Detailed analysis of ports and shipping operations

Annex to Motorways of the Sea Detailed Implementation Plan April 2018

Mobility and Transport

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Introduction

This document (known as the MoS Study) analyses in detail the TEN-T core and comprehensive seaports in order to identify and define horizontal priorities aiming at a better integration of seaports in the TEN-T network. The market-based findings of the study provide a supplementary basis for the MoS Coordinator, in synergy with the Detailed Implementation Plan (DIP) for developing his recommendations. Chapter 1 of the study presents an overview of cargo traffic per segment in core and comprehensive ports in 2016. This is intended to provide an overall picture of maritime traffic in the EU, with a focus on seaports as entry points to the Core Network Corridors (CNCs). The chapter is complemented by extensive annexes with tables and maps on the maritime connectivity of the European core and comprehensive network seaports.

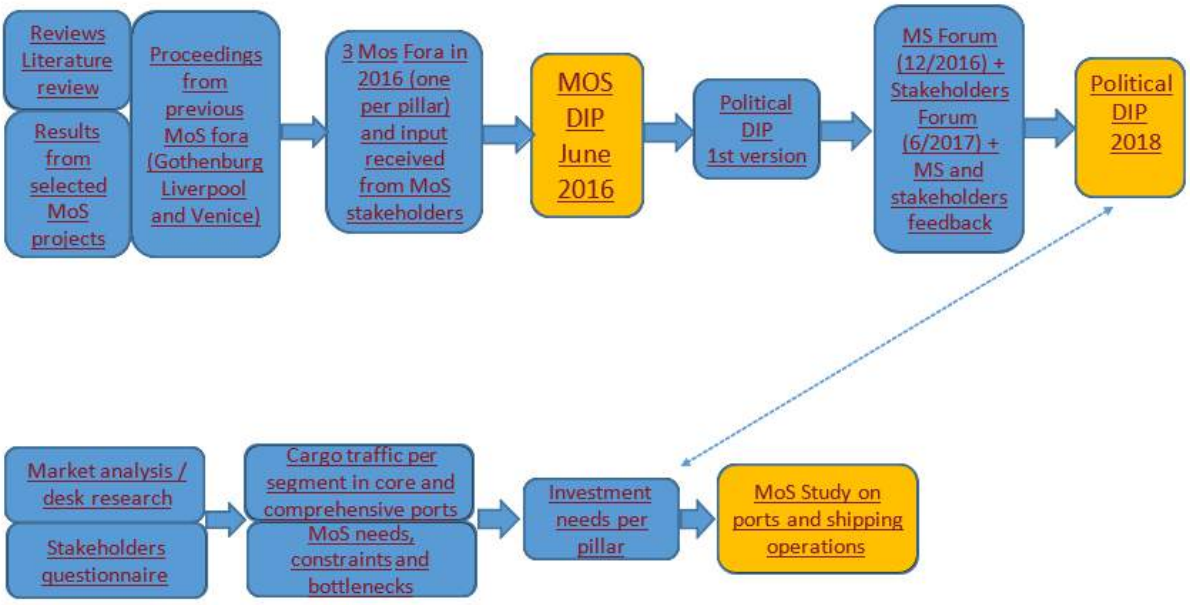
Following this analysis, the study identifies in Chapter 2 the main bottlenecks and investment needs in the European port landscape related to Motorways of the Sea based on a survey of ship operators and ports as well as on data analysis and desk research. The analysis is crucial for prioritising the most urgent lines of development for the future Motorways of the Sea programme as well as for serving as a basis for estimating the overall costs per pillar as presented in Chapter 3.

To recall, the MoS Coordinator's DIP presented a number of recommendations for the further development of the EU short sea shipping sector through the Motorways of the Sea funding programme under three pillars: Environment; Integration of maritime transport in the logistics chain; and Safety, Traffic Management and Human Element.

