer of European economies to non-fossil fuels, providing appropriate handling and alternative fuels terminals, as well as storage and hinterland infrastructure. Given that the future demand of new fuels is not yet known, investment plans need to be flexible and react quickly with regard to a developing demand and supply.

Due to its relatively high energy efficiency, maritime transport can also play an important role in reducing the climate impact of transport. Especially on long coastal routes, maritime transport should be considered as a serious alternative to road transport. Such coastal services with a reduced carbon footprint should be developed in cooperation with shippers and forwarders. It can also bring a contribution to modal shift, especially on the RORO market, reducing impacts, such as accidents and congestions from roads. Furthermore, such services reduce the need to increase road capacity along the Corridor.

Ports and port communities are also natural digital hubs, exchanging data with seaborne and land-based transport from all parties involved in the transport chain. Simplifying procedures, harmonized data flows and a common approach to deploy interoperable ICT systems will further facilitate the use of maritime transport.

Finally, the resilience of maritime transport chains requires the cooperation of ship operators, ports and forwarders. Exogenous shocks, such as extreme weather events, may lead to a temporary breakdown of ports or parts of the hinterland transport chain. To address such possible shocks, alternative shipping routes should be identified for relevant transport flows. Such alternative shipping routes may involve stakeholders along the TEN-T Core Network Corridors with core and comprehensive network ports.

Ireland-continental EU Connectivity

The Irish economy is highly dependent on maritime trade. Significant volumes of Irish trade with Continental Europe has historically been transported by road across the British land bridge, requiring crossings of both the Irish Sea and (usually) the Short Strait of the English Channel. Following the UK's departure from the EU Single Market and Customs Union on 1st January, greater priority is being placed by policymakers on strengthening economic and transport links between Ireland and the rest of the EU.

While several RORO operators had already launched new direct RORO services between Ireland and the European continental mainland before 1st January 2021, it was after the UK's departure from the Single Market and the Customs Union that there was a particular surge in new capacity on this maritime Corridor, which links Ireland to ports located on the North Sea - Mediterranean and Atlantic Core Network Corridors. The dramatic increase in capacity on direct RORO services was a response by the RORO operators to meet demand from hauliers and freight forwarders who were seeking to avoid the additional paperwork and potential delays involved in crossing Great Britain on the traditional land bridge route.

Based on data collated by the Irish Maritime Development Office (IMDO), direct Ireland to European continental mainland RORO traffic doubled in 2021 compared to 2020. An additional 190,000 RORO units were transported on direct services during 2021 compared to 2020, so that the proportion of total Irish port RORO traffic transported on direct services increased from 17% to 33% of the total. The number of direct sailings each week increased from 26 to 68[36]. Additional capacity and new direct routes were added on the North Sea - Mediterranean Corridor to French, Belgian and Dutch ports and on the Atlantic Corridor to French and Spanish ports. This has enhanced Ireland's direct connectivity with the rest of the EU.

Between the end of 2020 and summer 2022, the Port of Dublin's RORO connectivity and capacity improved overall due to an increased frequency of services offered to Zeebrugge and Cherbourg, as well as the continuing availability of a service to Rotterdam and Santander in northern Spain. However, a service linking the Port to Leixões in northern Portugal has ceased to operate. Over the same period the Port of Cork's RORO connectivity and capacity improved (from a lower base) due to the addition of new services to Zeebrugge/Antwerp and Roscoff/Santander, as well as additional capacity and service frequency being provided on an existing route to Zeebrugge. The port of Rosslare's RORO connectivity and capacity also improved significantly overall over the period, due to additional capacity being provided on the well-established route to Cherbourg, as well as new services to Dunkerque, Zeebrugge and Le Havre. The frequency of service to northern Spain has been maintained, but with a switch of port from Santander to Bilbao[37]. It is worth noting that maritime services between Ireland and the continental mainland often operate on schedules that include ports in the UK such as Liverpool, Portsmouth and Plymouth in order to provide a critical mass of traffic to increase financial viability, which underlines the continuing importance for the shipping lines of serving both Ireland and Great Britain.

In terms of additional infrastructure in Ireland, additional port capacity is being introduced at both Dublin (under its masterplan 2040 and in particular the Alexandra Basin Redevelopment and the MP2 strategic infrastructure projects) and at Cork (Ringaskiddy), where the new container terminal opened in April 2022. These developments will cater for deeper drafted container and RORO vessels and support

[36] The Irish Maritime Transport Economist, Volume 19, IMDO, May 2022.

[37] MDS Transmodal RORO Databank, August 2022.

growth in trade between Ireland and the rest of the EU and the rest of the world. The Core Network Corridor in Ireland has been extended to include the Port of Shannon-Foynes, which equally has ambitious development plans, with its associated hinterland connections linked to the road and (in future) rail networks. Maritime links between Ireland and the northern continental range, as well as the Atlantic coast ports, are therefore likely to become even more important.

5.2 Plans for the deployment of alternative fuels infrastructure

The European climate law requires the Union to reduce its net greenhouse gas emission by at least 55% by 2030. Such emission reduction will require a significant contribution from transport. There is now considerable momentum regarding the market uptake of zero- and low-emission vehicles in the EU. However, in order to facilitate the transition to a mass market and develop a truly common EU transport market, full connectivity and a seamless user experience along the European transport network for low- and zero-emission vehicles, vessels and aircraft are needed. The TEN-T network has to provide the backbone of this endeavour.

The Commission report on the application of Directive 2014/94/EU of the European Parliament and of the Council on the deployment of alternative fuels infrastructure provides a comprehensive assessment of the state of play of alternative fuels infrastructure rollout in the EU[38]. It shows that market maturity varies considerably, depending on the mode of transport. Although some Member States have raised their ambition, the EU still lacks a comprehensive and complete network coverage of easy-to-use alternative fuels infrastructure, for all modes of transport. The European Court of Auditors has also stressed the significant differences between Member States in deploying charging infrastructure.[39]

The Commission proposed a new Regulation on the deployment of alternative fuels infrastructure and repealing Directive 2014/94/EU. Being part of the Fit for 55 Package of 14 July 2021, the proposal seeks to provide for a dense, widespread network of publicly accessible alternative fuels infrastructure in the EU.

