European Commission

Scandinavian Mediterranean

Fourth Work Plan of the European Coordinator

Pat Cox

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Mobility and Transport

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Abbreviations

ATM	Air Traffic Management
bn	Billion
CEF	Connecting Europe Facility
CNC	Core Network Corridor
DG MOVE	European Commission – Directorate General for Mobility and Transport
EC	European Commission
EIA	Environmental Impact Assessment
ERTMS	European Rail Traffic Management System
ERDF	European Regional Development Funds
EU	European Union
GDP	Gross Domestic Product
ICT	Information and Communication Technologies
INEA	Innovation and Networks Executive Agency (EU)
IWW	Inland waterway
km	kilometre
KPI	Key performance indicator (set of indicators based on the TEN-T Regulation)
m	metre (for distances)
m	Million (for other)
MoS	Motorway(s) of the Sea
MoT	Ministry of Transport
MTMS	Multimodal Transport Market Study
MS	Member States of the European Union
n.a.	not available / not applicable
OEM	Orient / East-Med (Corridor)
OJ	Official Journal (of the European Union)
p.a.	per year / annual
RD	Rhine-Danube (Corridor)
RFC	Rail Freight Corridor
Scan-Med	Scandinavian-Mediterranean (Corridor)
TEN-T	Trans-European Transport Network
TMS	Traffic Management System

Country Codes after ISO 3166, relevant for this report:

AT	Austria
DE	Germany
DK	Denmark
FI	Finland
IT	Italy
MT	Malta
NO	Norway
SE	Sweden

1 Towards the Scandinavian-Mediterranean Corridor 4th Work Plan

1.1 Introduction

Transport is a policy pillar that can make a vital contribution to boosting long-term competitiveness, sustainable growth and the development of the internal market and the wider European economy. Efficiency improvements in the transport of people and goods within the internal market and with the wider world, enhanced deployment of intelligent transport systems, the greening of the sector and its infrastructures and by that mitigating its negative impact on climate change are key elements of TEN-T policy. Short-to medium-term capital investment in transport infrastructure and systems generates considerable direct and indirect employment and economic growth. Additionally, technological and systems innovation can be expected to foster the development of supporting business ecosystems specialising in the servicing and management of ICT and addressing sustainability challenges.

End of 2019 the EU presented the European Green Deal, a new growth strategy that aims to transform the EU into a fair and prosperous society, with a modern, resource-efficient and competitive economy where there are no net emissions of greenhouse gases in 2050 and where economic growth is decoupled from resource use. TEN-T policy and the core network corridors will have to play their role in stimulating this decarbonisation of the transport system.

In this context, the European Coordinator presents the fourth generation of the work plan for the Scandinavian-Mediterranean Core Network Corridor (Scan-Med Corridor) to the Member States for appraisal and approval. This plan is founded on the provisions of TEN-T Regulation (EU) No 1315/2013[1] and on the first, second and third Work Plans presented in 2015, 2016 and 2018.

The concept of the Core Network corridor, as described in Article 42.1, is an instrument that acts as the centre of gravity around which our work on modal integration, interoperability and coordinated development of infrastructure orbits.

What follows is a detailed description of the key characteristics of the Scan-Med Corridor as derived from the corridor studies supported by the comments and insights of the Member States, Norway, the European Commission and invited stakeholders forming the Corridor Forum. The primary objective of this plan is to drive the realisation of the Scan-Med Corridor between now and 2030, as a matter of common interest and shared responsibility.

This fourth iteration in planning the Scan-Med Corridor permits the European Coordinator to focus on the agreed key priorities with a view to ensuring that it makes the fullest contribution to realising the objectives of the Trans-European Transport Network.

The European Coordinator thanks all those organisations and public officials who contributed such valuable time and insights to this challenging and complex exercise.

1.2 Achievements along the Corridor since 2014

Progress in the Corridor's development is usually achieved by undertaking projects that bring the corridor closer to compliance with the requirements of the TEN-T Regulation, through eliminating bottlenecks, missing links and addressing interoperability issues. The indicative Project List[2] for the nine Core Network Corridors

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[1] OJ L 348, 20.12.2013.
2 Updated final presentation on the Project List dated November 2019.

now includes **817 Scan-Med relevant projects with a total of known costs of €220bn**. 142 projects with a total cost of €29.9bn have already been completed between the adoption of the TEN-T Regulation and the end of 2018 (67 from 2014-2016 and 75 from 2017-2018). While the highest number of projects has been completed in the Motorways of the Sea category (30) the highest share of investment (€14.8bn) has gone to rail. The following table provides an overview of the distribution of the completed projects by country and project category.

Table 1: Number of projects completed 2014–2018, by country and project category, and their total cost in billion €

Country / Category	*Rail*	*Rail ERTMS*	*Road*	*Mari-time*	*MoS*	*Air-port*	*Multi-modal*	*Inno-vation*	*Other*	***Total***
FI			*4*			*1*	*1*	*2*		***8***
SE	*7*		*6*	*2*	*1*	*2*	*2*			***20***
DK	*2*		*1*							***3***
DE	*9*	*2*	*6*	*4*		*6*	*3*	*1*		***31***
AT		*2*	*4*							***6***
IT	*4*		*3*	*5*	*1*	*7*	*1*		*1*	***22***
MT			*1*	*3*		*4*				***8***
NO						*1*				***1***
Multi	*2*	*2*	*4*	*4*	*28*		*1*	*2*		***43***
Total N°	***24***	***6***	***29***	***18***	***30***	***21***	***8***	***5***	***1***	***142***
Total cost [bn€]	***14.8***	***0.1***	***8.4***	***0.8***	***1.2***	***2.5***	***0.1***	***0.1***	***1.7***	***29.9****

** Officially known costs from the project list; displayed sums may differ from calculations due to rounding.*

Source: KombiConsult analysis, November 2019

With a view to the envisaged completion of the corridor by 2030, some encouraging **key figures and developments** in the different modes of transport can be stated although some **uncertainties regarding delays and financing** remain.

Rail and Rail / Road terminals

Rail infrastructure, being the backbone of future pan-European freight traffic shows high compliance rates with the TEN-T parameters "track gauge", "electrification", "axle load" and "line speed". While the track gauge is compliant with the requested standard gauge already today (Finland as "isolated network" is exempted), the entire corridor is expected to be electrified by 2030 the latest. Italy and Germany have set up dedicated programmes to improve the situation regarding the parameters "Train length" and "Axle load". Also, in Sweden there is an ongoing project with the aim of contributing to the KPI "train length". Missing links of the rail alignment have been closed (high-speed line Erfurt-Nuremberg) or will be added to the corridor until 2030.

Also, in Sweden the implementation of Scan-Med projects is progressing smoothly. Most projects are financed within the current national investment plan 2018 – 2029. Studies on the new high-speed rail lines Ostlänken, Göteborg-Borås and Lund – Hässleholm have started. However, financing and standard of the entire high speed rail line between Stockholm – Jönköping – Göteborg/Malmö is still not decided.

Rail/Road terminals as the main access points to market driven intermodal transport services are available in high density and attain good quality levels along the corridor. In 2020 the "Mega-Hub" Hannover-Lehrte is expected to be operational. Other main terminals like Kouvola, Hamburg-Billwerder, Berlin-Großbeeren, Munich and Verona are subject to capacity and layout upgrade measures.

Major Rail projects recently completed

- **ABS/NBS Nürnberg - Erfurt**: A new high-speed rail line with total costs of €6.4bn that helped cutting travel times between Munich/Nuremberg and Berlin.
- **Citybanan**, a rail project with total costs of about €2.2bn that doubles total rail capacity in Stockholm.
- **Rail connection Napoli - Foggia – Bari**: upgrade of infrastructure and technology on the line section between Bovino and Cervaro. Costs ca. €260m.
- **Upgrading Battipaglia - Reggio Calabria**: Infrastructure and technological upgrade of the line (incl. new PRG and ACC Lamezia C.le). Costs ca. €230m.

Despite the above, corridor evolution is hampered, as various rail projects are facing **delays or financing uncertainty**: 13 projects with importance for KPI achievement are expected to be concluded only after December 2030 or have no exact finalisation date at all (see Table 2). Moreover, financing of 42 projects with KPI relevance is not totally approved yet. This insecurity regarding on-time completion applies – among others - to some key rail projects with vital importance for the corridor. For the Fehmarn Belt fixed link while a major milestone has been reached and preparatory works on the Danish side have started the permitting procedures completed on the German side in January 2019 are currently a case at the Federal Administrative Court in Leipzig. The northern and southern access routes to the Brenner are subject to gradual expansion (according to expected traffic volumes) until the construction of a completely new_route (in Germany) or will be finalised only after 2030 (in Italy).

Table 2: Rail projects with end date "unknown" or "after 2030" and at least one "KPI to be achieved"

TEN-T Project ID	Project promoter/ Project name	Project category	KPI(s) achieved	Project end date	Total costs (official) M€	Total project financing approved
Norway						
5182	Jernbanedirektoratet (Norwegian Railway Directorate): Construction of 57km double-track railway and capacity improvements in 4 stations.	Rail	ERTMS Line speed >= 100km/h Axle load >= 22.5t Train length >= 740m	12/2034	2,300.0	no
5185	Jernbanedirektoratet: Follobanen	Rail	ERTMS Line speed >= 100km/h Axle load >= 22.5t Train length >= 740m	12/2022	2,800	yes
Finland						
5439	Finnish Transport Infrastructure Agency: Improvement of the section Espoo - Karjaa	Rail	Axle load >= 22.5t Train length >= 740m	unknown	10	no
5691	Finnish Transport Infrastructure Agency: Improvement of the section Imatra - border	Rail	Line speed >= 100km/h Axle load >= 22.5t Train length >= 740m	unknown	73	no

TEN-T Project ID	Project promoter/ Project name	Project category	KPI(s) achieved	Project end date	Total costs (official) M€	Total project financing approved
Sweden						
5174	Swedish Transport Administration: Göteborg - Landvetter-Airport - Borås (Airport connection)	Rail	Connection to rail	unknown	3,486	no
5407	Swedish Transport Administration: Hallsberg - Åsbro (Etapp/Phase 3)	Rail	Line speed >= 100km/h Train length >= 740m	unknown	344	no
Germany						
6320	DB Netz: Rail facilities for Rail Undertakings	Rail	Train length >= 740m	unknown	unknown	n.a.
Italy						
5979	RFI: Upgrade Verona Q.E. NEW	Multimodal	740m train terminal accessibility	unknown	unknown	n.a.

Source: KombiConsult analysis based on the updated 2019 Project List of CNC Scan-Med

Road

High quality **roads** are indispensable for maintaining speed and safety standards, and to mitigate critical issues on the Corridor's road network. To avoid congestion in and around large cities or in geographically limiting areas, bottlenecks and missing links need to be addressed. There were altogether 29 road projects completed during the period 2014 to 2018 with official total costs of €8.4bn.

Major Road projects recently completed

- **A 7 Dreieck Bordesholm – Hamburg**, upgrade: a PPP highway project upgrading this highway section to six track lanes. Total costs about €1.5bn.
- **Koge – Bugt Motorway**, expanding the motorway south of Copenhagen from six to eight lanes, removing a bottleneck of 14 km.

In the field of **clean fuels deployment**, the project *MECOR* achieved the availability of clean fuels KPIs connecting two urban nodes of Malmo and Copenhagen as multimodal e-mobility hubs. Project *EVA+* improved the clean fuels KPIs by a set of preparatory studies, a pilot implementation of 200 (thereof 180 in Italy) multi standard fast chargers and a real-life trial of Electric Vehicles on the Core Network in Italy and Austria along a major section of four multimodal Core Network Corridors.

Also in the case of road, the project list contains some projects that are facing **delays or financing uncertainty**. In total 28 projects have an unknown starting date and for 37 projects, the end date has not been given.

Airports

As concerns **airports**, 21 projects with a total cost of €2.5bn are known to have been completed by the end of 2018. Out of these 15 concern the increase/optimisation of infrastructural capacity (9 projects for landside infrastructure and 6 for airside infrastructure). Geographically, the highest share of these 21 projects is located in Italy (7 out of 21), with total costs of €204.55m.

Major Airport projects recently completed

- **Airport expansion Oslo Airport:** Construction of a new terminal thereby expanding the terminal area by 117,000 m² (from 148,000 m²) with total costs of about €1.5bn.

For the future period, between 2019 and 2030, 49 further airport projects are planned for implementation on the Scan-Med Corridor, with total known costs estimated at €3.5bn. If projects with a later or unknown end date are counted as well an investment of €8.3bn is derived.

Maritime / Seaport and MoS

Eighteen **maritime projects** have been completed in the period 2014 to 2018 located in Sweden, Germany, Italy and Malta or "multiple countries". More than €0.8bn were invested in these projects. A noteworthy share of this amount has been invested to provide more **transhipment capacity** such as in Malta or to **improve the railway infrastructure** in seaports.

Major Maritime projects recently completed

- **Livorno:** Construction of a new station at Darsena Toscana terminal in the port area, and its direct connection to the Thyrrenian line worth €43m.
- **Twin-port Bremen/Bremerhaven:** Improvement of railway capacity and quality infrastructure upgrade of the shunting rail yard 'Imsumer Deich' with a total cost of €16.5m.

For the period between 2019 and 2030, 117 projects are planned to be completed while a further 33 projects are expected to be completed only after 2030 or have an unknown end date. For Seaports the development of infrastructure for the provision of clean fuels is an ongoing and important task (see compliance chapter).

Thirty **MoS** projects have been completed between 2014 and 2018 worth almost €1.2bn of investment. A significant share of these projects is related to **LNG-bunkering or other sustainability improvements**. A further 19 projects shall be completed until 2030 while for seven projects the end date is not known.

Major MoS projects recently completed

- Create **break bulk infrastructure for small-scale LNG supply** in the ports of Rotterdam and Gothenburg. These ports have the critical mass to assist the market transition towards maritime LNG in Northern Europe.
- The Nordic Maritime Link - Connecting the Scan-Med Corridor via Integrated MoS aims to increase the **multimodal attractiveness** of the Nordic Maritime Link between continental Europe and Scandinavia. This was done by integrating rail-based services with high-frequency, safe and green RoPax services on the maritime link from the Port of Gothenburg to the Port of Frederikshavn.

2 Characteristics of the Scan-Med Corridor

2.1 Alignment

The Scan-Med Corridor links the major urban centres in Germany and Italy to Scandinavia (Oslo, Copenhagen, Stockholm and Helsinki) and the Mediterranean (Italian seaports, Sicily and Malta). It covers seven EU Member States and Norway and represents a crucial axis for the European economy, crossing almost the whole continent from North to South.

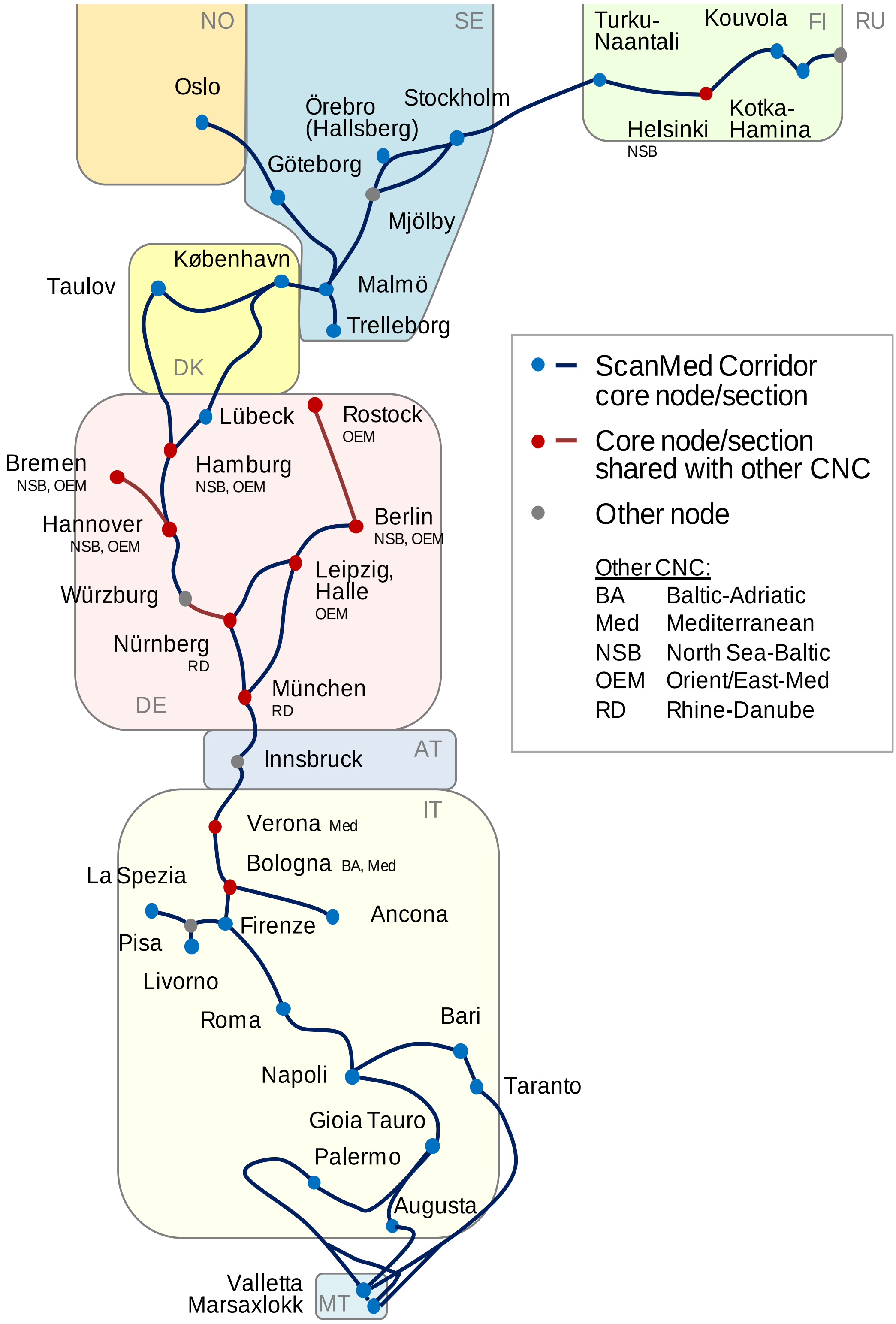
The Corridor is the largest of the corridors in terms of Core Network length – with more than 9,600 km of core rail and in excess of 6,300 km of core road network – together with 25 core ports, 19 core airports, 28 core intermodal terminals and 19 core urban nodes.