The identification of investment needs and related cost estimations based on solid and verifiable data are of utmost importance for supporting the recommendations formulated by the MoS Coordinator in his Detailed Implementation Plan.[1]

[1] It is worth mentioning that in March 2018, the European Seaports Organisation published a study with the title 'The infrastructure investment needs and financing challenge of European Ports'. While overlaps in results with the present MoS study could be expected, a comparison with the ESPO study is not feasible as the study does not provide figures for all the investment categories found in the MoS study. In addition, the ESPO study includes large investment projects for deep sea traffic which are not within the scope of the present study.

The following diagram illustrates the two parallel processes of the DIP and the MoS study.

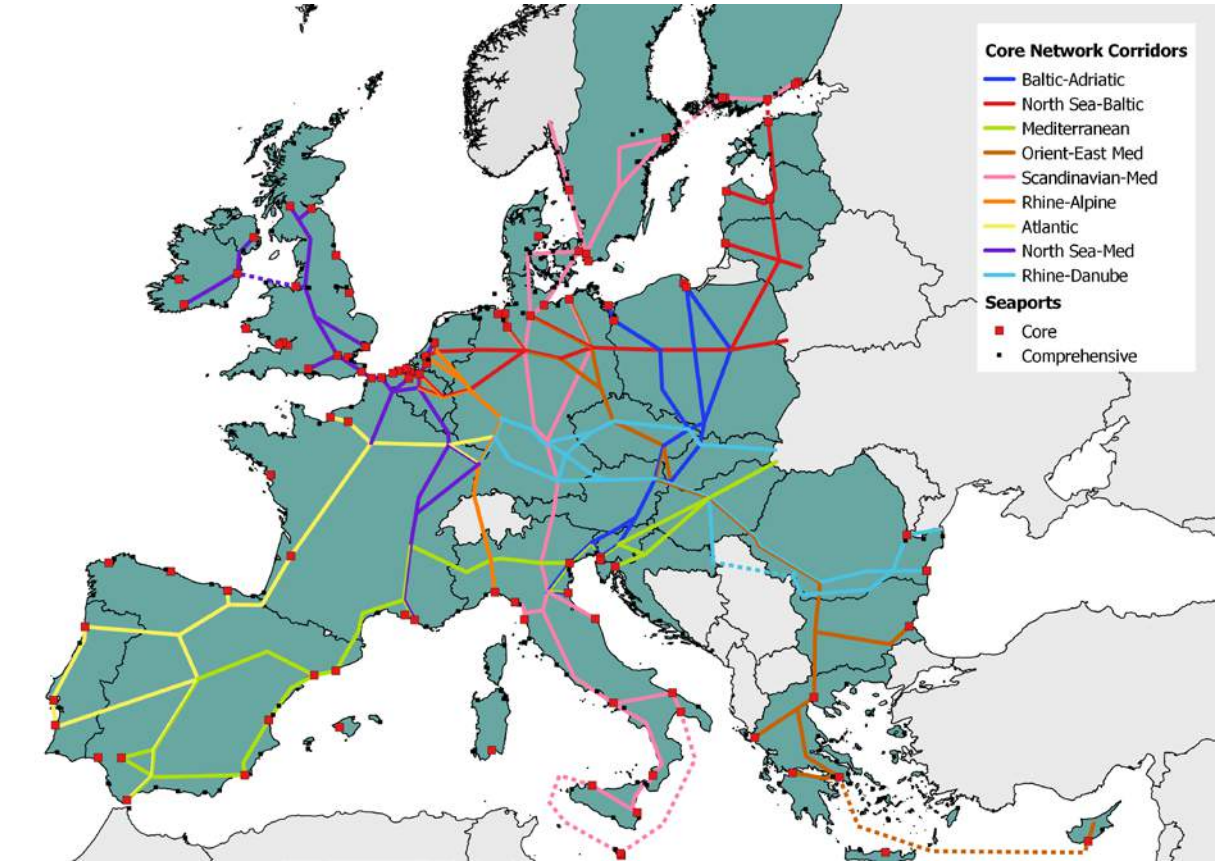


1. Detailed analysis of TEN-T ports[2]

There are 331 seaports in the TEN-T core and comprehensive network and these handled 3.5 billion tonnes in 2016, of which 2.6 billion tonnes were handled in the 84 ports situated on the Core Network Corridors (CNCs).