The proposal sets forth binding requirements for rollout of an infrastructure with a sufficient amount of minimum recharging and refuelling capacity to ensure full cross-border connectivity of light and heavy-duty vehicles throughout the EU. Distance-based targets for fast-recharging infrastructure along the TEN-T network complement national fleet-based targets for recharging of light-duty electric vehicles. A combined approach of distance-based targets along the TEN-T network with targets for overnight recharging infrastructure for trucks in safe and secure parking places and targets at urban nodes should further support the electrification of heavy-duty vehicles.

Distance-based targets for deployment of hydrogen refuelling stations, including for each urban node, will also ensure necessary minimum refuelling infrastructure for light- and heavy-duty fuel cell hydrogen vehicles.

Following the provisions of the proposal, shore-side electricity supply should be provided in maritime and inland waterway ports. In addition, an appropriate number of refuelling points for LNG should be put in place at maritime ports and on road network of the TEN-T core and comprehensive network. Finally, stationary aircraft at airports and commercial transport operation should be able to make use of external electricity supply while parked at gates or at outfield positions at TEN-T airports. The

[38] COM(2021) 103 final.

[39] Special Report 05/2021: Infrastructure for charging electric vehicles: more charging stations but uneven deployment makes travel across the EU complicated (europa.eu).

proposal for the revision of the TEN-T Guidelines provides cross-references to the proposed new Regulation on the deployment of alternative fuels infrastructure.

As mentioned in Chapter 2, per transport mode, the Corridor has made progress towards deploying alternative fuels (electricity, LNG, CNG or hydrogen refuelling stations) serving roads, inland waterways and ports.

Several Corridor ports in France, Belgium and the Netherlands have started developing LNG and hydrogen bunkering facilities, with the potential to serve the maritime, inland waterway and road sectors, but these are at different stages of completion. More focus is required on the provision of alternative maritime fuels at ports in Ireland.

For aviation, the usage of alternatives to conventional aviation fuels is still in an early stage. The current policy is directed towards the use of sustainable aviation fuel (SAF) and schemes for offsetting CO2 emissions. This is supported by the 2020 EU launched its "ReFuelEU" Aviation initiative.

In the NSMED Corridor, 2% of the investments in the project list are allocated to projects related to alternative clean fuels infrastructure, the majority on road (72%), followed by maritime (19%), with smaller shares for rail and inland waterway and multimodal[40].

Offshore Renewable Energy

To reach climate neutrality by 2050, it is necessary to sharply step up offshore renewable energy production. In November 2020, the European Commission published the EU Strategy on Offshore Renewable Energy, proposing to increase Europe's offshore wind capacity from its current level of 12 GW to at least 60 GW by 2030 and 300 GW by 2050.

While the primary function of the ports is to facilitate maritime transport, they are more than trading gateways to the world. They are also enablers of other activities. The significant role that ports can play in facilitating the development of the offshore renewable energy sector is widely recognised. Ports are a vital part of the supply and logistics chain that is needed for the installation, assembly, operation and maintenance of offshore wind farms. Expanding offshore renewable energy generally requires upgrading port infrastructure.

Sufficient renewable energy sources over the coming decade will be critical not only to achieving the EU climate targets but also, within that, to supporting the transport switch over from fossil based fuels to clean energy. In this broader perspective, the ports of the Corridor have a significant role to play in this synergy between transport and renewable energy.

5.3 The development of Urban Nodes by 2030

Urban nodes represent most of the points of origin and destination of transport flows on the Corridors. The effectiveness of the Corridors is therefore impacted by the effectiveness of the first and last miles of the journeys in those urban nodes and it is important to ensure sufficient multimodal connections. Urban nodes can also contain bottlenecks and missing links on the Corridors; conversely, they can be impacted by the negative aspects of traffic on the Corridors in terms of pollution, noise and safety.

[40] Majority of the projects are multimodal terminals/platforms.

Given this context, the proposal for the revised TEN-T network defines more clearly the role of the urban nodes within the network and their constituting elements and it also sets additional requirements that the Member States should ensure in this regard. Those additional requirements include the development of Sustainable Urban Mobility Plans (SUMPs), the use of sustainable urban mobility indicators and the development of multimodal passenger hubs and freight terminals. In addition, the proposal extends the list of recognised urban nodes from the previously limited list of 88 "network defining urban nodes" to all cities of at least 100.000 inhabitants and, for NUTS2 regions without such a large city, the capital of those regions. Depending on the final version that will be adopted by Council and Parliament, the number of urban nodes per Corridor would thus significantly increase.

The present Work Plan addresses the key issues remaining to be solved in and around the urban nodes of the Corridor, notably bottlenecks, congestion and need for greater multimodality.

6 Funding and Financing

6.1 Update of the Corridor Funding needs

This section accounts for the financial aspects of the 505 projects of the NSMED project list, providing summaries of their costs, maturity and financial sustainability.