This Corridor also needs to be looked at in the context of developing global transport routes. The cross-border section between Finland and Russia plays a significant role for the terrestrial connections to the eastern and northern markets in Russia, China and Asia, while the North Sea and Mediterranean ports provide maritime access to the American and African continents and the rest of the global trading network. The cartogram in figure 2 shows the Corridor's schematic alignment, sections shared with other Core Network Corridors (CNC), core nodes according to the TEN-T and CEF Regulations (in particular the Annex I, Part 1 Alignment) as well as pre-identified sections including projects.

Rail and road, but not inland waterways, are the key "linear" modes of transport designated in the Scan-Med Corridor. Several sections of the alignment are sea crossings ("Motorways of the Sea"), in particular the connections between Finland and Sweden, Sweden and Denmark, Denmark and Germany as well as between Italy and Malta. The maritime dimension, however, goes far beyond the single Corridor and connects European countries with each other and the rest of the World.

The other dimension of the Scan-Med Corridor is composed of "nodal" infrastructure such as airports, seaports and rail-road terminals of the Core Network. As regards modal and infrastructural interconnection between the Trans-European, regional and local transport networks, "urban nodes" are of specific importance. As "multimodal" infrastructures they facilitate the transfer between modes and generate both passenger and freight traffic.

Figure 1: Alignment of the Scan-Med Corridor



Source: KombiConsult analysis, October 2016, this illustration does not distinguish rail from road

2.2 Compliance 2018 and 2030 with the TEN-T guidelines parameters

Article 4 of Regulation (EU) 1315/2013 describes the objectives of the trans-European transport network, which shall strengthen the social, economic and territorial cohesion of the European Union. The aim is to create a single European transport area, which is efficient and sustainable to increase the benefits for its users and to support inclusive growth. At the end of 2014, the Member States of the Scan-Med Corridor agreed a list of specific objectives, which have to be met by 2030 at the latest (see "Target 2030" in the following tables per mode).

These objectives have been transferred into Key Performance Indicators (KPIs) that apply to all core network corridors. The KPIs allow measuring and monitoring the extent to which target values are realized. The percentage values presented in the following tables represent the length of the compliant infrastructure or the number of compliant nodes, compared to the overall length or number of nodes. Persisting bottlenecks and missing links are subsequently described in chapter 2.3.

Rail Compliance

The following Table 3 compares the current compliance situation of the corridor rail network with the status to be achieved by 2030 while figure 2 below shows the expected compliance situation in the target year 2030.

Table 3: Compliance with TEN-T rail requirements by 2018

	Target 2030	2018
Railways		
KPI "Traction" Target: lines electrified	100%	96%
KPI "Track gauge" Target: 1435 mm	100%	100% (96%*)
KPI "Line speed" Target: ≥ 100 km/h	100%	92%
KPI "Axle load" Target: ≥ 22.5 t	100%	92%
KPI "Train length" Target: ≥ 740 m	100%	49%
KPI "ERTMS" Target: in operation	100%	7%

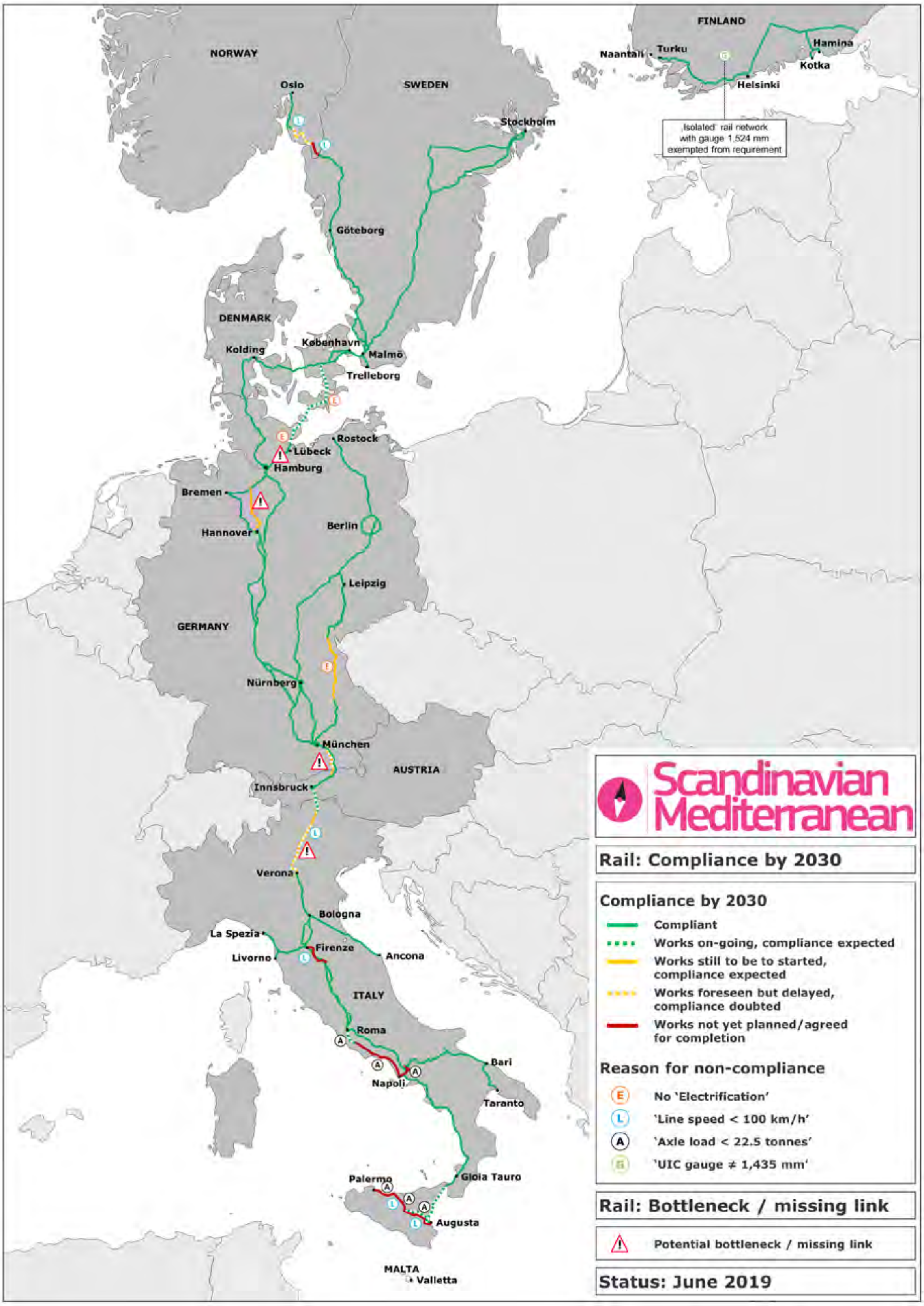
** Isolated rail network in Finland with gauge 1,524 mm exempted from requirement.*

Note: Since 2018 until the completion of the 4th WP more sections of the network allow a train length of 740 m (see text below).
Source: HaCon analysis, June 2019, ERTMS analysis provided by EY/INECO October 2019.

Four out of six **rail** KPIs show high compliance values already in 2018:

- Corridor rail lines are **electrified** to 96%. Non-electrified corridor sections are located on the northern and southern access routes to the planned Fehmarn Belt fixed link between Germany and Denmark (Ringsted – Rødby and Puttgarden - Bad Schwartau-Waldhalle) and in the eastern part of Germany (Hof – Regensburg).
- All rail lines along the Scan-Med Corridor feature the standard **track gauge** of 1,435 mm, with the exception of Finland, which due to its connection with the Russian territory uses the Russian track gauge of 1,524 mm. The Finnish rail network is thus considered as "isolated" and as such exempted from the requirement of realising 1,435 mm.
- Almost the entire corridor provides a **line speed** of at least 100 km/h (92%). Large non-compliant sections are located in Italy on the southern access line to the Brenner Pass/Brenner Base Tunnel and in Sicily. Moreover, some countries show small incompliant sections within the nodes, particularly in the surroundings of big stations (e.g. Halle, Firenze, Napoli).
- Huge parts of the corridor provide for **axle loads** of at least 22.5 tonnes already today. All non-compliant sections are located in the southern part of Italy, namely between Roma and Napoli as well as in Sicily.

Figure 2: Map of rail compliance by 2030



Source: HaCon analysis, June 2019

In contrast to the above mentioned KPIs, two rail parameters show considerably lower compliance rates:

- **Freight train length** of 740 m is permitted only on half of the corridors rail network. Particularly in Sweden and in Italy, the length for freight trains is limited – in general to 630 m or below.[3] In 2019, the Norwegian Railway Directorate stated the new standard permitted train lengths to be 740 m for international connections. If information was missing, the compliance of some corridor sections has been classified as "unknown".
- **ERTMS** is made of two components: GSM-R for which 92% of the lines are equipped and ETCS which is applied on only 7% of the Scan-Med corridor rail lines. Finland, Norway, Sweden and Germany have the lowest rates to date (for upgrade plans see chapter 4.2).

The forecast on the **expected rail situation by 2030** is based on the above-mentioned status quo analysis in combination with the impact of projects that are KPI relevant and have a completion date before 2030 (see figure on previous page). Compared to the current situation, the following main developments can be stated:

- The remaining gaps of **electrification** will be closed by ongoing or planned projects. Thus, by 2030 total compliance of the corridor can be expected, if all these projects are finalised according to schedule.
- 100 km/h **line speed** will be achieved by the new Brenner Base tunnel and the Italian access route until Ponte Gardena/Waidbruck. Between Ponte Gardena/Waidbruck and Verona however, project finalisation is scheduled after 2030. Remaining speed limitations are to be expected in Norway (section Halden – Kornsjoe (33 km)) and Italy (south of Firenze and in Sicily).[4]
- Concerning permitted **axle load**, Italy has set up an infrastructure upgrade programme that will make most of the corridor compliant. However, some compliance gaps are expected to remain; they are located between Firenze and Napoli (via Formia) and on some sections in Sicily.
- Particular progress is expected regarding the permitted **train length**. In Sweden and Italy, projects are ongoing to achieve compliance. Network sections with permitted train length lower than 740 m will remain between Firenze and Roma, between Roma and Napoli (via Formia) and in parts of Sicily.
- **ERTMS** deployment is agreed upon only until 2023. The 2030 values are set as targets only with no commitment on underlying projects so that in particular full ETCS deployment can be doubted, if no acceleration is agreed upon.
- **Bottlenecks** to be closed until 2030 are located in Germany. The "Alpha-E" hinterland connection from/to the North Sea ports is covered by upgrade of existing infrastructure. The upgrade of the Brenner access route in Germany will be developed according to traffic requirements. Therefore, the upgrade to four tracks will be completed only after 2030.

Incompliant sections without ongoing or planned projects are subject to the definition of additional projects (see chapter 2.3).

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[3] In Sweden, the provided Scan-Med RFC train paths allow 730m from the Öresund bridge to Stockholm and 630 m on the line Malmö- Gothenburg - NO border.

[4] However, in order to ensure the continuity of the corridor, the line Firenze-Roma via Pisa and Grosseto and Rome - Napoli via Cassino (belonging to the comprehensive network) will be upgraded to the 750m track length and D4 axle load parameters by 2030.

Road compliance

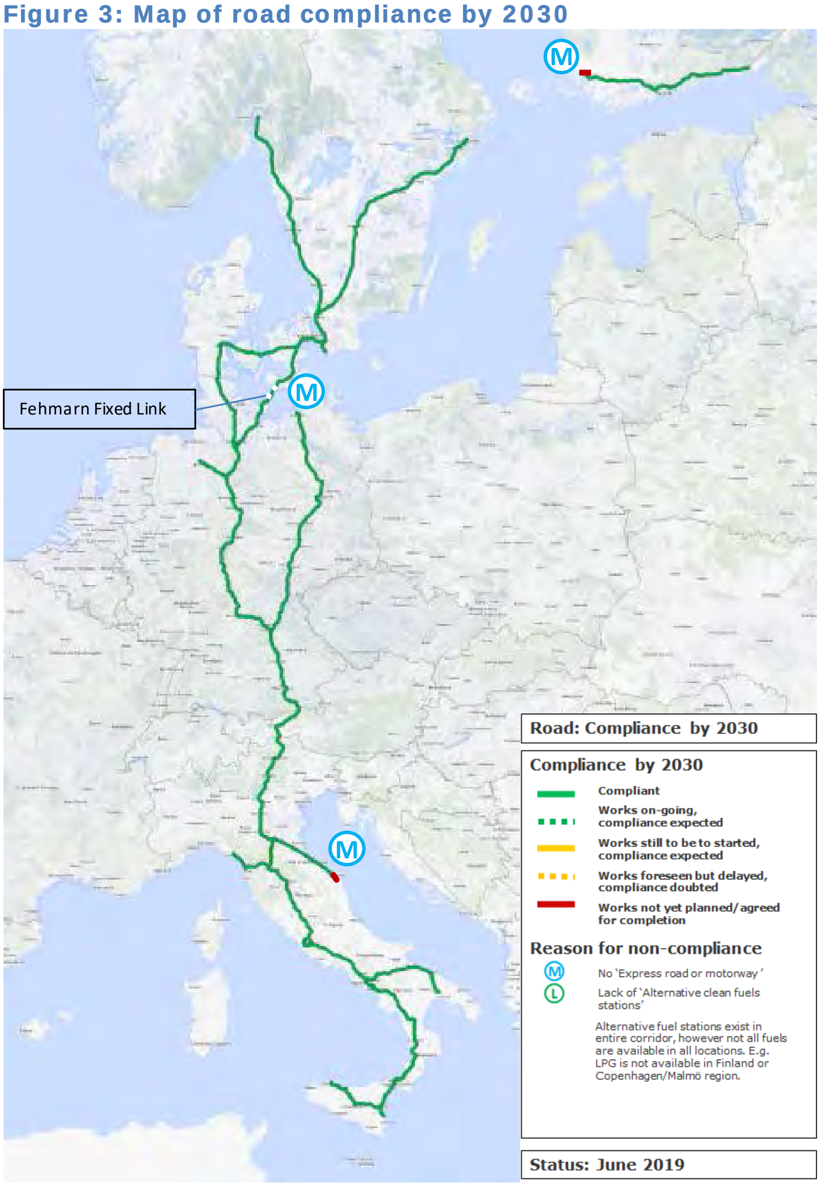
In terms of requirement for **express road or motorway**, the existing network is compliant to 99.7%. The remaining non-compliant sections are located in Finland (known to the Finnish planning authorities and planned for improvement) and in Italy (road connection to the Port of Ancona). In addition, the TEN-T Regulation requires the availability of **clean fuels** along corridor roads which to date is achieved only at a rate of 63.2%.

Table 4: Road infrastructure - Compliance with TEN-T requirements by 2018

	Target 2030	2018
Road		
KPI: Express road / motorway	100 %	99.7%
KPI: Availability of clean fuels	100 %	63.2%

Source: Ramböll analysis, June 2019

Figure 3: Map of road compliance by 2030



Source: Ramböll analysis, June 2019

Airport compliance

Regulation (EU) 1315/2013 requires main airports to be connected to the rail network, provide non-discriminatory access for operators, deploy SESAR and make clean fuels available.