There are further 22 core network ports that are not part of the Core Network Corridors. Most of these ports lie far away from the main land-based corridors so their integration into the CNC network would involve a considerable amount of additional infrastructure. Eight ports in the UK located off the London-Manchester-Glasgow axis are included in this group. Spain counts six such ports – two in North Spain and three on the Canary and Balearic Islands. In general, these ports play an important role for serving their regional markets, but they are not part of major international transit routes in the hinterland.

Figure 1: Core Network Corridor ports and Comprehensive Network ports



Source: ISL based on Eurostat

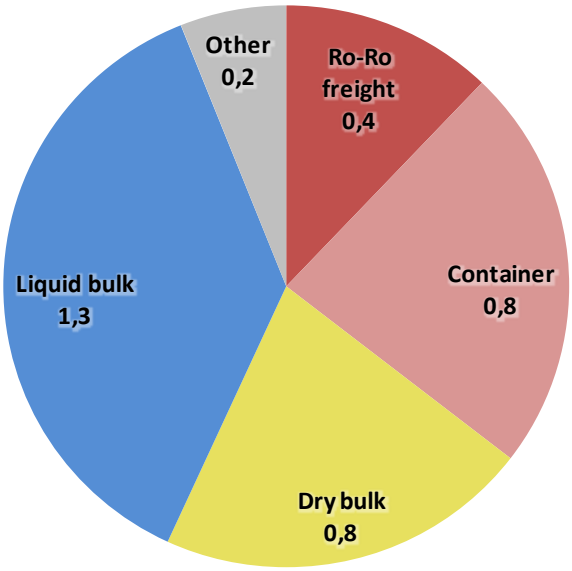
[2] covering Tasks 2.1 and 3.1

The traffic profile and main characteristics of the core and comprehensive network ports are outlined below.

1.1. The TEN-T core and comprehensive network ports

The full list of maritime ports included in the core and comprehensive network (see Annex 1) spans 23 EU Member States. In total, 3.5 billion tonnes were handled in 2016. While the vast majority of bulk traffic is subject to tramp shipping without regular schedules, container and ro-ro traffic are almost exclusively transported on regular shipping services. Out of the total 3.5 billion tonnes, 1.2 billion tonnes were generated by these regular shipping services, namely 0.8 billion tonnes of container traffic and 0.4 billion tonnes of ro-ro traffic.

Figure 2: Total cargo traffic of core and comprehensive network ports by type 2016 (billion tonnes)



Source: ISL based on Eurostat

The network of regular shipping services to and from EU ports is large and very diverse. Early in 2017, 408 regular container shipping services and 450 ro-ro services were identified.

The **container** services included 150 deep sea services and 15 services within one Member State only. The remaining 243 services were connecting at least two Member States or one Member State with a

neighbouring country. In terms of volume, around half of the container traffic of the comprehensive network ports was short sea traffic and half of it was deep sea traffic.

The deep sea container traffic is concentrated in a number of hub ports. Only 36 out of 331 ports reported more than one million tonnes of containerised cargo directly coming from or going to ports outside Europe. The top 10 European ports handled 80 % of this cargo. Short sea traffic (including feeder traffic) is much more dispersed: 63 ports handled more than one million tonnes and the top 10 ports only accounted for little more than half of the total short sea container volume.

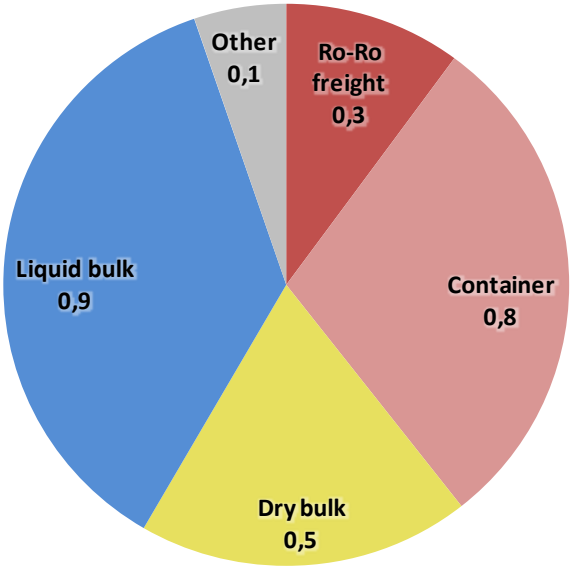
Overall, almost half of the 331 core and comprehensive network ports reported container traffic. Out of these 161 ports, container traffic exceeded one million tonnes in 70 ports (see Annex 2).