Figure 29: Total costs of Corridor projects, by country

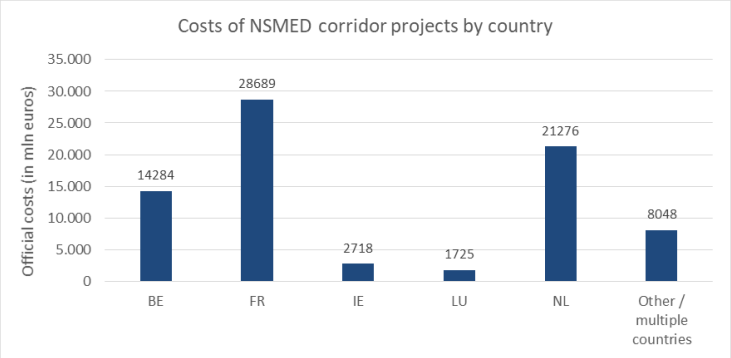
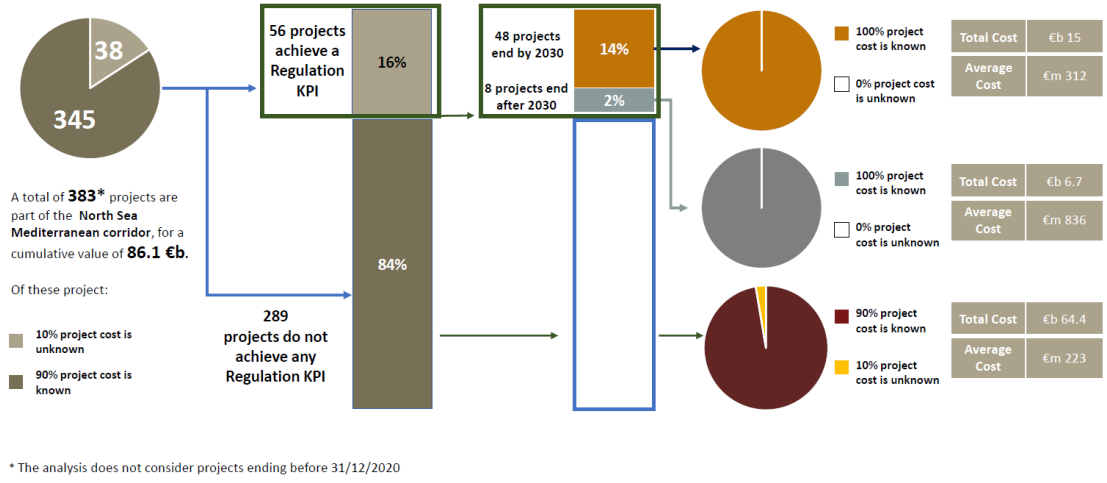


Figure 29 shows that the largest share of the total known costs, amounting to €76.7 bn, goes to projects in France (€28.7 bn), followed by the Netherlands (€21.2 bn) and Belgium (€14.2 bn). Ireland (€2.7bn)[41] and Luxembourg (€1.7bn) are following.

When assessing the added-value of the project pipeline (see Figure 30), it is evident that 56 projects achieve a Regulation parameter and 289 projects address bottlenecks and/or support innovation. The total costs are €86.1 bn[42].

Figure 30: Number of projects and values by category



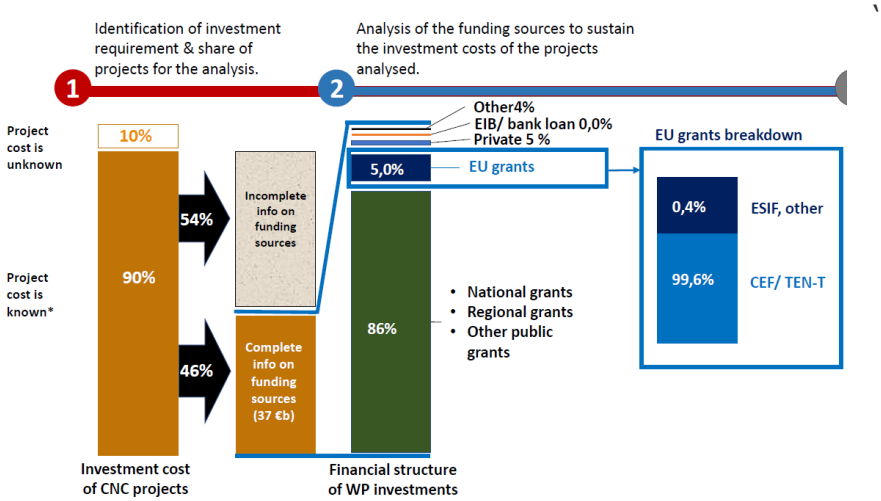
* The analysis does not consider projects ending before 31/12/2020

[41] In the project list of October 2021, several Irish projects did not have cost figures provided. Therefore, in the figure presented here, some estimates were included. Those estimates are not reflected in the other analyses in this document. This figure still represents an underestimation of the costs for Ireland.

[42] This value includes the official costs as provided by the stakeholders and the costs estimated by the consultants upon a common methodology applying to the majority of the projects included in the Project List without any cost indication.

An analysis of the funding sources (Figure 31) shows that, for the projects for which complete information on funding sources is provided (representing €37 bn or 46% of the project list total known costs), 5% of the funding comes from EU sources (€2.3 bn) - overwhelmingly CEF grants (99.6%).

Figure 31: Funding and financing sources



* The analysis does not consider projects ending before 31/12/2020

It is worth reiterating that there are several possible sources of financial support at EU level in addition to CEF grants. Such other sources include the Recovery and Resilience Facility Fund (RRF), and in certain cases, the European Regional Development Fund (ERDF). One last important source of EU support is the EIB (European Investment Bank) and the National Promotional Banks, which can provide loans and guarantees, including under the so-called InvestEU financial products under its "Sustainable Invest Window".

When public sources are not sufficient or cannot be obtained, project promoters should try to call upon the private financial market. A good entry point includes the Member States' national promotional bank.[43]

Advisory support, including for financial structuring is available for TEN-T transport projects under the InvestEU Advisory Hub, the JASPERS advisory facility or ELENA for sustainable urban transport mobility.

Last but not least, project promoters should take into account new opportunities in the context of the Green Deal and related instruments such as the Taxonomy Regulation. In other words, projects will stand a higher chance to receive financial support if they are prepared in a way that maximises their green value. In a number of cases, this will imply setting up projects that go beyond the area of transport alone, for instance creating synergies with the energy sector.

[43] National promotional bank (NPBs) – Belgium (Flanders): Participatiemaatschappij Vlaanderen NV (PMV); France: Caisse des Dépôts et Consignations (CDC) and BPI France; Ireland: Ireland Strategic Infrastructure Fund (NTMA); Luxembourg: European Investment Bank (EIB).

6.2 The Green Deal and the Recovery and Resilience Fund

The Recovery and Resilience Facility (RRF) Regulation has made €672.5 bn in loans and grants available to support both reforms and investments undertaken by Member States in the framework of national recovery and resilience plans. The aim is to mitigate the economic and social impact of the coronavirus pandemic and make European economies and societies more sustainable, resilient and better prepared for the challenges and opportunities of the green and digital transitions.