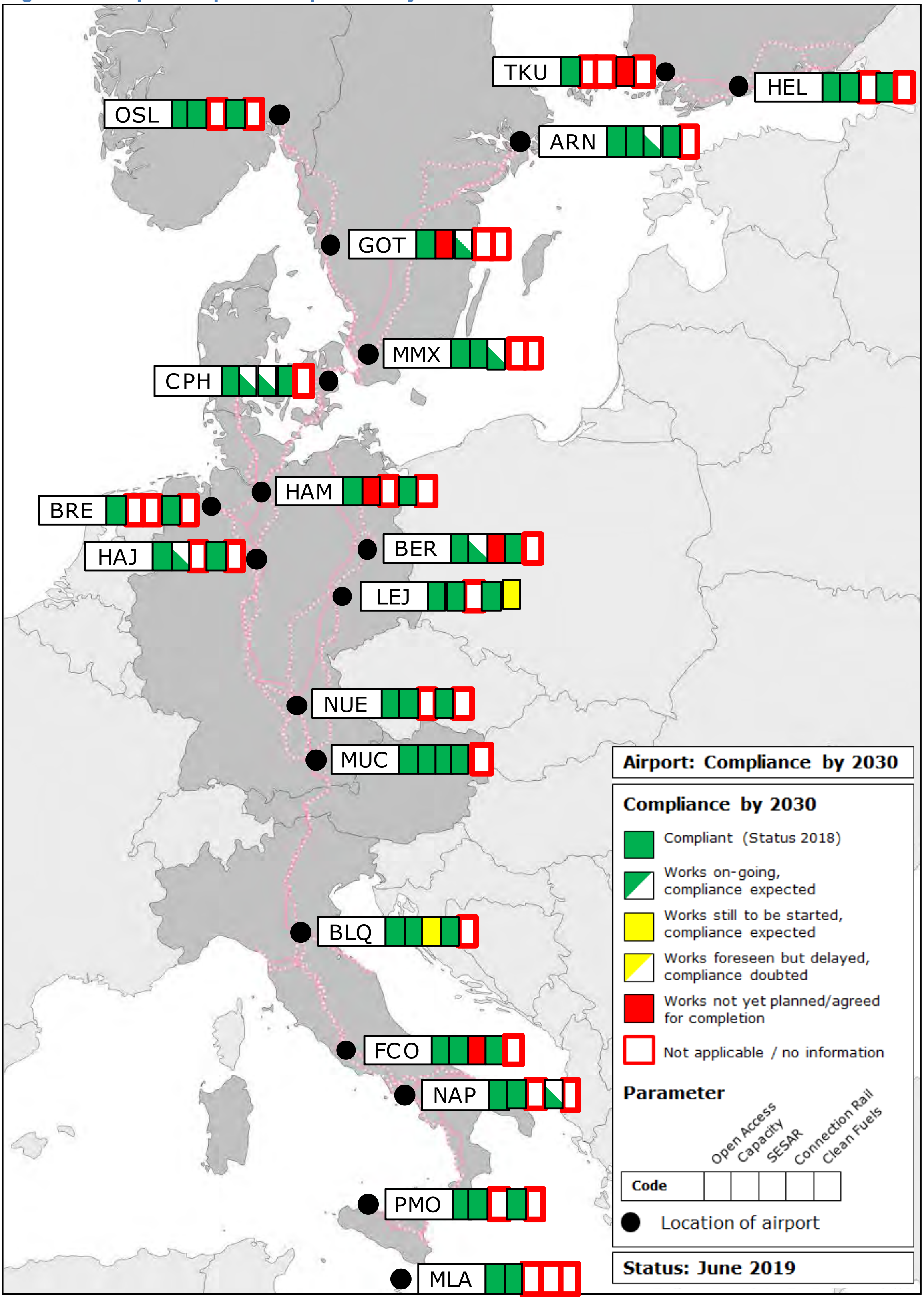
All airports on the Scan-Med corridor provide already **non-discriminatory access** for operators. With regards to the deployment of **SESAR** the airports of Stockholm, Gothenburg, Malmo, Copenhagen are in the development phase, while the airport of Munich completed deployment already. No SESAR projects have been developed for the remaining airports, and the implementation of the Air Transport Control systems is depending on national authorities.

Among the 19 core airports of the corridor 14 are already compliant with the requirement **connection by rail**. This includes already the airport of Bologna that recently has concluded the works for a Monorail System, called "Marconi Express". A People mover between the Central Railway Station and the Airport of Bologna with total cost of €119m.[5] An airport railway link is planned to Gothenburg Landvetter Airport. The seven main airports – for which the Regulation requires a rail connection - are already connected to rail. No airport connections are planned to the airports of Malmö and Turku and the compliance parameter is not applicable for Malta.

There is no relevant operational progress about the **availability of clean fuels** as this parameter depends mainly on the technological development of the industry. Looking at the **capacity** of the airport system of the Scan-Med Corridor it seems satisfactory. Major developments are expected for the airport of Berlin, and the opening of Berlin Brandenburg Airport is expected by October 2020. Other works to increase capacity are ongoing for Copenhagen and Hannover.

[5] Finally, by 2030 it is expected that also the airport of Naples will be connected by light rail and works are ongoing. It has to be clarified with the EC if light rail airport connections fulfil the requirements of the regulation.

Figure 4: Map of airport compliance by 2030



Source: PTSClas analysis, June 2019

Maritime / seaport compliance

Regulation (EU) 1315/2013 requires seaports to be connected to the rail network, provide an ECMT Class IV connection to Inland Waterways and make clean fuels as well as facilities for ship generated waste available.

Table 5: Seaports infrastructure - Compliance with TEN-T requirements by 2018

	Target 2030	2018
Seaports		
Connection to rail	88%	84%
ECMT Class IV Inland waterway connection	100%	100%
Availability of clean fuels	96%	84%
Facilities for ship generated waste	100%	100%

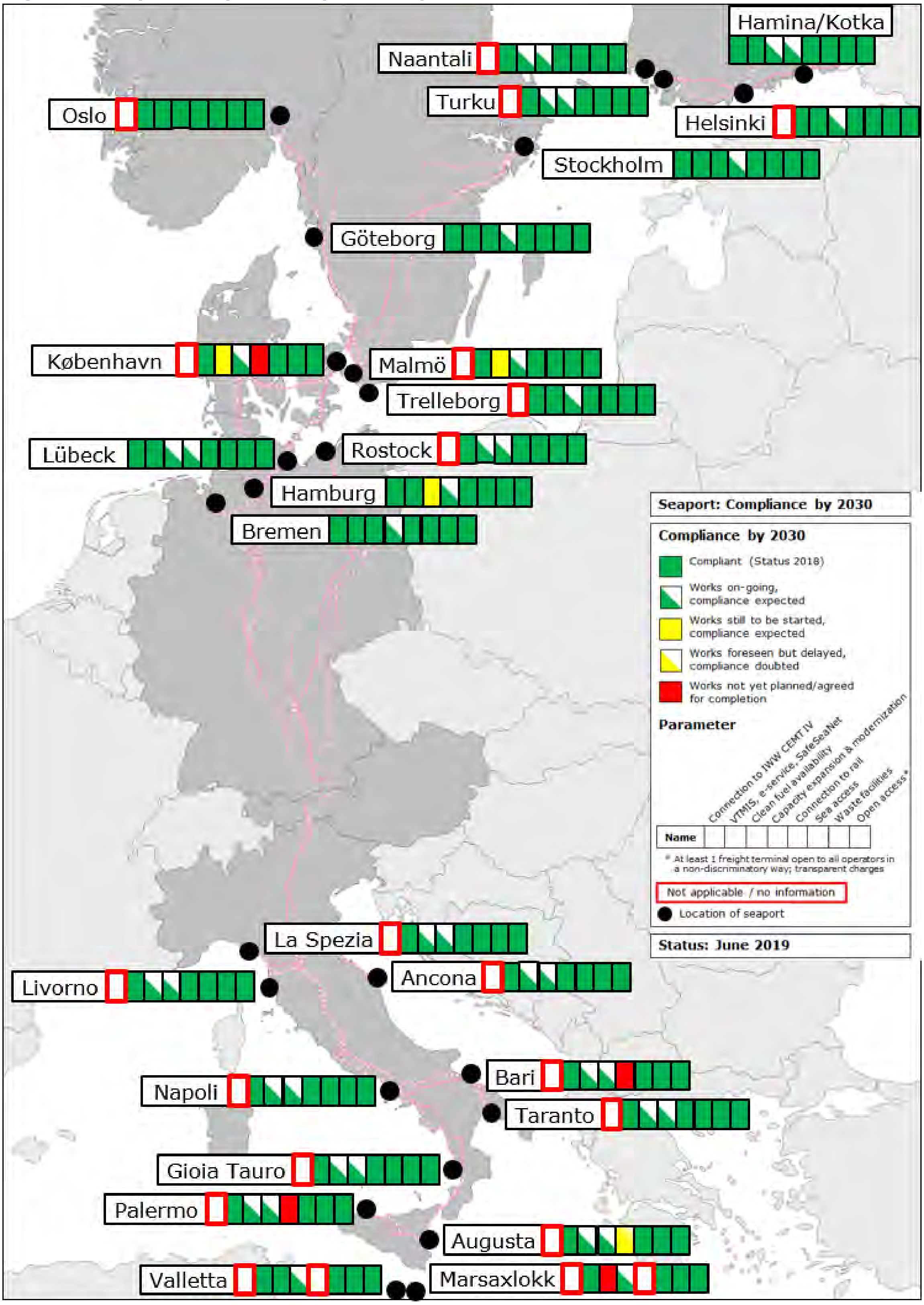
Source: HPC analysis, June 2019

Scan-Med seaports are already fulfilling many of the compliance parameters set in the Regulation so that the corridor will be fully or at least strongly compliant in the target year 2030. Supply of **clean fuels** and **connection to rail** are the least advanced features today and additional measures need to be taken if the 2030 targets shall be reached.

The ports of Bari, Copenhagen and Palermo do not have a connection to the railway network. In the port of Bari, the existing direct railway access to the port has been closed. While in the port of Palermo geographical and space restrictions are constraining the establishment of a rail connection. CMP's strategic plan to move the container terminal in Copenhagen to a new site (Ydre Nordhavn) in 2020 does not foresee a connection to the railway network on the Danish side of CMP.[6] Therefore, it is assumed that these three ports will not be compliant with this parameter in 2030 so that the total target was reduced to "88%". The Maltese ports are exempted from the requirement.

6 See: http://www.cmport.com/business/containers; http://www.cmport.com/en/business/rail

Figure 5: Map of Seaport compliance by 2030



Note: So far, the Port of Copenhagen did not reach compliance regarding the parameter "Connection to rail". Due to space restrictions inside and in the vicinity of the port, this parameter might not be applicable. A decision by the EC is needed, if an exemption from the requirements of the regulation can be approved.

Source: HPC analysis, June 2019

Rail-Road terminal compliance

Regulation (EU) 1315/2013 directly requires Rail-Road terminals to be open for all operators and be capable for transhipment of intermodal transport units while for the rail access electrification and handling of 740m long freight trains comes on top.

Table 6: Rail-Road terminals - Compliance with TEN-T requirements by 2018

	Target 2030	2018
Rail-Road Terminals		
Capability of intermodal transhipment	100%	74%
Availability of at least one freight terminal open to all operators	100%	100%
Electrified train accessibility*	100%	48%
740m train terminal accessibility*	100%	19%

Source: KombiConsult analysis, November 2018, partly updated November 2019
* These are no direct requirements according to Regulation (EU) 1315/2013 but the requirements set for the rail network itself make it necessary also for terminals to comply with those provisions

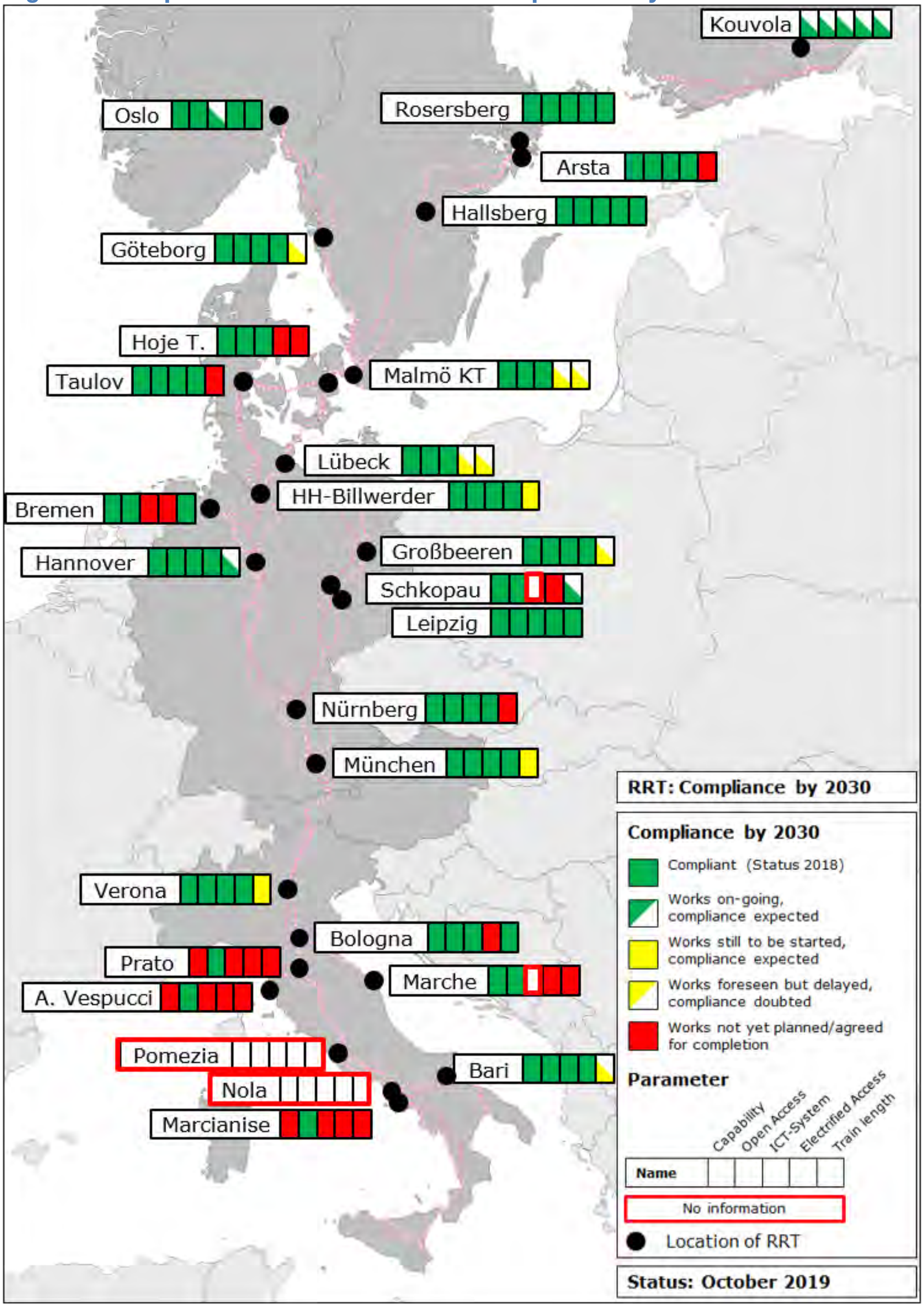
The 28 Rail-Road Terminals of the Scan-Med Corridor are generally connected to rail and road, provide discrimination-free access for their users and qualified handling equipment for all types of intermodal loading units. **Terminal management systems** are widely used (except for one terminal) to provide real-time information on the operational situation in the terminal and for data exchange with connected transport mode operators (railway undertakings, intermodal operators and forwarders). **ICT system** implementation is a field where improvement is needed by the owners or operators of the respective sites. If it comes to public financing, the public entities should ensure that the ICT systems fulfil the requirements of Articles 28(1)(b) and 29(c) of the TEN-T Regulation in the strict sense.

The largest challenge for the present sites is that their **connection to rail infrastructure is outdated** (single sided, non-electrified, annex to shunting yard or port railway line). Hence, it does not correspond to the requirements of market-driven transport services and needs urgent improvement. Additional problems are caused by the limitation of the (wagon) train length by either the reception/departure siding or the transhipment track(s) which are below the target set for the rail lines (electrified, 740m trains).[7]

In addition to the five sites already fulfilling the requirement (Rosersberg, Hallsberg, Bremen, Bologna and Nola) Kouvola, Hamburg, Berlin-Großbeeren, Munich and Verona are also committed to achieving compliance with the parameter (≥740 m train length) by 2030. For the other terminals, there are project ideas but "works are not yet planned/agreed for realisation", so that only slight improvement is expected compared to 2018. It is recommended that rail infrastructure managers and terminal managers cooperate in a coordinated way to achieve the track- and terminal-side improvement of that parameter.

[7] However, the TEN-T Regulation does not contain any direct requirements towards rail-road terminals concerning these issues.

Figure 6: Map of Rail-Road Terminal compliance by 2030



Source: KombiConsult analysis, June 2019, updated October 2019

2.3 Persisting bottlenecks and missing links

The previous chapter highlighted in how far the Scan-Med corridor can expected to be compliant with the TEN-T Regulation. As has been shown, in many areas full or almost full compliance can be achieved. However there are other factors beyond the requirements set in the regulation (missing projects or projects delays, administrative and operational barriers etc.) that risk to negatively impact the corridors good functioning in 2030 and beyond. To counter these compliance risks, **additional projects** have been proposed and are further outlined in chapter 4.

Rail

The "Green Deal" presented by the European Commission gives the railways a key role in limiting climate change and the resulting impacts. However, the railways can only fulfil this role, if the infrastructural and operational prerequisites are met. In this respect, the Scan-Med rail infrastructure shows a high quality already. However, with view to the envisaged completion of the corridor by 2030, some **compliance gaps** are expected to remain from today´s point of view. In terms of achieving 100 km/h **line-speed** projects are missing in Norway (section Halden – Kornsjoe (33 km)) and in Italy (sections south of Firenze and Augusta – Bicocca). The **train length** criterion might not be achieved in Austria (Kufstein – Innsbruck)[8] and in Italy (Rome - Napoli and in Sicily).[9] On the northern and southern access lines to the Brenner Base tunnel, projects in Italy are partially scheduled after 2030, whereas the envisaged four-track-upgrade in Germany is still in the study phase.