For **ro-ro shipping** (excluding traded vehicles), regular deep sea services are the exception (12 services). Indeed, there are many more connections between ports within one Member State (179 services). The number of services connecting (at least) two Member States or one Member State with a neighbouring country hence reaches 259 services. The network comprises 185 ports having reported ro-ro cargo traffic in 2016, of which 86 have handled more than one million tonnes. Less than 2% of the total ro-ro volume has its origin or destination overseas.

1.2. The Core Network Ports

The 84 Core Network Ports situated on one of the Core Network Corridors 2.6 billion tonnes of cargo in 2016. Their traffic profile is similar to the profile of the full set of ports, with one notable difference: the share of container traffic is considerably higher. This is due to the fact that the CNC ports cover 93% of the total container traffic, while their share ranges between 62% and 73% in the other cargo segments.

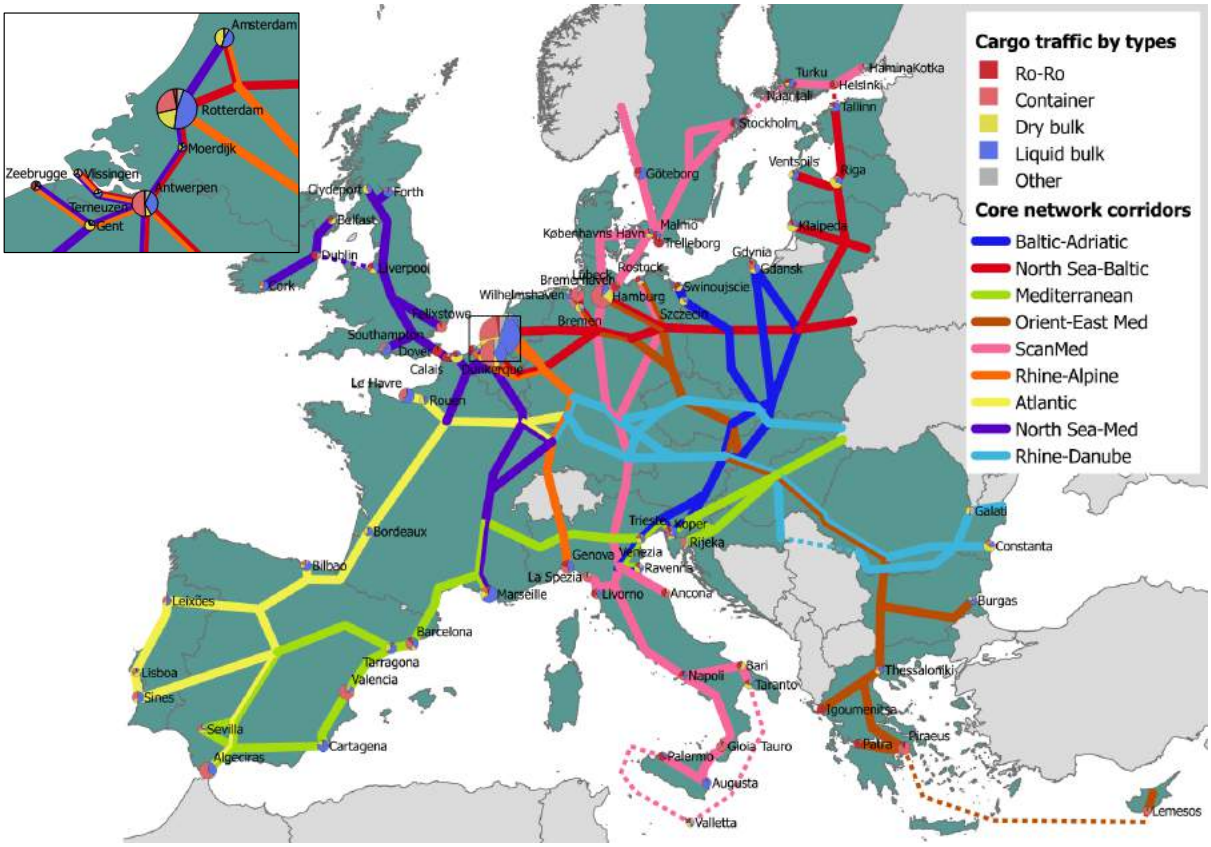
Figure 3: Total cargo traffic of Core Network Corridor ports by type 2016 (billion tonnes)