The Annual Growth Strategy for 2021 (AGS) and the Commission RRF guidelines have identified the development of sustainable, smart and safe transport as a priority for the European recovery and mentioned the deployment of alternative fuel infrastructure among the 7 European flagship initiatives national recovery plans are invited to contribute to.

In this framework and considering the national plans already submitted, the Commission expects Member States to dedicate significant parts of the RRF funding to transport, placing it among the top sectors of the economy to benefit from investments under NextGenerationEU.

While the RRF will finance a large variety of projects, priority will be given to those contributing to the decarbonisation of the transport system in the framework of the European Green Deal. Investments in the rail sector, in particular on the TEN-T network, will therefore have a prominent place. Other priorities will include sustainable urban mobility solutions (including collective transport and active mobility), inland navigation and the electrification of road fleets. In addition, digitalisation of the European transport system will be accelerated by RRF support to investments in ERTMS, ITS or RIS.

The Member States of the North Sea – Mediterranean Corridor have taken advantage of the RRF for transport, including for projects on the Corridor or indirectly linked to the Corridor.

Belgium is using RRF funding to finance some works on the line Brussels - Luxembourg (EuroCap-Rail) and to further lift bridges on the Albert canal.

Ireland is using RRF funding to partly fund network capacity enhancements in the commuter rail system of Cork (€185m).

France is using RRF funding to accelerate rail and inland waterway network upgrades and renovations. For example, 100 waterway projects are concerned, including locks and dams, mainly on the narrow gauge network. Those projects will benefit the Corridor since it covers wide areas - the Seine, Scheldt, and Saône-Rhône basins. Luxembourg, France and Belgium will also employ RRF funding to further develop electric charging stations on their road network, which will benefit the Corridor.

6.3 Connecting Europe Facility for the period 2021-2027

The CEF 2021-2027 Regulation entered into force on 14 July 2021, applying retroactively from 1 January 2021. The total budget for the CEF transport is €25.807[44] bn and its division between the envelopes as follows:

- General envelope: €12.830 bn
- Cohesion envelope: €11.286 bn
- Military mobility envelope: €1.691 bn

[44] All amounts are in 2021 prices.

The main priorities of the CEF are:

- Completion of the network: supporting the completion of the TEN-T, with particular priority to cross-border sections and missing links of the core network Corridors (60% of general envelope and 85% of cohesion envelope).
- Modernization of the existing infrastructure: tackle much more decisively the challenge of decarbonization and digitalization of the transport sector, to support the transition to smart, sustainable, inclusive, safe and secure mobility (40% of general envelope and 15% of the cohesion envelope).
- In line with the Action Plan on Military Mobility, for the first time, support the critical development of civilian-military dual-use transport infrastructure.

The CEF will contribute at least 60% of its funding to the climate objectives (compared to 30% of the overall target of the MFF).

The blending of CEF grants with other financial sources will be allowed. This might be implemented either through blending calls (CEF grants in combination with non-EU financial instruments, e.g. commercial banks or national promotion banks) or through blending operations (blend CEF grants with InvestEU).

The CEF will allow the implementation of synergies between CEF transport, energy and digital sectors. It will be applied either as "synergetic elements" (it will be possible for each sector to accept as eligible cost ancillary elements pertaining to another sector) or through joint work programmes jointly financed from each sector involved with the possibility to apply the highest co-funding rate of the sectors concerned and 10% top-up. The Commission adopted the first multiannual work programme 2021-2027 on 5 August 2021. This specifies the funding objectives and budget for the years 2021-2023.

According to the latest reporting figures, projects on the North Sea – Mediterranean Corridor received a total of €1.66 bn of CEF funding, for a total cost of 5.5 bn, with the following breakdown: around €789 m to inland waterways, €441 m to rail, and almost equal smaller shares for maritime and road projects, €227 m and €200 m respectively.

6.4 The inclusion of Military Mobility in the network development plans

As of 2021, military mobility is taken into account in the Corridor work plans. The efforts addressing military mobility are based on 2018 EU Action Plan on Military Mobility which aims to improve military mobility in 3 key areas of action: transport infrastructure, regulatory and procedural issues, and other cross-cutting topics.

Concerning transport infrastructure, in 2019 the Council of the EU approved the Military Requirements for Military Mobility within and beyond the EU. These Military Requirements identify the geographical scope for military mobility and defined transport infrastructure standards necessary for the military. The gap analysis performed in 2019 by the Commission services and the European External Action Service (EEAS) emphasises the synergies between TEN-T and military mobility: 93% of the military transport network is also part of TEN-T and military transport infrastructure standards are mostly compatible with civilian transport infrastructure needs.

Owing to these synergies between civilian and military transport needs, actions aiming to complete TEN-T Corridors can also improve military mobility. The EU's new long-term budget now includes a dedicated €1.7 bn military mobility envelope as part of the Connecting Europe Facility to co-fund such dual-use transport infrastructure projects. The first CEF call for proposals to improve dual-use transport infrastructure was launched on 16 September 2021. In order to be eligible, projects have to be on

both the TEN-T and the military transport network, as well as to address dual-use transport infrastructure requirements identified in Commission Implementing Regulation (EU) 2021/1328. A second call for projects was launched in May 2022.

7 The European Coordinator's recommendations and future outlook

The past years have brought about significant changes in the context within which the North Sea – Mediterranean Corridor must operate. The exit of the United Kingdom from the EU, the disruptions caused by the COVID-19 pandemic and more recently the Russian war of aggression against Ukraine are the main ones, in a context where the effects of the climate crisis are more and more acute and geopolitical tensions are heightening on the global stage. In addition to short-term impacts on the Corridor's transport flows, these changes will have long-term consequences which require reflection on the potential need to adapt the Corridor objectives or the pace of their realisation.

Despite new complexities adding to the ongoing challenges, I am happy to see the Corridor make steady progress. Looking back to 2014 when the Corridor was set up, we have made significant progress in the last seven years towards completing a truly cross-border, multimodal, well-integrated, operationally efficient and, above all, sustainable transport system along the whole North Sea – Mediterranean Corridor.

We see this progress clearly when we look at the completed projects and ongoing works, as well as the degree of maturity of short- to mid-term plans and strategies to meet the Corridor objectives. This concerns hard infrastructure - across all modes, including alternative fuels infrastructure and digital systems – as well as actions to improve operational efficiency and achieve the most effective use of infrastructure.