In addition to the requirements of the Regulation, the realisation of the **intermodal profile** P 70/400 (or higher) is a minimum market requirement and thus essential to ensure competitiveness of combined transport with road transport. In this respect, projects are ongoing in Germany and Italy but additional action is required on some corridor sections in southern Italy.

Apart from these infrastructure parameters, rail (freight) operation on the Scan-Med corridor is still hampered by **different electric voltage and signalling systems**. These require the employment of multi-system locomotives. Alternatively, locomotive change processes have to be optimised at border sections. Particularly the border crossing between Austria and Italy shows a change of several operating parameters: besides the rail voltage the maximum allowed train length, ERTMS equipment as well as the signalling system vary. In general, distinctions in rail voltage are most common parameter changes on Scan-Med border sections.

Next to the line infrastructure, **urban nodes** are a crucial component of TEN-T corridors merging and redistributing traffic flows. Overall goal of the urban node network development is the appropriate interconnection of passenger and freight transport between all modes involved. For rail transport, the seamless connection between the (long-distance) TEN-T infrastructure and the access points (e.g. terminals, ports, airports) plays an outstanding role. In this respect, the current situation of the Scan-Med urban nodes is characterised by non-compliance of the last-mile infrastructure. In particular, the train length is restricted on many access lines, requiring additional splitting/composing procedures of the long-haul trains. Moreover, some access lines are not electrified or do not fulfil the 22.5 t axle load requirement. Dedicated projects designed to improve the situation on the last-mile rail infrastructure are currently missing.

Road

Despite good practice in cross-border road projects, some critical issues regarding road transport should be noted. The 2nd generation of the Work Plan already lists critical issues of a general nature. An indicative detailed list of concrete measures per country is available for information in the Final Report on Elements of the Work Plan (August 2017).

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[8] Running 740m trains is possible already today between AT/DE border and Innsbruck and depends on schedule and actual train path. It is not possible on the mountain line from Innsbruck to Ponte Gardena in Italy. The BBT and Lot 1: Fortezza – Pt. Gardena will eliminate this compliance gap.

[9] However, in order to ensure the continuity of the corridor, the line Firenze-Roma via Pisa and Grosseto and Rome - Napoli via Cassino (belonging to the comprehensive network) will be upgraded to the 750m track length and D4 axle load parameters by 2030.

Availability of a variety of **alternative fuels and filling stations** is needed along the entire corridor. The location or co-location of stations for alternative fuels should be agreed. Information systems and **ITS** solutions to inform and steer the traffic to/from desired routes must be implemented to avoid delays or accidents further down the network, to re-route in case of big events or simply to control the traffic flows via traffic metering. The Regulation also requires **safe parking facilities** along the route. General developments of vehicle technology, emission regulations, weights and dimensions regulation etc. could also have a significant effect on the Scan-Med Corridor. **"Greening"** is also an important element of the Corridor. Projects such as SWIFTLY Green can provide concrete advice on issues such as **reducing noise and air emissions** as well as increased environmental efficiency by mode. In the absence of an initiative by the EU there is still no common view between countries or regions on the issue of allowing "longer and heavier trucks" thus exempting parts of the road freight transport from the maximum permitted parameters defined in Directive (EU) 2015/719 amending Directive 96/53/EEC. **Larger and heavier trucks** are currently allowed in Sweden, Finland and Norway. Denmark is testing the same vehicle dimensions on the major road network. The potential benefits of this solution are a better use of available capacity, as well as lower emissions per ton transported and lower costs. Germany has done field tests on some roads for selected applicants. As a result, there are 5 different types of longer trucks ("Lang-Lkw-Verordnung") allowed in Germany on selected roads and routes. Others (Austria and Italy) remain concerned with regards to larger trucks as they fear an additional reason for deferring the intended shift of freight traffic from road to rail (Austria) and because of technical compatibility with the national road infrastructure network (Italy). Austria and Italy have already stated that they will not accept such vehicles.

Airports

As shown in detail in Figure 4, the airports in the Scan-Med corridor are all currently compliant to EU Regulations as concerns **open access**, and show a generally positive situation in terms of capacity, as most of them are already compliant to the specific KPI or have relevant projects in the pipeline to address it.

Other compliance criteria such as **rail connections** are yet to be extensively fulfilled, while the seven main airports – for which the Regulation requires a rail connection - are already connected to rail, and other airports have projects in the pipeline. For the airports of Malmö, Sweden and Turku, Finland no plans for a railway connection exist.

However, the main weakness towards a full compliance lies in the field of **clean fuels availability**, due to the relevant technological barriers and the viability of projects addressing this objective. In fact, none of the Scan-Med airports provided information about plans to achieve compliance with the clean fuels criterion.

Seaports

Although the Scan-Med core ports have **railway access to the hinterland** the number of railway tracks does not represent the real infrastructure capacity need. Local capacity bottlenecks may occur within the port area itself, or at the intersection between the port and the railway network.

Therefore, it is important to improve linkages, build new rail stretches, consider extension and equipping of existing tracks an upgrading of handling operations at rail terminals. Only in case of adequate and matched capacities can it be ensured that the ports fulfil their role in the TEN-T Core Network.

Another critical issue is to maintain **good ice-breaking capacity** throughout the year, to ensure access to the ports in the Northern Baltic Sea (e.g. HaminaKotka, Helsinki, Turku/Naantali, and Stockholm). It is of high importance to reconsider the impact of climate change and, in consequence, the higher likelihood of extreme weather, including very cold periods also in the Southern Baltic Sea.

Regulation (EU) 1315/2013 and other EU legislation on sustainability, energy efficiency and CO2 reduction require publicly accessible alternative **clean fuels** for maritime (and IWW) transport to be provided by all the maritime core ports by 2030. In general, there seems to be "sufficient" time to achieve this objective. However, progress needs to be kept under constant review.

3 Transport Market Study

3.1 Current flows along the Corridor

To generate input data for the common Multimodal Transport Market Study, all corridors agreed upon a common data collection process. For this, Infrastructure Managers (IMs) were asked to provide freight and passenger flows by 2017 TENtec corridor sections as well as average vehicle occupancy rates and cargo weights. If an IM could not provide the data or did not answer the request, alternative sources like Eurostat were used. The common reference year for the collected data was 2016. However, in some instances data from other years was used to fill gaps.

The collected, harmonised and analysed data was then shared between corridors to guarantee a common base. Thus, flows along shared sections are identical for all corridors. Figures 7 to 10 on the following pages show the results of the data collection for the Scan-Med corridor.

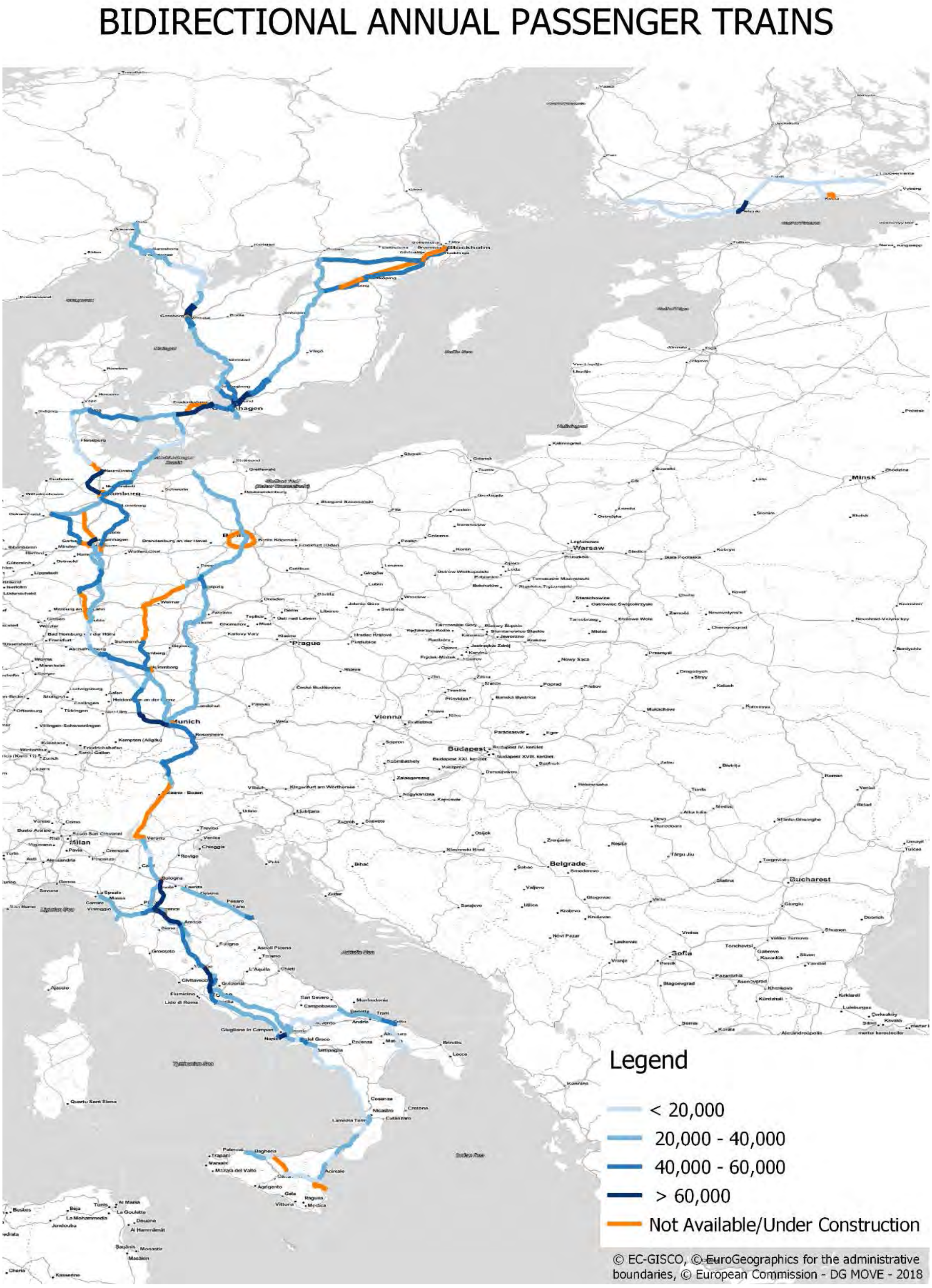
Annual bi-directional **freight train traffic** has been below 20,000 freight trains per year along most of the corridor in the base year 2016. Most freight trains were reported within Germany between Bremen and Fulda and between Wörgl in Austria and Fortezza in Italy with more than 40,000 trains on each of these sections. **Passenger train activity** is generally higher, with a multitude of sections around metropolitan areas counting more than 60,000 trains a year from Gothenburg (SE) in the north to Napoli (IT) in the south.

Seven sections count more than 100,000 total trains (freight and passenger). Of these, three are in Sweden, two in Denmark and two in Germany. Due to the high number of trains, these and some other sections in Scandinavia have a lower capacity left than most sections in Germany, Austria and Italy.

Daily bi-directional **passenger car traffic** is the heaviest around the cities of Copenhagen (DK), Hamburg (DE), Munich (DE) and Rome (IT) with more than 90,000 passenger cars per day. Generally, passenger car traffic is less dense in peripheral areas, with daily bi-directional traffic exceeding 30,000 cars almost continuously from Malmö (SE) to Napoli (IT). Daily bi-directional **heavy vehicle traffic** exceeds 9,000 vehicles from Hamburg (DE) to Salerno (IT), with more than 15,000 vehicles around Kassel (DE), Nuremberg (DE), Bologna (IT), Imola (IT) and Firenze (IT) and more than 20,000 vehicles around Hamburg (DE), Munich (DE) and Rome (IT).

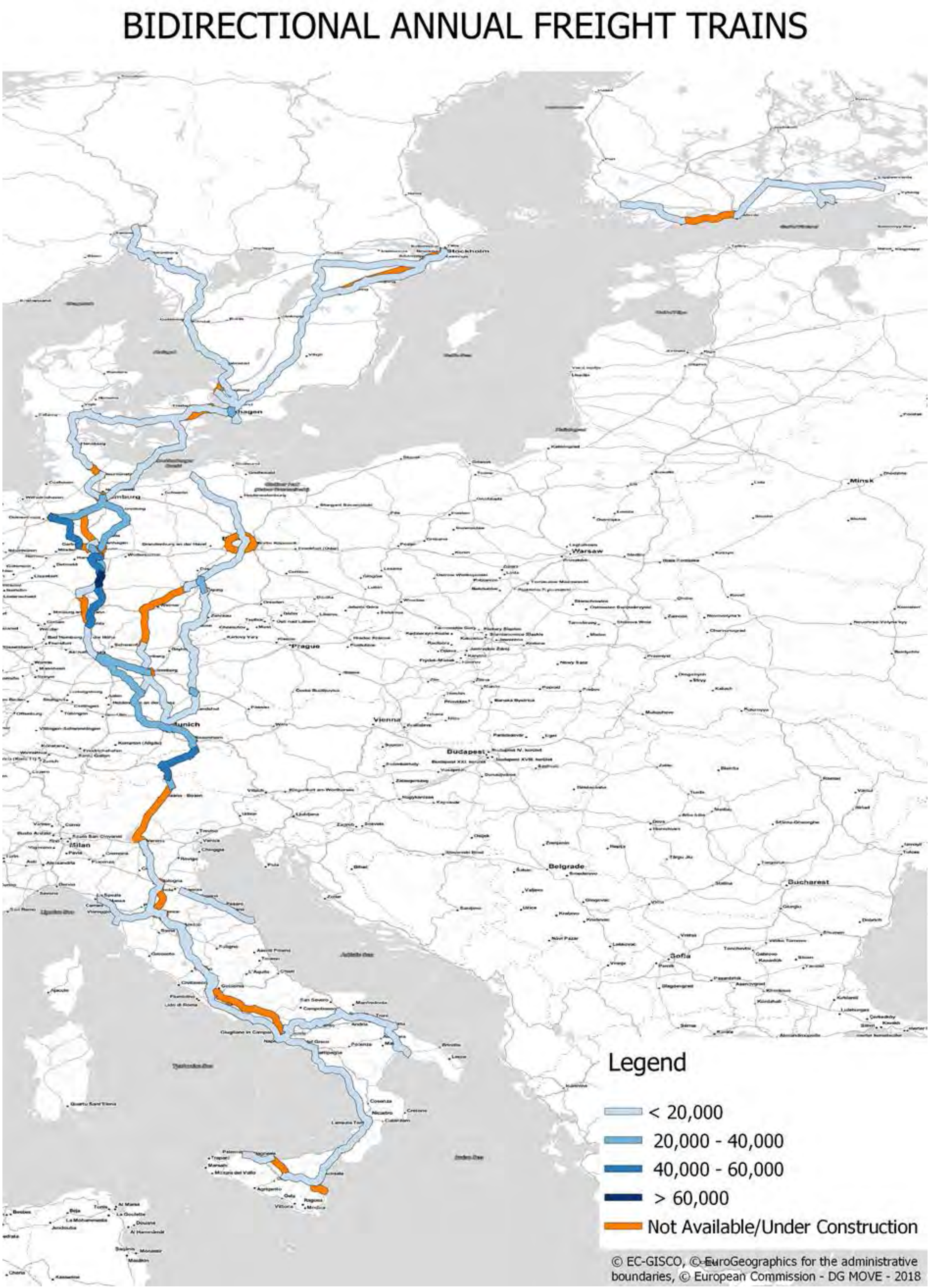
The lowest total road traffic (both passenger and freight traffic) with averages below 20,000 vehicles per day is found mostly in peripheral sections in East Finland and Southern Italy, but also in sections in Sweden (between Jönköping and Helsingborg and between Gothenburg and the border to Norway).