Source: ISL based on Eurostat

The Core Network Corridor ports link the Core Network Corridors to each other; and they link the Core Network Corridors with the comprehensive network ports and third countries.

Figure 4: Core Network Corridors and CNC ports' cargo traffic by type 2016



Source: ISL (cargo traffic based on Eurostat)

Out of the 84 CNC ports, 71 possess regular **container** services (see Annex 3 for a list of connections by corridor). However, only 41 CNC ports had regular deep sea services, the remainder being connected either to pure short sea services (door-to-door) or to short sea feeder services, connecting them to intercontinental trade via hub ports.

A similar number of CNC ports possess regular **ro-ro** services. Out of 72 such ports, only 20 are however connected to deep sea services (including con-ro). Virtually all of these ports have international short sea connections with other Member States or with third countries.

The European Motorways of the Sea network hence complements the land-based network, providing links between the different corridors, but also between the CNC ports and ports of the comprehensive networks as well as ports in neighbouring countries and the rest of the world.[3]

[3] see Annex 3 for detail per corridor and per port

The 21 Core Network ports that are not part of a Core Network Corridor handled a combined volume of approximately 320 million tonnes. The shares of liquid bulk (53 %) and dry bulk (24 %) are higher than on average. Container traffic, by contrast, only had a share of 8 %.

1.3. The network of intra-European Motorways of the Sea

Maritime transport plays an important role in interconnecting the European ports and their hinterlands. According to recent figures,[4] 37.7 million TEU equalling roughly 400 million tonnes of short sea combined transport cargo (container and ro-ro) were moved between ports within the EU or between ports in the EU and neighbouring third countries.

As the above analysis has shown, the network of European short sea services is vast and diverse. There are high-frequent ferry services bridging small distances, e.g. across the English Channel, the Fehmarn belt, or the Strait of Gibraltar. On longer sea distances, unaccompanied trailers and containers are shipped and often combined with rail or barge hinterland transport.

Most of the links have been developed decades ago and successfully operated by private ferry and container liner operators. For traffic across straits, competition is mostly between liner operators and ports, but not between modes – except where tunnels/bridges are an economically viable alternative. Improving the efficiency and extending the capacity of such links makes transport cheaper and helps promoting the single market.

On coastal routes, where modal shift from road or rail to sea is possible, there is direct competition by land-based modes of transport. The commercial operation of coastal short sea routes hence depends much more on the competitiveness of seaborne transport vis-à-vis other modes of transport. In general, the longer the distance, the more attractive short sea transport becomes because the cost per kilometre and unit is particularly low. Supporting the efficiency of short sea transport may hence also promote a modal shift towards maritime transport.

Apart from efficiency gains, improving the environmental performance of shipping is certainly an overarching goal for all types of short sea transport. Here, the Motorways of the Sea programme may support shipowners in

[4] ISL, KombiConsult (2017): Updating EU combined transport data, study for the European Commission, DG MOVE

being ahead of ever-stricter regulations and piloting alternative fuels, new propulsion types and other solutions that help the shipping sector to undermine its reputation as an environmentally friendly mode of transport.