The present Work Plan accounts for all these developments.

In this regard, I would like to warmly thank all the stakeholders, be they public authorities, managers of the infrastructure or market players, for their dynamism, and in particular all members of the North Sea – Mediterranean Corridor Forum for their valuable involvement and contributions. I would also like to show gratitude to the governance bodies of the Seine-Scheldt project and to the NSMED Rail Freight Corridor, as well as to CINEA and our consultants for their devoted cooperation.

7.1 Challenges and critical points for the North Sea - Mediterranean Corridor

Despite the progress made, the Work Plan acknowledges that there is still a long way to go to meet the 2030 target of Corridor completion.

Overall, the infrastructure of the North Sea – Mediterranean Corridor, located in one of the most developed regions of Europe, is of good quality and well maintained, generally meeting the standards of the TEN-T Guidelines. However, the dense traffic on the Corridor currently relies too heavily upon motorways and fossil fuels.

In addition to the progress mentioned above, changing this requires stepping up efforts to achieve a better offer of sustainable multimodal transport solutions, both for freight and passenger transport, which is competitive and sufficient in quantity.

To this end, the capacity of the more sustainable transport modes needs to be strengthened, so to enable their large-scale use. This involves removing the hard infrastructure bottlenecks and bridging the missing links along the Corridor. In parallel, it is necessary to ambitiously deploy alternative fuels, zero-emission vehicles and (connected) intelligent transport systems in all modes. This needs to be accompanied by the removal of administrative, legal and technical **interoperability** barriers and by ensuring efficient cross-border coordination in terms of services

offered (in particular for rail). Moreover, for an efficient and optimal transition, a coordinated and synergistic approach with the energy and digital sectors is necessary.

At Corridor level, I therefore see two main pillars for our contribution to the implementation of the Green Deal and Smart and Sustainable Mobility Strategy: first is to achieve an ambitious **modal shift** towards the more energy efficient transport modes (rail, inland waterway and sea) and second to accelerate the **greening of transport** across all modes, primarily road, maritime and air, via widespread use of clean fuels and more stringent emissions standards.

In this perspective, I would like, in particular, to draw the attention on the following:

Rail

- Regarding **passenger rail**, the existing high-speed network already connects virtually all Corridor urban nodes in continental Europe.

  However, the modernisation of the rail link between Brussels and Luxembourg and further to Strasbourg, symbolically connecting the three European capitals and also referred to as **EuroCap-Rail**, is still to be completed. In addition to improving short and medium distance cross-border traffic, there is potential for long-distance connections, e.g. to Switzerland and Italy. In Luxembourg, the remaining works are to be finished in 2026, while a few additional years might be needed for project completion in Belgium, where most works still remain to be realised. In France, the improvements needed mainly concern the link between the Luxembourg border and Metz as well as easing traffic around urban areas. Belgium and Luxembourg have renewed their strong commitment to the project, considering this rail link as a priority. I welcome the fact that Belgium has decided to use part of the European Recovery and Resilience Facility to progress on this. Considering the strong expectations of the citizens towards significant transit time reductions and increased service reliability, I would suggest the adoption of an **Implementing Decision**, primarily concerning the Brussels – Luxembourg axis, in order to fix the timeline and provide continuity to the current political impetus.

  On a broader note, the Commission Action Plan on long-distance and cross-border rail, setting out concrete actions to make rail travel more attractive for passengers will contribute to the development of new long-distance rail services, including on our Corridor – thus contributing to offer a real alternative to air or road transport.

- **Rail freight** remains the only clean mode enabling the movement of goods from one end of the continental part of the Corridor to the other, without transhipment, as well as providing long-distance interconnections to the neighbouring Rhine-Alpine, Atlantic and Mediterranean Corridors. Rail has therefore a very significant modal shift potential across all branches of the Corridor. A large part of this potential is still to be realised, both within the Corridor and in relation to the connected markets, e.g., in Italy and the Iberian Peninsula. We therefore need to exploit all the possibilities that rail offers and in order to do so, the quality, punctuality, reliability and productivity of rail freight services need to be improved.

  For this, there is a need to continue developing rail infrastructure:

  - Firstly, continued emphasis should be put on **decongesting the main rail nodes** and developing **access to ports**, in order to ease current traffic and to accommodate traffic growth of both passengers (short-distance and long-distance) and freight. Ambitious projects are ongoing (e.g. in the Lyon, Marseille, Paris, Strasbourg, Brussels or Amsterdam nodes, or access to the Antwerp-Bruges ports).
  - Secondly, ensuring the possibility of running **740m trains** and the **deployment of ERTMS** along the whole Corridor are essential to ensure continuous operation and important productivity gains.

Regarding the former, there are restrictions in Belgium and the Netherlands, mainly during daytime. The study conducted in Belgium has now ended and I am looking forward to the results of the ongoing assessment of the investments needed. The objective of the Belgian authorities remains a full implementation of this standard by 2030. According to the Dutch authorities, meeting the 2030 deadline for allowing 740m trains to run without restrictions on the Corridor in the Netherlands will be a challenge. The follow-up at political level of the study concluded in 2019 is still ongoing and I encourage progress on this matter.

In its proposal for a revised TEN-T Regulation, the Commission suggested refined criteria to be met for the 740m train requirement, aimed to bring clarification on how to implement it.

While ERTMS deployment is progressing, let me reiterate the importance of sticking to the deadlines as set in the European Deployment Plan, which covers both infrastructure and rolling stock. According to current information, ERTMS deployment by 2030 will be achieved, except for the French lines planned in the EDP beyond 2023 and a line in the Netherlands. In the short-term, finalising the deployment on the Longuyon-Basel section by 2025 remains a priority. When this is realised, the key rail freight route from Benelux to Switzerland and further to Italy will be the first in Europe to be fully equipped with ERTMS.