Figure 7: Bidirectional passenger trains per year along the Scan-Med Corridor, 2016



Source: Prognos based on data provided by Infrastructure Managers

Figure 8: Bidirectional freight trains per year along the Scan-Med Corridor, 2016[10]



Source: Prognos based on data provided by Infrastructure Managers

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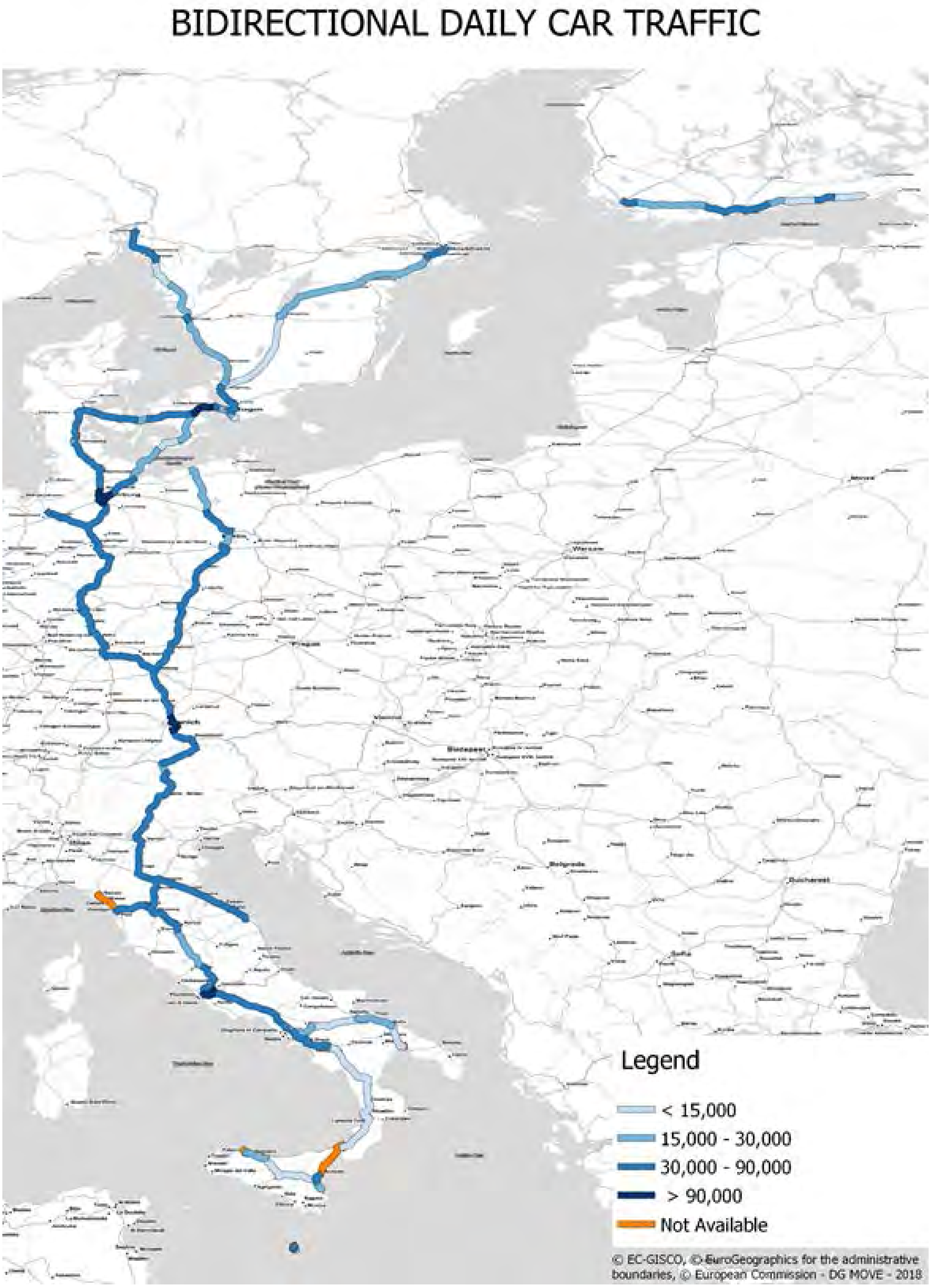
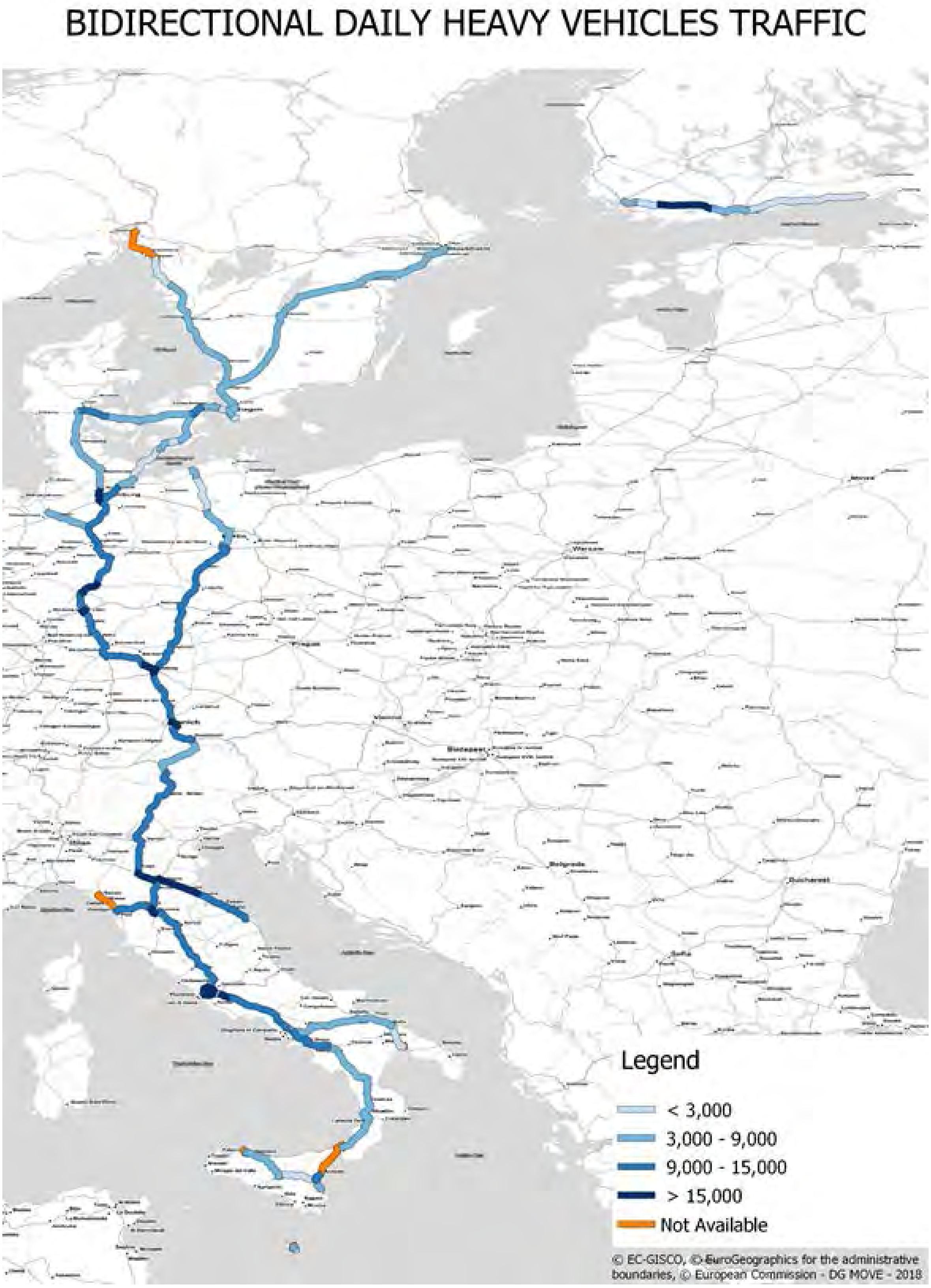
[10] Since the opening of the rail connection over the Great Belt fixed link in Denmark the Fehmarn Belt route is not used by freight trains anymore contrary to what is depicted in the map.

Figure 9: Bidirectional daily car traffic along the Scan-Med Corridor, 2016



Source: Prognos based on data provided by Infrastructure Managers

Figure 10: Bidirectional daily heavy vehicles traffic along the Scan-Med Corridor, 2016



Source: Prognos based on data provided by Infrastructure Managers

3.2 The Corridor scenario

Besides the analysis of the current flows and available capacity of the corridor infrastructure, future transport activities have been estimated, as well as macro-economic impacts for three different corridor development scenarios:

1) The **baseline scenario**, assuming that no additional core TEN-T network investments are taking place beyond 2016;

2) The **reference scenario** assuming full completion of the core TEN-T, in line with the projects identified through the work of the European Coordinators in 2017 and

3) A **specific scenario per corridor** highlighting particular aspects such as critical projects, special opportunities, specific sets of investments or measures of relevance for the individual corridor.

For all three scenarios, a combination of the "Assessment of Transport Strategies" (ASTRA) and "TRansport eUropean Simulation Tool" (TRUST) models have been used. For the scenarios relating to full corridor completion, this work plan draws on the results of the "Study the impact of TEN-T completion of Growth, Jobs and the Environment" published in 2019 by the European Commission.[11] The corridor-specific scenario was instead elaborated as part of an additional study conducted in view of this work plan by the same authors.

3.2.1 Reference scenario

The impact analyses performed under the "Growth and Jobs" study allow capturing the direct effects of new infrastructure developments in the transport sector and the indirect effects on supplying industries. In addition, they take wider economic impacts induced by mechanisms such as higher productivity diffusing to other economic agents and into future years at regional/national scale into account. According to this analysis, the full implementation of the TEN-T core network (reference vs. baseline in 2030) will lead to an increase of 0.8% of cumulated GDP (€680bn.) during the period 2017 – 2030 in the Scan-Med corridor countries. Furthermore, it will lead to the generation of 1.9 million additional person-years of jobs.

Moreover, the planned investments along the corridor, as presented in this work plan, are expected to enhance the environmental performance of the TEN-T (notably in the field of rail and through improvements in intermodal transport) as they create favourable conditions to increase the modal share of greener transport modes and mitigating greenhouse gas emissions, noise as well as other negative environmental impacts.

Whereas the transition to innovative and sustainable transport technologies will generally make possible the decarbonisation of all transport modes, a positive contribution is also expected from the large-scale adoption of alternative clean fuels and zero-emission vehicles. The ongoing and planned projects on the TEN-T are expected to play an important enabling role by supporting the early adoption of such technologies.

3.2.2 Corridor specific scenario

In line with the analysis of critical issues and in order to illustrate the importance of a coherent project implementation on the Scan-Med Corridor, this highly hypothetical corridor scenario assesses the potential impact of the non-completion of feeder infrastructure for the Fehmarn Belt Fixed Link and the Brenner Base Tunnel in Austria, Denmark, Germany and Italy respectively.

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[11] https://op.europa.eu/en/publication-detail/-/publication/71e25029-55d6-11e9-a8ed-01aa75ed71a1

The non-implementation of these projects would reduce the positive impact of complete TEN-T implementation on national GDP by 1.9% and on employment by 2.4% (corridor vs reference in 2030) in the seven Member States crossed by the Scan-Med Corridor and Norway. Higher negative effects would be observed in Italy (-3.2% of TEN-T implementation impact on GDP and -3.1% on employment) and Denmark (-4.2% of TEN-T implementation impact on GDP and -4.5% on employment). The effects would be less pronounced in Germany (-1.6% in GDP and -2.4% in employment) and Austria (-0.2% in GDP and -0.3% in employment).

The non-completion of the feeder infrastructure for Fehmarn Belt Fixed Link and Brenner Base Tunnel would furthermore affect the development of the corridor as a continuous and interoperable infrastructure. Such conditions would hamper the development of seamless traffic flows between Scandinavia and Central Europe and across the Alps. This would negatively affect the attractiveness of rail and intermodal transport, jeopardising the positive effects associated with the full implementation of the TEN-T policy along a corridor that connects important economic centres of the European Union.

4 What has still to be realised by 2030

The indicative project list that had been elaborated and agreed in the 2014 Corridor Study and, based on that, the (First) Work Plan of 2015 has been continuously reviewed and updated over the years. The most recent update has been performed in the framework of the current third phase of the Corridor Study mainly addressing three elements: 1) data included on existing projects was improved, 2) the number and quality of project parameters was expanded and 3) further projects were added or projects that were not relevant anymore removed. Several sources of information were used and coordinated across corridors:

- the 2014 and 2015-2017 Study;
- the comprehensive Project List;
- CEF Call results;
- National Transport Master Plans/Transport Operational Programmes;
- The Rail Freight Corridor Scan-Med Implementation Plan of November 2015;
- stakeholder contacts for validation/completion of project data according to the coordinated responsibilities for data gathering by corridor/project category;
- Coordination and data exchange with other corridors for projects which are on shared sections and nodes.

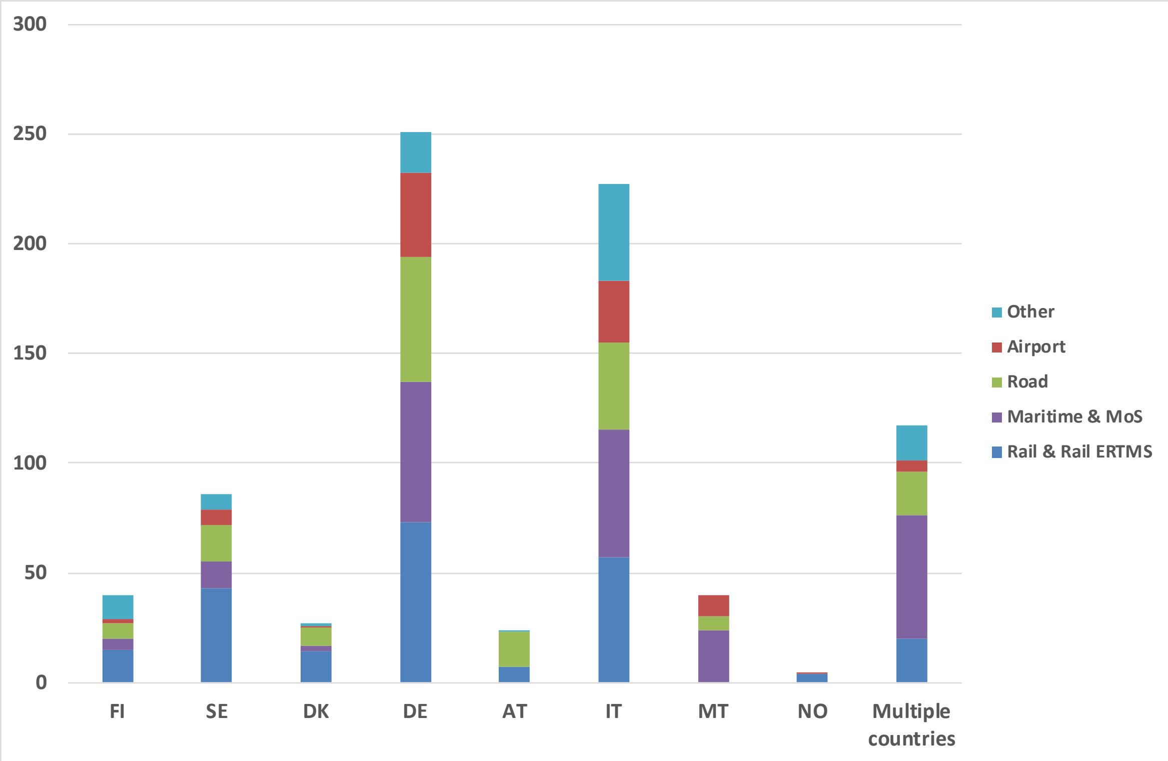
As presented above, the Project List, as completed by October 2019, includes **817 projects and measures** related to the Scan-Med Corridor (compared to 374 projects in 2014, 543 projects in 2016, and 666 projects in 2017). 26 projects completed by 2013 have already been excluded from the list.

58 of these 817 projects are located on “cross-border” sections, 83 on “last-mile” sections and 182 are qualified as “pre-identified CEF section or project”, in accordance with Annex I Part 1 of the CEF Regulation.

505 projects are related to the Scan-Med Corridor alone, while 170 are shared with North Sea-Baltic, 159 with Orient-Eastmed, 85 with Rhine-Danube, 73 with Mediterranean, and 64 with the Baltic-Adriatic Core Network corridors. The high number of overlapping projects is an indication of the strategic and connecting role of the Scan-Med Corridor in the Trans-European Transport network.

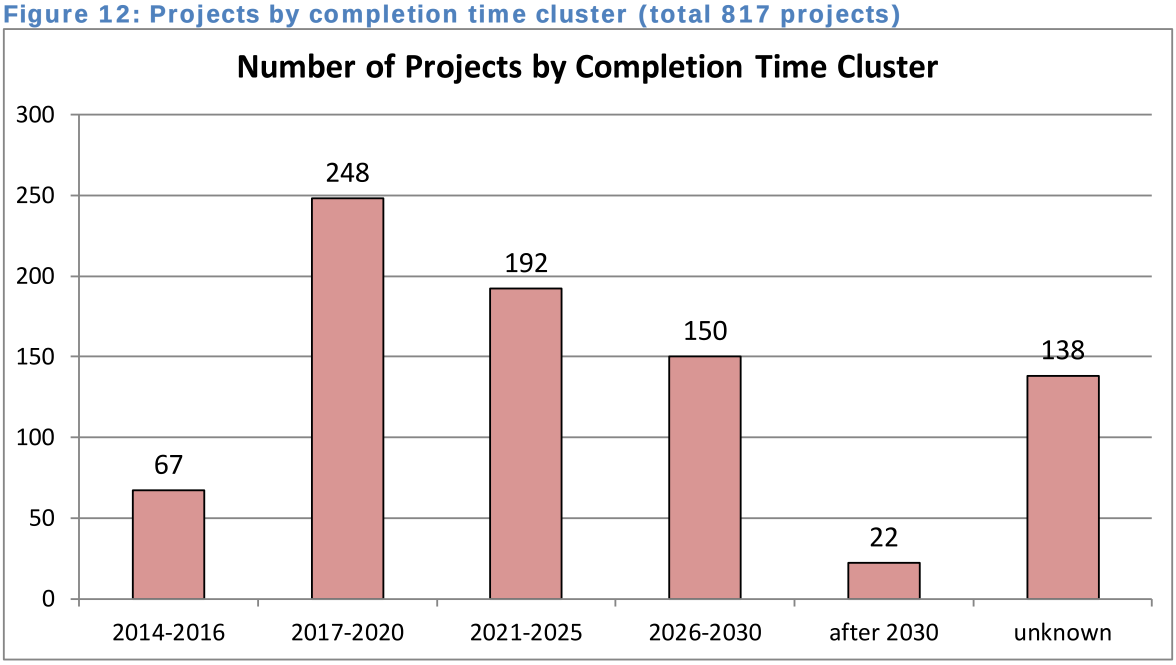
With 142 projects, about 17% of the 817 Scan-Med relevant projects were **already completed** until end of 2018. However, this also means that 675 projects are still ongoing or planned. 173 projects shall be completed by 2020, further 192 by 2025, and 150 by 2030, the target date of the Regulation. 22 projects are said to be completed only after that target year and for 138 projects the completion date is “unknown”. This missing information is partially due to the current uncertainty about the completion time, e.g. projects that are in the planning stage, and partially due to not existing data. Nevertheless, with 515 projects, the **majority of projects is expected to be completed by 2030**, and it is assumed that the vast majority of projects with “unknown” status will also be completed by 2030.