2. Bottlenecks and investment needs[5]

In order to fulfil their role as facilitators of intra-European transport, seaports have to provide the necessary infrastructure to guarantee smooth transfers between sea transport and land-based transport. An analysis of the adequacy of ports with regard to their role in combined transport operations can therefore not be limited to the analysis of the seaside access and quayside facilities, but needs to take into account also the connection with other modes of transport, i.e. road, rail and inland waterway.

When it comes to promoting "green shipping", the focus naturally lies on the fleet trading in European waters. However, many potential measures with regard to vessels also have an impact on ports, e.g. LNG-fuelled vessels need economically viable LNG supply in the ports or closed-loop scrubbers need adequate sludge reception facilities.

Based on a survey of ship operators and ports as well as on data analysis and desk research, the main bottleneck issues and investment needs in the European port landscape were identified.

The concept of adequacy:

The requirements of the 331 ports in the core and comprehensive network differ from one port to another due to the different cargo types and ship sizes on the relevant trades. Setting meaningful common European standards with regard to ship sizes, for example, is impossible. In addition, despite the importance of a modal shift from truck to rail, many ports do not need a rail connection because intermodal services are not viable (e.g. ports on smaller- to medium-sized islands). Consequently, 'compliance' with European-wide standards is not a useful concept when it comes to developing Motorways of the Sea. Instead, an analysis of the needs of each port, its integration into maritime and hinterland transport chains is a prerequisite for efficiently developing the Motorways of the Sea network.

In the present study, the notion 'adequacy' is introduced in order to take into account the diverse needs of the European seaports. It entails the

[5] covering Tasks 2.2, 2.3, 3.2 and 3.3

definition of concrete objectives, e.g. determining the total number of ports that should have a rail connection or that should be able to handle a certain ship type. In this context, the 'degree of adequacy' describes the share of ports in each sub-sample that meet this objective.

In order to define the objectives, an analysis of regular shortsea ro-ro and container services was performed. This analysis indicates the needs for physical infrastructure in a certain port or port range for Motorways of the Sea. This status-quo analysis is complemented by a survey of shortsea ship operators (users of the seaports' maritime infrastructure) and an analysis of investment needs as perceived by the seaports.

The port survey:

The aim of the port survey was to get an indication of the investment needs and future requirements as perceived by the ports. The survey thus took a broader perspective, asking about the requirements to prepare the ports for the challenges of the future in the context of Motorways of the Sea.

In order to provide a broad perspective, a representative sample of 39 ports defined covering all Member States and the different port categories (core and comprehensive ports, ports in outermost regions, different size categories, deep sea/short sea ports, etc.).

Below is the list of ports covered by the survey.

Table 1: *Sample ports for survey*

		Container			RoRo			5th set: additional selected criteria	
Country	Port	Rail tracks	electrified		Rail tracks	electrified		located in outermost area	development of a port cooperation
BE	Antwerpen	2	yes		n.a.	n.a.	cont & roro		
BE	Zeebrugge	2	yes		1	yes	cont & roro		
BG	Varna	2	yes		1	yes	cont & roro		
CY	Limassol	0	n.a.		0	n.a.	cont & roro		
DE	Bremen/Bremerhaven	2	yes		n.a.	n.a.	cont & roro		
DE	Hamburg	2	yes		n.a.	n.a.	cont		
DE	Kiel	n.a.	n.a.		1	yes	roro		
DK	København	0	n.a.		0	n.a.	cont & roro		x
EE	Tallinn	1	yes		0	n.a.	cont & roro		
ES	Bilbao	2	yes		2	yes	cont & roro		
ES	Las Palmas	0	n.a.		0	n.a.	cont & roro	x	
ES	Valencia	1	yes		0	n.a.	cont & roro		
FI	Helsinki	1	yes		0	n.a.	cont & roro		
FI	Kemi	1	no		1	no	cont & roro		
FR	Calais	n.a.	n.a.		1	yes	roro		
FR	Le Havre	1	yes		0	n.a.	cont & roro		
FR	Marseille	1	yes		1	yes	cont & roro		
GB	Dover	n.a.	n.a.		0	n.a.	roro		
GB	Hull	0	n.a.		0	n.a.	cont & roro		
GB	Liverpool	1	yes		0	n.a.	cont & roro		
GR	Piraeus	1	yes		0	n.a.	cont & roro		
HR	Rijeka	1	yes		1	yes	cont		x
IE	Dublin	0	n.a.		0	n.a.	cont & roro		
IT	Genova	2	yes		0	n.a.	cont & roro		
IT	La Spezia	2	cont		n.a.	n.a.	cont		
IT	Triest	1	yes		n.a.	n.a.	cont & roro		x
LT	Klaipeda	1	yes		2	yes	cont & roro		
LV	Riga	1	yes		0	n.a.	cont & roro		
MT	Marsaxlokk	0	n.a.		0	n.a.	cont & roro		
NL	Amsterdam	n.a.	n.a.		0	n.a.	roro		
NL	Rotterdam	2	yes		1	yes	cont & roro		
PL	Gdynia	1	yes		0	n.a.	cont & roro		
PL	Swinoujscie	n.a.	n.a.		1	yes	roro		
PT	Canical	0	n.a.		n.a.	n.a.	cont	x	
PT	Leixoes	0	n.a.		0	n.a.	cont & roro		
RO	Constanza	1	yes		n.a.	n.a.	cont & roro		
SE	Malmö	0	n.a.		1	yes	cont & roro		x
SE	Trelleborg	n.a.	n.a.		1	yes	roro		
SI	Koper	1	yes		n.a.	n.a.	cont & roro		x