- Thirdly, the "loading gauge" bottlenecks preventing free circulation of trains carrying P400 freight units is another critical issue for the Corridor, limiting the potential for additional combined transport and further road to rail modal shift. Moreover, removing this bottleneck would bring the NSMED Corridor closer in line with the neighbouring Rhine-Alpine Corridor, a key outcome to reduce disruptions. While there are **P400 loading gauge** issues on the Southern part of the Corridor, the main bottlenecks are caused by the profile of several tunnels in Eastern France between Lille and Strasbourg. This is a topic at the centre of the discussions of the Rail Freight Corridor governance over the last few years. Progress is currently being made as detailed studies for enhancing the profile of the tunnels between Metz and Strasbourg are about to be launched by SNCF Réseau, with EU funding. If needed, I am ready to bring my support. It is of utmost importance that benefits at corridor level, as well as cross-corridor interoperability, be taken into account when addressing this issue. I am calling the different parties not to delay possible investment decisions.

  The proposal for a revised TEN-T Regulation suggests the P400 loading gauge as new requirement, in particular for the Corridors. This is in line with the efforts made in the North Sea – Mediterranean Corridor to remove this bottleneck and to increase combined transport traffic.

- There are additional considerations, which need attention in order for trains to cross borders smoothly and efficiently. These considerations are of non-infrastructural nature, such as the provision of enough high-quality paths coordinated across borders, digitization of processes, coordination of traffic management, coordination of maintenance and construction works, removal of administrative and technical barriers and the reliable exchange of real-time information.

  Eliminating operational barriers is not only absolutely necessary for the development of rail freight, but it is also a prerequisite for the success of our infrastructure development policy, since issues of an operational nature hinder the realisation of the benefits expected from the investments. Operational barriers indeed jeopardise continuity of traffic, create inefficiencies, increase waiting and travel times, augment the need for additional resources, raise transport costs, etc. We should think in a holistic way: when designing and implementing solutions to eliminate the barriers hampering cross-border rail freight, we should always consider together operational and infrastructure measures, which are the two

complementary sides of the same policy. Certain operational measures can often be implemented much faster than large infrastructure projects.

- This is why the role of the **Rail Freight Corridor** is so important. I therefore renew my call to the Member States to play a strong role in the RFC governance. In setting the objectives of the RFC and supervising its progress and results, the Member States, as Executive Board, have the central role in driving the RFC forward.

  As Coordinator, I can give political impetus. I intend to pursue my close **cooperation with the RFC**, like in the past years: on the one hand benefiting from the RFC expertise to identify infrastructure priorities for rail freight, in particular to inform the Work Plan; on the other hand standing ready to help to progress on more operational issues when needed.

  This corresponds to the spirit of the proposal for a revised TEN-T Regulation, which provides for the integration of the RFCs and CNCs into European Transport Corridors. This integration aims to boost synergies between the two governance structures in the various competence areas and to bring simplification and efficiency in the corridor "concepts", addressing the question of overlapping of competences and tasks. In addition to a single geographical scope, it defines more precisely the processes for cooperation between the rail freight governance and the Coordinator in two key areas: infrastructure investments and operational performance.

- In addition, we should not overlook the areas of **common interest between the NSMED Corridor and the Rhine-Alpine Corridor**, for which we share much of the same economic hinterland and many origin-destinations.

  The two corridors need to be developed so that their railway lines can function in the most efficient way, independently, to serve traffic of this broader North-South axis. At the same time, to mitigate the effects of disruptions, like it happened in Rastatt or Müllheim in the past years on the Rhine-Alpine corridor, I encourage the Member States and infrastructure managers to address the interoperability shortcomings between the two corridors, both in terms of infrastructure parameters and operational aspects. Past disruptions have shown that trains cannot always easily switch from one corridor to the other. Providing for more quality interconnections between the two Corridors, including more alternative itineraries, would maximise network benefits - improving overall resilience, reliability and combined capacity usage of the NSMED and RALP corridors, in a context of expected traffic growth on an already very busy axis.

  With this in mind, the proposed merge between the NSMED and the RALP Corridors is a positive aspect: the discussion around this proposal will be an opportunity to look at this axis in a more holistic way, notably in terms of infrastructure. It includes the question whether additional interconnections for rail freight between the two corridors should be included in the TEN-T and modernised accordingly, e.g. between France and Germany. Let me welcome the ongoing discussions between Switzerland and France, and between Switzerland and Germany, on those broader questions.

- Regarding Ireland, I would like to welcome the study launched by the Irish authorities, the "**all-island Strategic Rail Review**" addressing both passenger and freight traffic. The potential of rail in Ireland is untapped and I am looking forward to the results, due by the end of 2022. They will inform a new strategy and plan for future investments in Irish rail infrastructure and rolling stock. This is complementary to the existing Rail Freight Strategy, which includes a plan to develop intermodal freight facilities. In this regard, let me stress the importance to develop active and efficient rail connections to Irish port facilities which handle or will handle significant volumes of goods, e.g. in Cork or Shannon Foynes.

Inland waterways

Inland waterways have a very significant place within the North Sea – Mediterranean Corridor. Although it is constrained to the two main sub-networks in the Corridor (Seine-Scheldt-Maas, and Rhône-Saône), it is highly suited for handling large freight volumes, over medium to long-distances. As such, they represent the leading clean transport mode for freight in the Corridor, in terms of tonnes. Furthermore, inland waterway transport can also offer opportunities for shorter distance freight movement, and for smaller shipments, such as urban distribution. In that respect it is important to acknowledge the potential of smaller waterways.