Figure 11: Projects by category and country (total 817 projects)



Source: KombiConsult analysis based on the 2019 updated project list (November 2019)

Figure 12: Projects by completion time cluster (total 817 projects)



Source: KombiConsult analysis based on the 2019 updated project list (November 2019)

Most Projects that are still to be finalised until 2030 are rail and rail ERTMS projects (166), followed by Maritime & MoS (135) and road (108). These categories also require the highest amounts of investments, with €81.7bn for rail and rail ERTMS, €19.4bn for road, and €6.3bn for Maritime and MoS. In total, the 515 projects that are still open and to be finalised until 2030 require an investment of about €119.3bn (official costs).

Table 7: Number of projects still to be completed 2019–2030, by country and project category, and their total cost in billion €

Country / Category	Rail	Rail ERTMS	Road	Mari-time	MoS	Air-port	Multi-modal	Inno-vation	Other	**Total**
FI	11		3	3	1		6	1	-	**25**
SE	20	5	10	6	1	5	3		1	**51**
NO	1	1								**2**
DK	8	1	4	3		1	1			**18**
DE	54	4	40	46	2	18	10	2		**176**
AT	5		12					1		**18**
IT	39	7	18	42	1	14	12	4	3	**140**
MT			5	16		6				**27**
Multi	6	4	16		14	5	7	6		**58**
Total N°	**144**	**22**	**108**	**116**	**19**	**49**	**39**	**14**	**4**	**515**
Total cost [bn€]	**77.7**	**4.0**	**19.3**	**5.9**	**0.5**	**3.5**	**7.6**	**0.3**	**0.6**	**119.3**

* official known costs; displayed sums may differ from calculations due to rounding

Out of these 515 projects, an additional €1.9bn has been estimated for KPI-relevant projects and envisaged finalisation until 2030 where the cost is not official/known, resulting in total cost of about €121.2bn (official + estimated costs).

Even after finalising the KPI relevant projects from the project list until 2030 there will be remaining gaps in terms of fulfilling all criteria of the TEN-T Regulation. Thus, the consultants compiled a list of **"additional projects"** with measures that from their point of view would be useful for fulfilling the mode specific KPI's. This list contains 63 Scan-Med relevant projects with further estimated costs of about €5.3bn. The division by mode is displayed in the following table.

Table 8: Number of additional projects to be completed by 2030 by project category, and their total cost in billion €

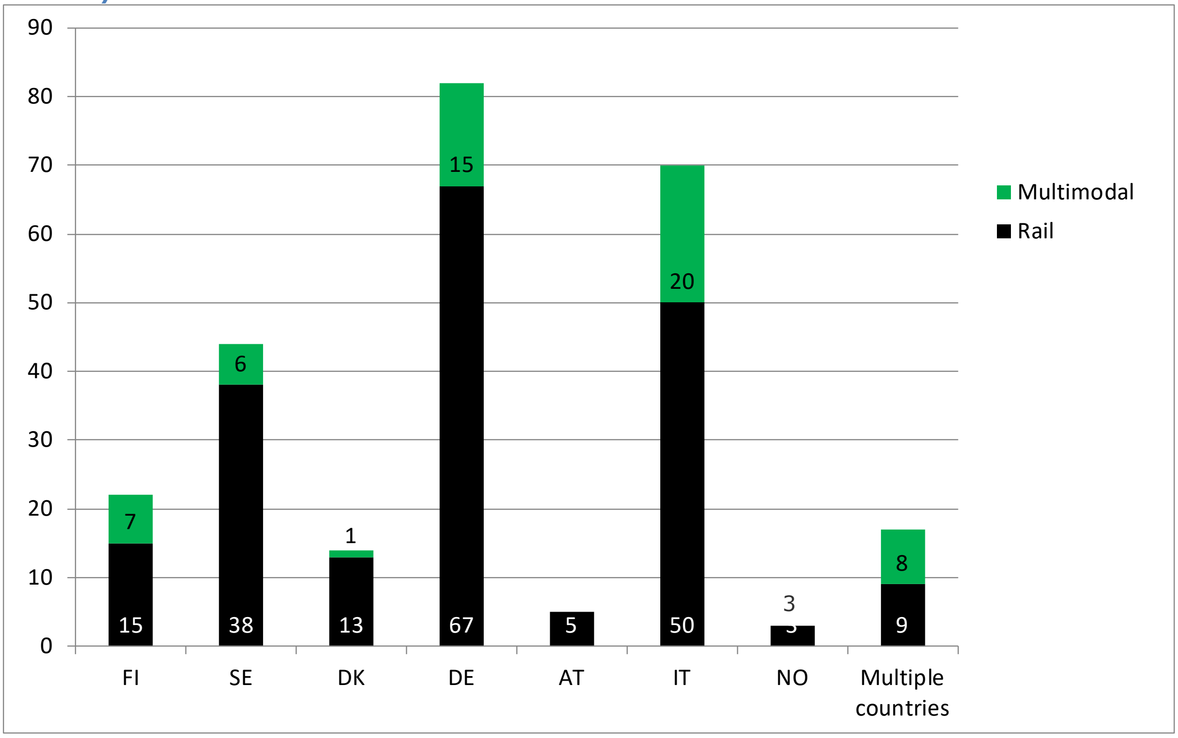
Country/ Category	Rail	Rail ERTMS	Road	Maritime	MoS	Airport	Multimodal	Inno-vation	Other	**Total**
Total N°	**15**	**n/a**	**1**	**5**	**n/a**	**24**	**18**	**n/a**	**n/a**	**63**
Total cost [bn€]	**4.490**	**-**	**0.036**	**0.504**	**-**	**0.288**	**0.029**	**-**	**-**	**5.342**

* estimated costs; displayed sums may differ from calculations due to rounding

4.1 Rail & RRT

200 Rail and 57 RRT projects are located on the Scan-Med corridor (See fig.15)[12]. More than half of these projects are located in Germany and Italy, in line with their share of overall corridor rail network length. Nine Rail and eight RRT projects are allocated to several countries. Apart from pan-European studies, most of these measures refer to the large-scale projects "Fehmarn Belt" and "Brenner".

Figure 13: Rail and RRT projects on the Scan-Med corridor by country (total: 200 Rail, 57 RRT)



Source: HaCon analysis based on the 2019 updated project list (November 2019)

Out of these 257 projects, 27 Rail and nine RRT actions have already been concluded between 2014 and June 2019. With a dedicated view on the year 2030 it can be stated that 168 Rail (84%) and 46 RRT (82%) projects are expected to be completed. Eight Rail projects have a finalisation date after 2030. Among these projects are the access lines to the Brenner Base tunnel, the upgrade of Salerno - Reggio Calabria, rail node upgrades in Roma and Bari as well as the Oslo - Ski (Follobanen) and Haug (Råde) - Halden connections. For another 24 Rail and 10 RRT projects information about the completion date is lacking.

The costs of the projects sum up to **€145.7bn for Rail projects**. This figure represents "official" project costs that were verified and approved by Member States and stakeholders. Half of this total investment is allocated to ten large-scale projects: Salerno - Reggio Calabria (IT), Brenner base tunnel (AT/IT), Fehmarn Belt Fixed Link (DK/DE), ABS/NBS Nuremberg – Erfurt (DE), Ostlänken (SE), Upgrade Catania – Palermo (IT), Napoli - Foggia – Bari (IT), NBS/ABS Hamburg/Bremen-Hannover (Optimised Alpha E) (DE), ABS/NBS Hanau - Fulda - Erfurt / Aschaffenburg –

[12] This chapter provides main results on projects related to the categories "Rail" and "Rail/Road Terminals" (RRT, encoded as "Multimodal" category in the project list). The "Rail" refers to rail projects exclusively and not to ERTMS, which is treated separately in chapter 4.2. However, some of the Rail projects, especially large-scale upgrades and new constructions, often include ERMTS implementation as well.

Nantenbach (DE) and ABS/NBS Nürnberg - Ingolstadt – München (DE). For Rail projects without official costs values, the consultants provided estimations, leading to additional costs of €16.5bn.

The 57 **RRT projects sum up to €1.2bn** (€0.8bn official costs + €0.4bn estimated costs). Major projects in this category are located at Kouvola, Lübeck, Helsinki, or Verona. Of the 57 RRT projects, there are 38 RRT projects to be finalised until 2030, which sum up to €0.8bn (€0.5bn official costs + €0.3bn estimated costs, see table 10).

Table 9: Rail projects still to be completed 2019-2030, per country, and their total cost (official and estimated) in billion €

	Number of projects	Official cost [billion €]	Estimated cost [billion €]	Total cost [billion €]
NO	1	1.0		1.0
FI	11	3.1		3.1
SE	20	5.4		5.4
DK	8	3.6		3.6
DE	54	31.7	1.8	33.5
AT	5	0.2		0.2
IT	39	24.3	0.9	25.2
MT	n/a	n/a	n/a	n/a
Multiple	6	24.3		24.3
Total	144	77.7	2.7	80.4

*Note: For one project in **Norway**, the end date has been brought forward. Therefore, the number of relevant projects in Norway is actually 2, with official costs of € 3.8bn. This will be considered in the next update of the project list at the beginning of 2021. The costs figures for **Austria** only indicate the planning costs of the projects. The real construction costs of the 5 projects are not yet published but will be significantly higher.*

Source: KombiConsult analysis, based on the 2019 updated project list (November 2019)

Table 10: Rail—Road terminal projects still to be completed 2019-2030, per country, and their total cost (official and estimated) in million €

	Number of projects	Official cost [million €]	Estimated cost [million €]	Total cost [million €]
NO	0			
FI	6	180.7		180.7
SE	3	56.7		56.7
DK	1	19.5		19.5
DE	10	50.0	286.5	336.5
AT	0			
IT	12	107.7	33.3	141.0
MT	n/a			
Multiple	6	92.6		92.6
Total	38	507.1	319.8	827.0

Source: KombiConsult analysis based on the 2019 updated project list (November 2019)

4.2 ERTMS deployment 2023

The European Rail Traffic Management System (ERTMS) is basically made of the European Train Control System (ETCS) and the Global System for Mobile Communications – Rail (GSM-R). The TEN-T Regulation foresees – in Article 45 - a dedicated European Coordinator for ERTMS. The European Coordinator is technically supported by a study team which has analysed the ERTMS deployment and contributed to the ERTMS Deployment Plan and the Work Plan.[13]

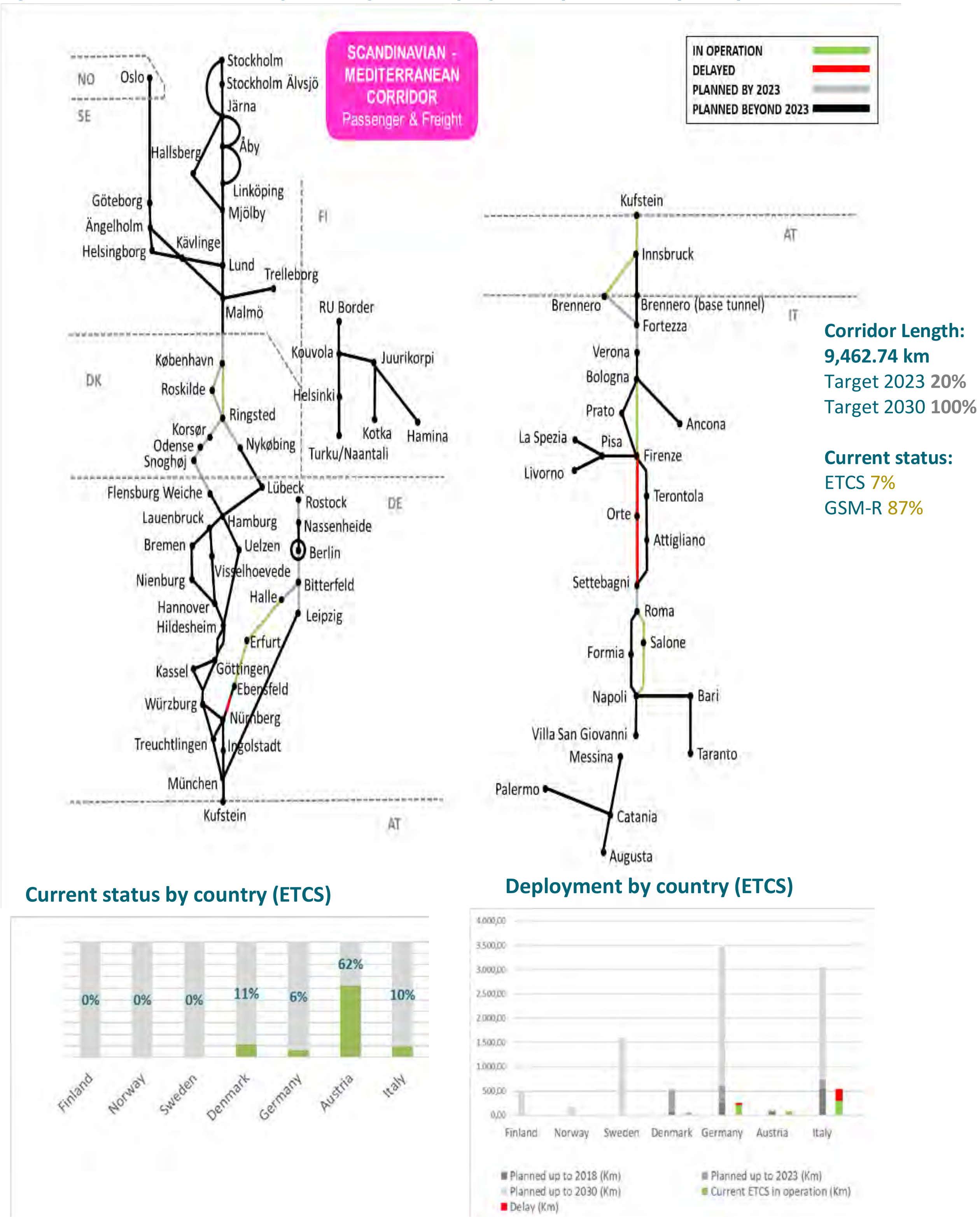
For purposes of the ERTMS analysis the Scan-Med rail corridor length is 9,462.74 km. The objective is to achieve an ETCS coverage of 20% by 2023 and 100% by 2030.

At the end of 2018 7% of the Scan-Med Corridor tracks are equipped with ETCS and 87% with GSM-R. Even though Denmark, Germany and Italy have agreed targets for ERTMS deployment by 2023 deployment is behind schedule in Germany and Italy ("delay" in the Figure 14) for this date. The other corridor countries intend to deploy ERTMS by 2030 only thus the pace shall increase only after 2023. Germany for example plans to equip the Scan-Med Corridor until 2030 within the framework of the nationwide programme Digital Rail Germany and also in Sweden the current national plan, decided 2018, includes two ERTMS-projects that together will complete ERTMS deployment on the Scan-Med corridor until 2029.

ERTMS has not only the track-side component but is made also of the vehicle-side where railway undertakings or leasing companies are called to equip their locomotives with the appropriate "on-board-unit". In order to coordinate the harmonized deployment of ETCS versions the Implementing Regulation foresees to establish cross border working groups. Those groups exist for the NO/SE, SE/DK, DK/DE and DE/AT/IT borders respectively.

13 The currently applicable EDP is included in the Commission Implementing Regulation (EU) 2017/6 of 5 January 2017 on the European Rail Traffic Management System European deployment plan. In May 2020 the European Coordinator for ERTMS has issued his 1st Work Plan (https://ec.europa.eu/transport/sites/transport/files/work_plan_ertms_2020.pdf).