Regarding the **Seine–Scheldt**, the main inland waterway project of the Corridor and also the biggest of the inland waterway TEN-T projects in terms of scope and costs, progress is steady and decisive milestones have been achieved. This concerns in particular the canal Seine-Nord Europe: the company in charge of the construction has now reached full operational capacity and first works have started. This also concerns works on the other main routes, notably the Lys, the Scheldt and the Seine.
In the past two years, projects have been delayed and many of those delays were unavoidable, in particular due to the impacts of the pandemic. It is however essential to stay on course and that all parties adhere to the completion timeline set in the Commission Implementing Decision for the different project components, which will allow for a coordinated entry into service of the main itineraries. Respecting the commitments taken in the context of that Decision is not only a question of financial resources, but also of completing the various procedures in a reasonable amount of time.
Regarding a few sections still to be implemented, e.g., the link to Zeebrugge, a final investment decision has not yet been taken: I encourage the relevant authorities to maintain progress on this.
If the roadmap provided by the Implementing Decision is held, a continuous and coherent high-gauge Seine - Scheldt network will be fully operational by 2030.
Finally, yet importantly, I would like to highlight the importance of **gradually intensifying the activities preparing the entry into service** of the main axis, as the provision of the sole infrastructure will not be a guarantee of its optimal use and of modal shift. Besides the general question of framework conditions for transport services, it is necessary to develop multimodal logistics platforms along the network and to adequately inform all the players in the logistics chains – operators, shippers, industry – so to help them structure the sector and plan their development, investments and new services with a timeline as close as possible to reality. In this context, I welcome the concrete informational initiatives already taking place on the ground, as well as the broader reflection within the EEIG on how to play best this role in the next years – and strongly encourage them further.

The **modernisation on other parts of the Belgian and Dutch networks** should continue as well, for example regarding bridge heights or capacity restrictions in locks. This will generate major network benefits, opening up high capacity routes linking the Seine – Scheldt network onwards to the Rhine/Maas waterways.

In France, the **Marseille-Rhône-Saône axis**, which is key for freight transport, benefits from a wide-gauge waterway infrastructure up to close to Dijon, serving Marseille (port of Fos), Lyon and several cities and inland ports along the way. With large unused capacity, it offers an important modal shift potential, notably for the port of Marseille Fos (with currently 7% hinterland transport modal share). The prospects for traffic growth are significant, with a potential doubling at the 2030 horizon.

The effects of climate change for inland waterways transport brings concerns. The consequences of drought are already being experienced in the Rhine River with reduced navigable depth. The **frequency and severity of climate events** like extreme droughts or extreme rainfalls may further increase, making waterway transport less reliable and increasing the risk of disruptions in the supply chain. I

therefore welcome **adaptation initiatives** such as in the Netherlands, with measures to ensure good navigability ("drought package"), or in Belgium, where water-powered pumping stations have been built along locks of the Albert canal. It is to be noted that the proposal for the revised Regulation reinforces the "good navigation status" concept with specific requirements per river-basin.

In general, the **deployment of alternative fuels for inland shipping** needs to be accelerated to meet the 2030 deadline. All the relevant parties, including the transport operators, port authorities, shippers and other market players, should be associated in the discussions about the technologies and deployment strategies, taking account of the ongoing legislative developments at EU level. The Seine-Scheldt project, thanks to its integrated governance enabling cooperation at technical and political level, could show the way in Europe with a coordinated deployment on its different subnetworks (potentially associating at some stage neighbouring networks, e.g. in the Netherlands). The Implementing Decision provides for the elaboration of a coordinated deployment framework, which is in the spirit of the proposal for a revised TEN-T Regulation. Lastly, I would like to encourage the development of other opportunities related to inland waterways, such as realising possible synergies for the production of renewable energy.

Alternatives fuels and ITS deployment

The Corridor has made progress towards **deploying alternative fuels** (electricity, LNG, CNG or hydrogen refuelling/recharging stations) serving roads, inland waterways, and ports. However, as on all Corridors, there is still a need to accelerate the pace of their full roll out to meet climate targets. Besides that, guaranteeing interoperability amongst the solutions and uninterrupted recharging/refuelling stations per fuel type to ensure long distance transport is crucial.

The availability of clean alternative fuels for road has increased substantially across the Corridor in the latest years; in particular for electric infrastructure. Also, there are initiatives underway in several ports to produce or store hydrogen onsite, as well as the development of (bio) LNG bunkering facilities and ships. Some ports have also ambitious plans to play a key role in developing offshore wind energy. The usage of alternatives to conventional fuels for aviation is still in an early stage, but it is expected that the current ReFuelEU Aviation initiative provides substantial support to its deployment.

As we need to accelerate alternative fuels deployment, I would like to ask for the commitment of all parties to move towards the objectives set in the proposal for the Alternative Fuels Infrastructure Regulation (AFIR) and the proposal for the revised TEN-T Regulation (Chapter 5.2).

The deployment of **intelligent transport systems** helps to increase transport efficiency and safety. As for alternative fuels, guaranteeing interoperability between the different systems is a very important aspect to ensure seamless operations across borders. Besides ERTMS and RIS deployment for rail and inland waterways, the main initiatives are happening for road with C-ROADS being deployed in several Member States. Within this initiative, Member States are working together on the deployment of interoperable and harmonised C-ITS services along the Corridor.

Furthermore, our Corridor does not yet meet the requirements regarding **safe and secure parking facilities**, with shortages in terms of number of facilities, capacity, and quality standards they offer.

Urban nodes

Regarding **urban nodes**, it is of utmost importance to address congestion, promote the uptake of zero-emission technologies and find a more optimal balance between planning for short-distance and long-distance transport functions, notably with the development of multimodal interchanges/terminals that improve multimodal

connectivity, including with active modes. This also includes considerations of accessibility, especially for passengers with reduced mobility and passengers with disabilities, which is a TEN-T priority as regards public transport. Progress is needed in the Corridor as the situation in many urban nodes has to be improved, regarding both congestion and efficient interconnection between the urban public transport systems and the long-distance networks. We need to anticipate that urban nodes will take a more prominent place, in particular with the revised TEN-T Regulation (as described in Chapter 5.3).

Ireland – continental EU connectivity

Following the departure of the United Kingdom from the Single Market and Customs Union on 1st January 2021, the implications of the exit of the UK from the European Union on **connectivity between Ireland and continental EU** are becoming clearer. The sustained switch of demand away from the traditional land bridge route through Great Britain for Ireland's trade with the rest of the EU highlights the responsiveness of the market to additional administrative barriers to trade as well as the resilience of the new direct services. Nevertheless, we need to remain particularly vigilant about the overall connectivity of Ireland with the rest of the EU

7.2 Future outlook

The North Sea – Mediterranean Corridor is on the right track to fulfil its main objectives for the 2030 horizon but we can see that key issues remain that need to be overcome. It is important to keep in mind that the Corridor is only as strong as its weakest link – it is particularly true with regards to rail and inland waterways and their infrastructure parameters (740m long trains, ERTMS, loading gauge, CEMT class, bridge height). For the transport system, and the society overall, in order to fully benefit from the investments made so far, we need to remain vigilant that the points mentioned above are addressed on time, the pace of implementation of the Corridor projects and priorities is kept (in some areas even accelerated, e.g., greening the transport system) and avoidable delays reduced to the minimum. In this way, the regions crossed by the Corridor will be better equipped to face the challenges and pressures on their transport system - in particular decarbonisation, congestion and traffic growth - while ensuring connectivity, territorial continuity and support to the economy.