Figure 14: Current status by country and deployment per status (ETCS)



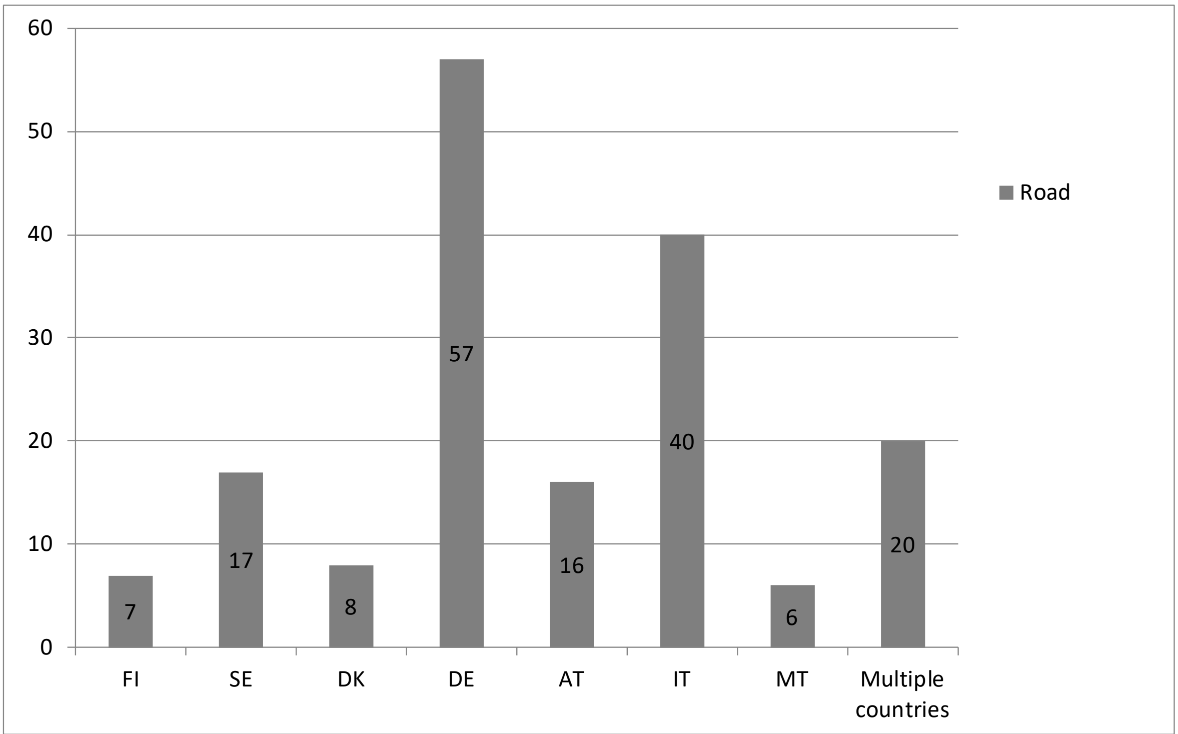
Note: The map still shows the previously planned new railway line Bremen/Hamburg-Hannover via Visselhoevede, the so called "Y-Trasse in Germany. The line is not planned anymore, but will be replaced with a planned upgrade of existing railway infrastructure in that area, the so called "Alpha E"-project. Therefore, line length figures in Germany are not representing the latest planning status.
Percentage values in the graph "ETCS status" include existing lines already equipped with ETCS (green) as well as existing lines still to be equipped with ETCS and new lines still under construction (grey).

Source: Technical support for the Deployment of ERTMS along the Core Network Corridors, INECO & EY

4.3 Road transport

The project database of the Scan-Med Corridor includes 171 "Road" projects and 29 of the projects were completed in 2018. 108 projects of the "Road" category are ongoing or planned projects and completion is expected between 2019 and 2030 (2 projects are said to be completed after 2030, and for 32 projects the completion date is unknown. Forty of those 108 "Road" projects are located in Germany, while 18 are located in Italy, 12 in Austria and 10 in Sweden. The number of projects in Finland is three, in Denmark 4 and in Malta 5. The remaining 16 projects are multiple countries projects.

Figure 15: Road projects on the Scan-Med corridor by country (total: 171)



Source: Ramböll analysis, based on the 2019 updated project list (November 2019)

To avoid congestion in and around large cities or in geographically limiting areas, bottlenecks and missing links need to be addressed. Some examples of ongoing or planned projects to eliminate the capacity bottlenecks:

- The third phase Ring Road III in **Finland** includes construction of new intersections and third lines for needed sections, improvement of existing intersections, parallel road connections as well as public transport and light traffic arrangements, implementation of the noise abatement. The third phase is planned to be concluded in 2030.
- In the **Stockholm region** several projects aim to improve capacity and accessibility. However, the largest investment increasing road capacity in Stockholm region is building of the E4 Stockholm bypass.
- In December 2017, the **Danish Parliament** adopted the construction of two additional lanes (one in each direction) on the motorway of Western Funen, the section Odense West – Nørre Aaby, thereby eliminating a significant current capacity bottleneck on the Corridor. The project is expected to be completed by 2022.

- In **Germany** several projects aim to improve capacity and accessibility. As an example, in Hamburg region the project A 7 motorway: upgrade to 6-8 lanes between Hamburg/NW (A 23) and Hamburg-Othmarschen (to be concluded by 2020) as well as A 7 Hochstraße Elbmarsch: upgrade to 8 lanes (to be concluded by 2023), target capacity improvements.
- In **Innsbruck region** the A 13 safety upgrading of main carriageways and reconstruction of junction Innsbruck south (to be concluded by 2027) will have impacts on safety.
- In **Italy**, the realization of the metropolitan expressway road north of the A14 between Solarolo and Bologna (Ponte Rizzoli) as well as the upgrading of the Bologna tolled A14 and untolled ring roads can be mentioned.

Table 11: Road projects still to be completed 2019-2030, per country, and their total cost (official and estimated) in million €

	Number of projects	Official cost [million €]	Estimated cost [million €]	Total cost [million €]
NO				
FI	3	480.4		480.4
SE	10	5,821.7		5,821.7
DK	4	248.2		248.2
DE	40	9,778.6		9,778.6
AT	12	243.3	299.0	542.3
IT	18	1,692.4	78.1	1,770.5
MT	5	129.1		129.1
Multiple	16	944.9		944.9
Total	108	19,338.5	377.1	19,715.6

Source: KombiConsult analysis, based on the 2019 updated project list (November 2019)

4.4 Airports

The project database of the Scan-Med Corridor includes 92 “Airport” projects, more than half of which are located in Germany and Italy (respectively, 38 and 28). Malta accounts for 10 projects, Sweden for 7, Finland for two and Denmark and Norway for one each. Another 5 projects are “located” in multiple countries. The airports accounting for the highest number of individual projects are the airports of Berlin and Bologna with 13 projects each, followed by the airport of Munich (11 projects).

Out of these 92 projects, more than a half (48) are still to be completed (see Table 12); most notably, 18 of them are in Germany and 14 in Italy until 2030. The total cost of these projects amounts to €3.7bn, with the biggest share of costs (€1.9bn) allocated to projects in Italy. These projects concern a range of topics, most notably airside infrastructural capacity improvements (13 projects) and landside infrastructural capacity improvements (10 projects). Further seven projects are dedicated to the improvement of land accessibility, including:

- The completion of the "**Erdinger Ringschluss Tunnel**”, a two-track railway connection between Munich Airport and the city of Erding. Once completed, the project will link the cities of Erding, Munich and Regensburg, as well as the North-Eastern and South-Western regions of Bavaria to Munich Airport, one of the EU’s major hubs on the core TEN network.
- A rail tunnel to connect long distance trains to **Helsinki airport** and the city centre.

None of the 48 projects involves initiatives in the field of alternative fuels.

Table 12: Airport projects still to be completed 2019-2030, per country, and their total cost (official and estimated) in million €

	Number of projects	Official cost [million €]	Estimated cost [million €]	Total cost [million €]
NO				
FI				
SE	5	59.3		59.3
DK				
DE	18	1,413.3	54.5	1,467.8
AT				
IT	14	1,965.1	5.7	1,970.8
MT	6	90.7	80.0	170.7
Multiple	5	13.4		13.4
Total	48	3,541.8	140.2	3,682.0

Source: KombiConsult, based on the 2019 updated project list (November 2019)

4.5 Maritime Ports and Motorways of the Sea

In the Seaport sector in total 166 projects are planned amounting to €12.7bn of known costs (see table 13). In addition, there are 56 projects in the category of motorways of the sea (Sweden, Germany, Italy 2 each, Finland 1 and multiple countries 49).

Table 13: Maritime projects per country and their total cost (official and estimated) in million € (without MoS)

	Number of projects	Official cost [million €]	Estimated cost [million €]	Total cost [million €]
NO	-	-	-	-
FI	4	179	-	179
SE	10	1,405	-	1,405
DK	3	475	20	495
DE	62	7,291	10	7,301
AT	-	-	-	-
IT	56	2,919	32	2,951
MT	24	252	30	282
Multiple	7	93	-	93
Total	166	12,615	92	12,697

Source: HPC analysis, based on the 2019 updated project list (November 2019)

The ports of the Scan-Med CNC handled **430 million tonnes of cargo** in 2018 (about 11% of all cargo transiting through EU ports), of which around 50 million tonnes are transhipment. Hence, around 88% of cargo, or 380 million tonnes, is actually moving between the ports and the corridor.[14]

While there is no regular direct maritime connection between the Baltic Sea and Mediterranean ports of the CNC, there are container services connecting Hamburg and several Mediterranean ports, namely Naples, Gioia Tauro and Marsaxlokk. Therefore,

[14] This and the following paragraphs were provided by the Consultant responsible for the Study supporting the European Coordinator for Motorways of the Sea.

maritime transport can be an **alternative to road transport** for some of the longer distances on the corridor. In addition, there are various maritime ro-ro and container services in the Baltic Sea and the Mediterranean that run in parallel to the Northern and Southern parts of the corridor. There are, for example, regular ro-ro services between Rostock and Trelleborg, Valletta and Pozzallo (Sicily), but also shorter-distance connections on or near the corridor such as Messina-Villa San Giovanni or Helsingborg-Helsingör. The Adriatic ports Ravenna, Ancona and Bari provide numerous ro-ro connections with neighbouring West Balkan countries. The Scan-Med CNC project promoters should take this potential into account. **Synchromodal concepts** are possible on some connections.

The attractiveness of **rail transport to and from the ports** is also key to a shift traffic from road to rail, but also to increase the acceptance of transport in general and of ports in particular. This can be complemented by measures to improve the acceptance of rail transport (e.g. noise barriers in densely populated areas).

Besides, parts of the Scan-Med CNC are of major importance for **port hinterland traffic**, particularly the stretch between Northern Germany and Northern Italy. These parts of the Corridor must hence be developed in accordance with the growing demand for port hinterland traffic – mostly deep-sea traffic for the North Sea ports and the link between Scandinavia and Italy.

As a priority the Scandinavian-Mediterranean Core Network Corridor shall make sure to **provide and develop the necessary rail capacity** to and from ports with potential for rail hinterland services. It will further be important to work together with ports, forwarders and ship operators to improve the administrative procedures and data flow across all modes as well as to assure the reliability of the network in order to guarantee the smooth flow of goods between MoS and the corridor and to avoid delays.

4.6 Innovation deployment of alternative fuels infrastructure

According to the Scan Med Corridor Project List, 24% of the investments allocated to projects contain an **innovative component**, which is much higher than the corridor average of 6%. Out of this 24%, projects relating to **telematics applications** receive 63% of all investments that go into innovative projects, while 24% goes to the realisation of **clean fuels infrastructure** and 21% to **sustainable freight transport services**. Looking at the transport modes, most innovation takes place in road and rail (+ rail ERTMS), followed by maritime and MoS.

The supply of **alternative fuels** along the road Corridor is steadily increasing. Currently, 63.2% of the corridor road network has a clean fuel refuelling station within 10 km distance, which is further expected to increase towards 2030. Alternative fuels supply for other modes remains low, though projects are foreseen for Maritime, MoS and Airports.

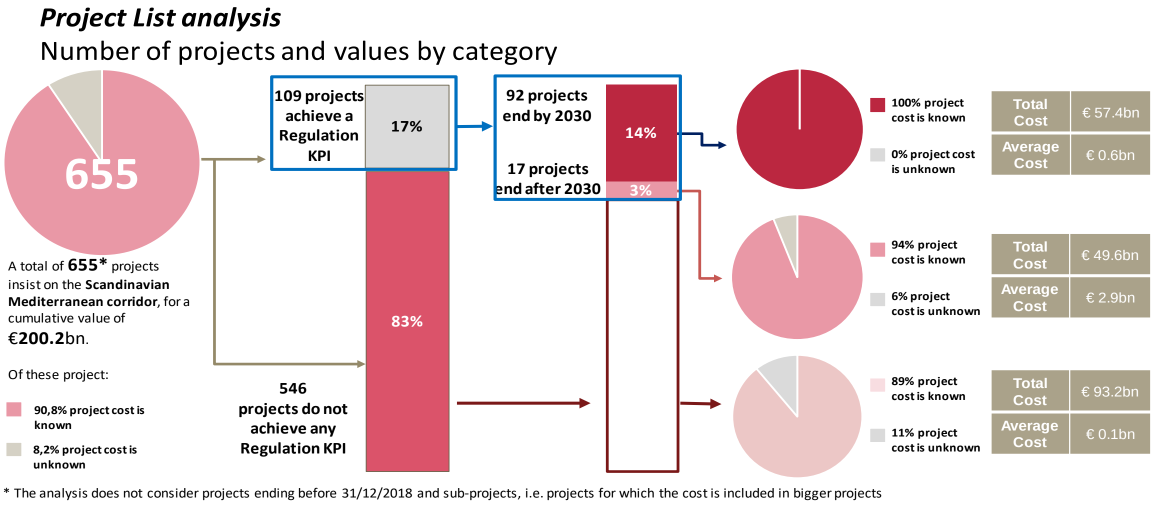
5 Funding and Financing

5.1 The funding needs

This section details the economic and financial aspects of the projects included in the Scan-Med project list and, more specifically, information on the projects' cost, maturity and financial viability.

Without considering the projects completed by 2018, there are 655 projects **ongoing or planned** on the Scan-Med Corridor, for a total cost of €200.2bn. Out of these 655 projects, 109 (17%) achieve a Regulation KPI, while the remaining 546 (83%) do not., One reason for that is that KPIs are already fulfilled for many stretches and projects are instead aiming at the overall objectives for the corridor, such as to extend capacity, reduce bottlenecks or to update single to double tracks.[15] Out of the KPI-relevant 109 projects, 92 (14% of the total of 655 projects) is expected to be completed by 2030. Their project costs are fully known. Only 17 (3% of the total) will end beyond 2030, and only 6% of these projects have costs which are still unknown.

Figure 16: Ongoing or planned projects: KPI-relevance



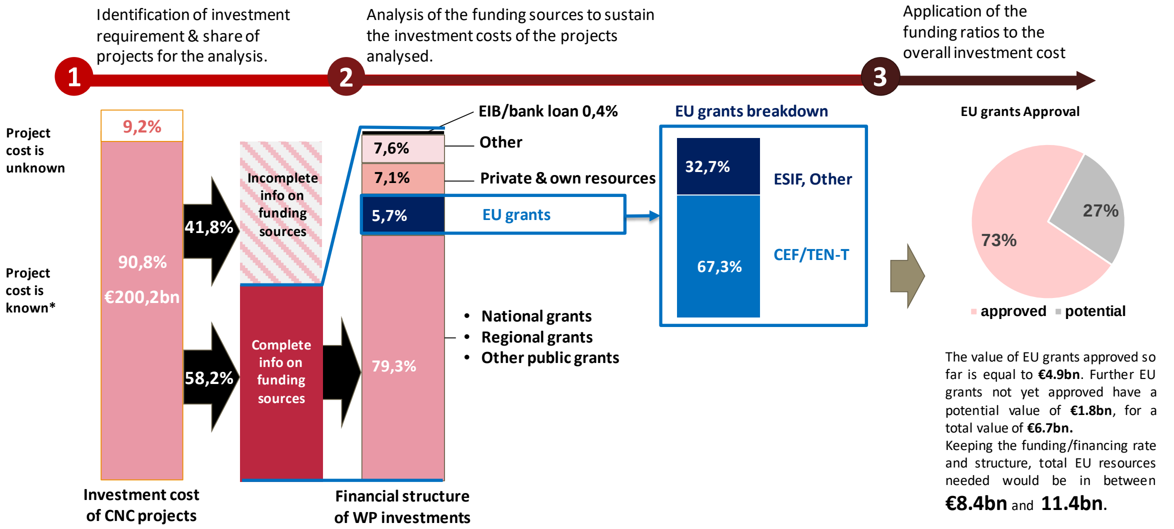
Source: PTSClas analysis, based on the 2019 updated project list (November 2019)

For 90.8% of the 655 on-going or planned Scan-Med projects the project cost are known. For 347 projects costing € 116.4bn, complete information about funding sources is available. The largest share of costs (79.3%) are financed from national, regional and other public grants from the individual Member States; further notable sources are own resources (in 7.1% of costs) and EU grants (5.7%), whereas around 8% of project costs are financed with other sources (including EIB or bank loans). The relatively low share of European funds can be explained by the fact that most countries – with the exception of Malta – are not benefitting from cohesion funds with the higher co-funding rates.

[15] The updated Final Project List of November 2019 includes 817 projects of which 142 were completed by end of 2018 and 675 are ongoing or planned. The list includes also 20 "sub-projects" for which the cost is included in global projects. Therefore only 655 projects were analysed with respect to their costs in this section.

As concerns the breakdown of projects funded by EU grants, such grants are represented by CEF/TEN-T grants for 67.3% of costs and by ESIF or other funds for the remaining 32.7%. For projects indicating a EU finance for 73% of costs EU grants are approved, whereas for the remaining 27% of costs EU grants are potential; this implies that the total EU resources needed for ScanMed projects would be in between €8.4bn and €11.4bn.