Maintaining such an ambition over the years and limiting delays requires consistency of national plans with the Corridor and EU priorities and sustained investments. In this regard, a series of policy instruments and funding possibilities are available at EU level. According to the Project list, the North Sea - Mediterranean Corridor has a high number of ongoing and expected projects (383), with a cumulative value of €86.1 bn[45] still needed. While the amounts from EU sources (e.g., as mentioned above, from CEF, NextEUGeneration, RRF, ERDF) that can be used for Corridor projects in the period 2021-2027 have significantly increased compared to the period 2014-2020, EU funding is far from sufficient to complete the TEN-T network. It will continue to play a catalytic role in realising the completion of the Corridor, bringing national investments closer to European priorities, but I do strongly invite public authorities and other project promoters to do their best to turn to alternative and innovative financing instruments and attract private sources of financing.

[45] This amount includes the cost for the majority of the 383 projects (for most projects, costs are provided by the stakeholders; for other projects, the consultants have produced an estimation; however, for some projects, it is not feasible to produce an estimate and no cost is included).

Climate change poses an immense challenge for the EU in the coming decades. Accounting for around 25% of total EU greenhouse gas emissions, the transport sector has a huge role to play in the overall decarbonisation of our societies to reach climate neutrality by 2050. The Green Deal, which calls for a 90% reduction in greenhouse gas emissions in transport, and the Sustainable and Smart Mobility Strategy have paved the way for the transformation of the European transport system. Sustainability and digitalisation are thus the focus. Accordingly, the legislative and policy framework is being adapted with a view to meet the targets and ambitions set in those Strategies. For example, the "Fit for 55 package" of July 2021 and the "Efficient and green Mobility package of December 2021, including the proposal for a revised TEN-T Regulation (among others), have already been mentioned and are under negotiation. In addition, a new package including a focus on rail freight and combined transport is expected in 2023.

We are placing our action on the Corridor in this context. Our priorities and objectives are contributing to reaching the strengthened ambitions and targets of the Green Deal and Sustainable and Smart Mobility Strategy and therefore all have their place. I am calling the Member States, the infrastructure managers and all stakeholders to concentrate on making progress according to our current plans. Moreover, the Corridor concept will be strengthened with the new TEN-T Regulation, with new tools and competences introduced for the Coordinators and the Corridors.

Nevertheless, we need to acknowledge that our activities within the Corridor system are based on a general hypothesis of ideal conditions (political stability, peace, commitment towards EU integration, continuous economic growth and expansion, stable climate conditions, etc.). However, as I mentioned above, unexpected shocks and crises occurred in the past years which significantly impact the resilience of our transport system and the continuity of our long-term plans. The exit of the United Kingdom from the EU, as well as political implications for the EU project as a whole, modified the internal logic of the North Sea – Mediterranean Corridor and reoriented part of its transport flows. The Covid-19 pandemic highlighted how important a reliable transport system is in time of crisis, to procure essential services and goods and keep the economy afloat, while at the same time traditional supply chains were broken due to disruptions in production or in transport services. In addition, global warming is causing more frequent and extreme weather events, disrupting the transport system. Rail and inland waterway transport are particularly impacted, two modes which play a key role in our endeavours to decarbonise transport and fight climate change. Floods or violent storms may block rail and extreme droughts may cause low water levels to the extent that inland waterway navigation has to stop or to be restricted. In both cases, easy alternative solutions are not always on hand. Finally, the Russian war of aggression against Ukraine creates a climate of political tensions and uncertainties that may be long lasting and will have social and economic impacts in Europe, not the least due to rising energy prices. It causes transport and supply chain disruptions; we can mention as examples the situation faced by Ukraine to export its grain, the need to bypass some traditional transport routes or general high transport fuel prices. There is also a risk of delays for infrastructure projects, notably due to possible shortages of raw materials or rising prices thereof. The war is happening in a more general context of heightening geopolitical tensions on the global stage, which might impact long-distance trade flows, for example due to a possible partial de-globalisation of production, and in turn the global transport system including its European connections.

Those crises remind us how fragile, but also how essential and strategic a high-quality transport infrastructure system is for the public interest, the cohesion of the Union and for the internal market.

The EU and the Commission are able to react swiftly and with unity. In respect of transport, these include but are not limited to the negotiations around the exit of the UK from the EU, the Green Lanes during the pandemic and more recently REPowerEU

or the amended TEN-T proposal adopted in July 2022, which reflects the impact on transport infrastructure of the war in Ukraine.

Yet, at the level of the Corridor, we might have to draw on the lessons from the recent events and reflect on how such shocks and more long-term trends affect the Corridor. While we need to focus in the short-term on our current priorities, we also need to see whether some of them should be strengthened or accelerated, or if new ones emerge. In this regard, I would like to give three elements as food for thought. Firstly, the concept of **resilience of the network** should be more prominent in our thinking. In general, alternative multimodal routes should be foreseen to cater for traffic disruptions. This includes reflections on how to best adapt the infrastructure to the effects of climate change. Secondly, **evolving production patterns and transport flows** caused by the new geopolitical context and their impact on infrastructure capacity of the Corridor should ideally be anticipated. Thirdly, the Corridor transport system might have a **broader role in the energy transition**, not restricted to decarbonisation of transport services, but through synergies with the energy sector. This includes in particular the production and transport of clean energy.

Those are the thoughts I would like to share with you for the coming months. Meanwhile, as European Coordinator, I will not lose sight of our common short- to mid-term priorities and wish to continue working with all Corridor stakeholders in the best cooperative spirit.

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