Figure 17: Ongoing or planned projects and their financing



Source: PTSClas analysis, based on the 2019 updated project list (November 2019)

The final step of the analysis is determining the **financial sustainability** of Scan-Med transport infrastructure projects, i.e. the number and value of Scan-Med projects able to generate returns from the market to cover the operating costs and possibly a share of the capital expenditure. According to the findings, almost 40.6% of the projects are potentially financially sustainable as per the aforementioned definition. More specifically:

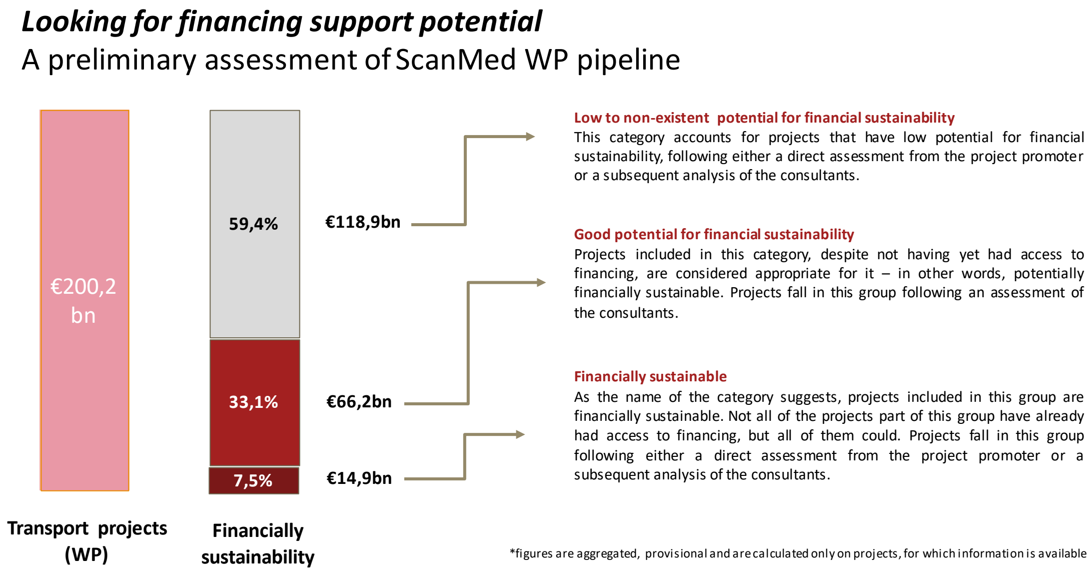
- **7.5%** of the projects, for a total value of **€14.9bn**, are **financially sustainable**. Projects fall in this group following either a direct assessment from the project promoter or a subsequent analysis of the Consultant.
- **33.1%** of the project list, for a total value of **€66.2bn**, presents **good potential for financial sustainability**. Projects included in this category, are considered appropriate based on Consultant's assessment.
- **59.4%** of the project list, for a total value of **€118.9bn**, has **low to non-existent potential for financial sustainability**. This was based either on a direct assessment from the project owner or on a subsequent analysis of the consultants.

Financially sustainable projects are relevant because they can be developed with less - or no - **impact on public finances**, and/or supported with softer support measures (i.e. soft loans, blending instruments, de-risk instruments, etc.). The more infrastructure is developed through projects generating returns from the market, the less the amount of grants and national public finance is needed to complete the TEN-T network.

Projects in the transport sector – and in some sub-sectors in particular, i.e. rail, inland waterway, etc. – usually face difficulties being (fully) financially sustainable. Various factors, among which the presence of financing gaps can indeed, prevent the project promoter from meeting the desired returns. In this case, projects are marked "potentially financially sustainable", indicating that they may require some financial aid to become fully financially sustainable.

Innovative financial tools, as further described in the next section, can support these projects being structured to generate revenues from the market and, thus, prevent or reduce the use of public finance/ grants (together with technical assistance structuring the project accordingly, when needed).

Figure 18: Ongoing or planned projects: Financial sustainability



Source: PTSClas analysis, based on the 2019 updated project list (November 2019)

5.2 Innovative financial tools

In line with the Coordinators' work plans, the aggregate **demand for investment in the TEN-T corridors represents a total cumulated value of about €640bn**, which can only be supported with a substantial contribution of private financing.

To improve the quality and bankability of TEN-T projects, DG MOVE and the EIB tested in the current multiannual financial framework (MFF) the **blending approach**, setting- up the **CEF Blending Call and Facility**. In the next MFF (2021-2027), the **InvestEU** will cover all financial instruments, as well as blending. InvestEU will also offer a broader risk spectrum than the EFSI, allowing for both lower and higher risk projects to be financed. This, together with blending, is expected to lead to a higher uptake of innovative financial instruments for the financing of the TEN-T.

The **3rd CBS report** of September 2019 by Coordinators Bodewig and Secchi "Enabling the uptake of the TEN-T pipeline by the financial market" gives a more detailed insight into financing issues for the TEN-T.[16]

[16] https://ec.europa.eu/transport/themes/infrastructure/downloads_en

6 The European Coordinator's recommendations and future outlook

In 1786 the poet Robert Burns wrote his poem "to a Mouse" in Scottish dialect. Its most famous line: "The best laid plans o' mice an' men Gang aft a-gley". The poet's allusion is to the fact that things do not always turn out as planned. We are making steady, if sometimes uneven, progress in the realisation of projects on the Scandinavian Mediterranean Corridor. The process of revising the TEN T Guidelines has commenced, with a definitive proposal for the revision expected in 2021. This will need to marry continuity and change – continuity in key infrastructure planning because long term projects can only be delivered by the consistent setting and keeping of long term goals – and change through adaptation and integration of the ambitions of the European Green Deal and the deepening technological and digital revolution and potentially changing supply and logistics chains linked to Brexit. These changes, being known, can be anticipated and planned for.

The Covid 19 pandemic is a disruptive event whose scale and impact was unforeseen and unforeseeable. This fourth iteration of the corridor work plan is being finalised in the shadow of the coronavirus crisis whose duration, depth and consequences are matters of conjecture but whose implications are and for some time will remain very real. Transport as an essential service is in the front line of society's response. Countries went into lockdown, economies into meltdown but the transport sector and its workers across all modes and nodes by land, sea and air quite literally delivered the goods. We owe them our gratitude and our duty of care for their health and welfare in these testing times.

We stand on the threshold of the deepest economic depression in decades, unparalleled in the history of the EU, including the financial and banking crisis of a decade ago. Given the territorial extent of the Covid 19 pandemic this is not just a regional crisis but is truly global in scale. The two largest economies in the world, the USA and China, could be a G2 locomotive that together with a determined EU macroeconomic boost could speed up global recovery. The risk through blame game polemics, creeping protectionism and great power rivalry is that the G2 could be reduced to G-Zero thus prolonging the evolving socioeconomic crisis that threatens everyone. Talk of strategic autonomy, re-shoring and de-globalisation abounds. Where this will lead, if anywhere, and at what speed is unclear especially with regard to supply chains and their transport implications. Bringing production back home has an alluring ring to it but at what cost foregone in terms of the trade benefits of comparative advantage and with what employment benefits in the era of the 4th industrial revolution where capital deepening rather than jobs growth could characterise future output growth.

Public deficits everywhere are set to explode in the short term, facilitated to a degree by extremely low interest rates, but at a level that will be unsustainable. As recession bites output falls and with it so does demand for transport services. Add to this the comparative ease of entering lockdowns but the hesitancy and experimentation associated with exiting them and the multiplicity of implications for travel and tourism as citizens and not governments choose how to react, pending an effective mass vaccine, or spooked by new coronavirus outbreaks, or constrained by the low income or unemployment consequences of the pandemic-induced downturn. In short, the exigencies of the current state of affairs will weigh heavily on our plans in the immediate future, propelling some projects to the front of economic recovery queues, slowing others down because of health and safety precautionary measures, reconfiguring urban transport spaces in many instances and probably sustaining some of the remote working capacity tried and tested during the height of the lockdowns with potentially significant implications for transport, work patterns and urban planning. We need to start sharing experiences and learning from each other from this new policy battlefront.

On the good news side of the balance sheet we can report satisfactory corridor progress since the adoption of the TEN-T regulation. 142 projects with a total cost of €29.9 billion have been completed with more than half of these since 2017. While the highest number of projects completed has been in the Motorways of the Sea (30), the highest share of investment (€14.8 billion) has gone to rail. The core characteristics of the corridor are well known but worth summarising. The Scandinavian Mediterranean Corridor is the largest of the corridors in terms of Core Network length – with more than 9,600 km of core rail and in excess of 6,300 km of core road network – together with 25 core ports, 19 core airports, 45 core intermodal terminals and 19 core urban nodes.

This fourth work plan has comprehensively reviewed and updated our project list now numbering 817 projects and measures related to the Corridor. This compares to 374 projects in 2014, 543 projects in 2016, and 666 projects in 2017. These investments are projected to lead to an additional increase of GDP in 2030 of 0.3% and the creation of additional 142,000 jobs compared to a scenario without the completion of TEN-T core network projects along the Scan-Med Corridor as a whole.

58 of the 817 projects are located on "cross-border" sections, 83 on "last-mile" sections and 182 are qualified as "pre-identified CEF section or project", in accordance with Annex I Part 1 of the CEF Regulation.

505 projects are related to the Scan-Med Corridor alone, while 170 are shared with North Sea-Baltic, 159 with Orient-Eastmed, 85 with Rhine-Danube, 73 with Mediterranean, and 64 with the Baltic-Adriatic Core Network corridors. The high number of overlapping projects is an indication of the strategic connectivity role of the Scan-Med Corridor in the Trans-European Transport network.

As remarked in our previous work plan, this level of detail is the product of the collective wisdom of all those who have contributed to our work. It has helped us collectively to weave together a coherent picture of what has been done, what we plan to do in future and where the gaps exist between agreed policy targets and actual performance. This is true for all relevant modes of transport along the entire corridor alignment. As a shared planning resource it represents an intimate and grainy level of detailed knowledge and is the instrument by which the future development of the corridor will be driven as we set out the priorities to be followed up to 2030 and beyond. For policy makers in search of driving recovery while investing in future success this list should be an invaluable resource both for the EU's recovery planning and for InvestEU priority setting. To everyone involved at EU, member state, regional and infrastructure manager level who has participated in and contributed to this exercise permit me to express our gratitude and admiration. As Coordinator I wish to express a special word of thanks to Martin Zeitler and Uwe Sondermann for their constant assistance and support on all corridor related issues and to Christer Löfving for his assistance in setting up our ideas laboratories.

Under the new CEF Regulation, as of 2021, our corridor will be extended. In Denmark the so-called "Jutland Route" will be added connecting the cities of Aarhus and Aalborg as well as the ports of Hirtshals and Frederikshavn to Kolding and the Scan-Med Corridor. This may give rise to new freight services from Oslo and Gothenburg using this route while at the same time connecting two major urban centres of Denmark.

In Scandinavia the route from Stockholm northwards along the Bothnian Gulf will be added connecting cities such as Sundsvall, Umeå and Luleå in Sweden and Oulu in Finland. The Corridor also needs to be looked at in the context of developing global transport routes. With the connection to Narvik in Norway the Scan-Med Corridor will directly connect to the Arctic Ocean. This recognises the increasing geostrategic importance of the Arctic region in a global context. Not only is the region important for raw materials (most significantly iron ore, other mining products), forestry and fisheries, but also for those needed to drive the decarbonisation of the transport sector through battery production.

Looking south, we will see our corridor connecting to the city of Cagliari in Italy a major TEN-T core network port that so far had not been on a TEN-T corridor. We very much look forward to welcoming these new stakeholders to our corridor family and working together towards a better connection of these regions with the existing Scan-Med corridor infrastructures.

The cross-border section between Finland and Russia plays a significant role for the terrestrial connections to the eastern and northern markets in Russia, China and Asia, while the North Sea and Mediterranean ports provide maritime access to the American, African and Asian continents and the wider global trading network.

We are making real progress but we need to do more and together. Progress on ERTMS/ECTS on the Scan-Med Corridor remains frustratingly slow and even by the agreed but modest targets for 2023 is falling behind schedule. This needs to improve. Too many of our Rail-Road terminals have out-dated connections to rail infrastructure with these often being single sided and/or non-electrified. Too many legacy technical rules and administrative procedures are hampering the optimum development and cost efficiency of railway operations and are a competitive handicap in promoting the shift to rail.

The greening of our ports has a way to go with many ports also still missing adequate last mile rail links for better hinterland connectivity. Interoperability needs more attention and more investment in customer friendly facilities both for passengers and freight across and between all transport modes and through deeper digitalisation to ensure greater seamlessness in mobility offers.

While all member states subscribe to the TEN-T objectives and the 2030 milestones, particularly for cross border sections, there is evidence of a lack of integration and necessary prioritisation of these elements in national planning strategies in some Member States. Implementing Decisions as foreseen in the TEN-T Regulation can be a support in this sense. Together with the member states concerned we aim thus to develop such decisions at least for our two major cross-border infrastructures the Brenner Corridor from Munich to Verona with the Brenner Base tunnel and the Fehmarnbelt fixed link in the coming months.

New cross border infrastructures will need new accompanying policy measures to ensure their optimum exploitation. These policies too often remain highly national in character and policy preferences while the new infrastructures are conceptualised and delivered with cross border ease of flow in mind. More attention will have to be paid and time invested in accompanying policy development, such as cross border tolling, intelligent and smart transport systems integration and smoother, greener, smarter logistics chains if we are to make the most of our new cross border infrastructures and opportunities.

Part of the quality of living in democracies is respect for our right of dissent. This often finds expression in planning objections to infrastructure projects, a right that must be upheld and respected. In entering commitments to complex and large scale cross border projects Member States should strive to strike a reasonable and fair balance in vindicating such rights and in respecting their duty of sincere cooperation with other Member States under the Treaties. Deciding route alignments earlier and not later, communicating plans openly and transparently as early as possible to host communities and acting as expeditiously as possible in resolving disputed planning permits would be a significant step forward.

As these conclusions began with consideration of the disruptive effects of the Covid 19 pandemic let us turn finally to another source of vulnerability and threat common to all humanity, namely the negative effects of climate change. At least in the short term and for the vast majority of people the pandemic has obliged us to pay attention to what our scientists are saying. The impact has been acute, accelerated, deadly and global, a virus invisible to the naked eye but totally visible in its devastating effects. In many ways it could be likened to climate change on speed. Climate change is ever present, pervasive and though spread out over locations, time and events remains deadly and disruptive in its effects. We know that transport needs to carry a significant burden of the mitigation, adaptation and resilience adjustments needed to address the challenges associated with climate change because as a sector it contributes so much globally to greenhouse gas emissions and to low level urban air pollution and because transport infrastructure is so vulnerable to climatic events.

In terms of humankind we are living in a new era. Since 1950 the great acceleration in human activity and numbers has left a mark on the planet in soil sediments and ice cores. Humans have mined, cultivated, fished, farmed, built, bleached, dumped, developed and emitted their way forward with new technologies and higher populations. This era has a name – Anthropocene - "The era of geological time during which human activity is considered to be the dominant influence on the environment, climate and ecology of the earth" as defined and officially adopted in 2014 by the Oxford English Dictionary. We are living in the anthropogenic age where human activity and not nature is the dominant force for climate change and biodiversity on the planet. The UN Secretary General, Antonio Guterres has said 'preventing irreversible climate change is the race of our lives", so far climate change is running faster than we are.

Awareness has risen dramatically but as the last COP 25 held in Madrid showed there is some way to go to achieve the scale of ambition required. Challenges faced today pale into insignificance compared to what is likely to occur in coming decades on current trends, according to the scientists whose climate prediction record is unimpeachable. The Covid downturn is but a pause and not a trend change in greenhouse gas concentrations. The next business cycle and the next electoral cycle are horizons whose tragedy is that they fail to encompass the intergenerational and inequitable consequences of failing to act with determination now. To paraphrase the Schuman Declaration of May 9th 1950, seventy years ago, our planet "cannot be safeguarded without the making of creative efforts proportionate to the dangers which threaten it." Climate action must be hardwired into everything we choose and plan to do together.

Let me share a personal credo. Many feel that sustainability is a global issue but worry that it may be beyond their personal agency to effect change. That is why government leadership is essential - to act as a moral multiplier and mobiliser - as a bridge to close the gap between vague goodwill and concrete choices and actions. This is not someone else's problem, it is ours. We are not bystanders, each in our own way is an actor in this great human and planetary drama. Each can do something. "There is a nobility in the duty to care for creation through little daily actions" is how Pope Francis puts it.

Such actions embrace empowerment over fatalism and hope over despair. This is a humble acceptance of an interdependent destiny in the natural world not an arrogant presumption of human exceptionalism. It is a call for stewardship and not dominion over nature. Mother nature is speaking to us in increasingly threatening and angry ways. In the end we each remain totally dependent on the bounty of this one small planet that offers us a place at nature's feast. We should treat this bounty with the care it deserves. History has made us the beneficiaries of human ingenuity and the inheritors of human folly. How this duel between ingenuity and folly is fought out will determine our planet's and our own future course. For us, our children and grandchildren we are embarked on the battle of a lifetime for the sake of their lifetimes. We must not fail.

Contacts

Pat Cox, European Coordinator

Martin Zeitler, Political advisor
Martin.ZEITLER@ec.europa.eu

Corridor website:
https://ec.europa.eu/transport/themes/infrastructure/scandinavian-mediterranean_en

Contact details:
European Commission – Directorate General for Mobility and Transport
Directorate B – Investment, Innovative & Sustainable Transport
Unit B1 – Transport Networks
http://ec.europa.eu/transport/index_en.htm
email: move-info@ec.europa.eu
Office
Rue Demot 28
1049 Brussels, Belgium

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