Corridors: ATL: Atlantic; BA: Baltic-Adriatic; MED: Mediterranean; NSB: North Sea-Baltic; NSM: North Sea-Mediterranean; OEM: Orient-East Med; RA: Rhine-Alpine; RD: Rhine-Danube; SM: Scandinavian-Mediterranean

Source: ISL

In order to understand the needs in the different ports, port development plans, port strategies and annual reports published by the ports were analysed. Using a content analysis software tool, the priorities for future development contained in the documents were extracted.

The analysis was complemented by a qualitative survey among the 39 ports with open questions. Thirteen ports responded to the survey and the responses were analysed using the same software tool. The responses cover all port types (container, ro-ro, container & ro-ro), traffic profiles (deep sea/short sea and short sea only), core and comprehensive ports, five of the nine corridors and include two ports engaged in two different port co-operations.

Most of the investment needs indicated by the ports (both sources combined) concern the construction of new terminals and the expansion of road and rail infrastructure.

Below is a tag cloud showing their key concerns.

Figure 5: Areas of investment needs and further requirements mentioned by the port authorities (tag cloud)

Source: ISL based on port operator survey and publicly available information on port development plans

Moreover, there are a number of port projects listed in the nine CNC work plans that are relevant to the MoS objectives.

A list of the relevant "port projects" has therefore been compiled and includes 407 projects that have been selected from the Core Network Corridors project lists[6] (the complete list can be found in the Annex).

[6] including more than 2,300 projects

These projects have been categorised according to the following parameters:

- "Port Dimension". The port dimension comprises projects regarding works, studies carried out within the port, aimed at improving the port from several point of views (e.g. new LNG bunkering facilities; new platforms; dredging works, etc.) for a total of 283 projects;

- "Network Connection". This parameter includes projects regarding works, studies and actions aiming at improving the connection of the port "on/from the outside" in a broad sense. Therefore, the list comprises not only projects that better link ports to corridors but also projects aimed at enhancing ports' accessibility in other ways (e.g. road, rail connections better linking the port with its hinterland; rail entry processes etc.), for a total of 36 projects;

- "Port dimension + network connection". 52 projects which presents elements from both the above-mentioned dimensions;

- "Mixed". This category contains 62 projects of two kinds: projects with a strong ICT dimension (e.g. Port Community Systems - PCS) and projects covering a wider range of ports and /or actions (e.g. Widermos).

Most of these projects could potentially be included in a MoS link project while many others could be part of a MoS wider benefit action.

The ship operator survey:

The ship operator survey focussed on liner operators offering regular short sea connections. This includes pure short sea door-to-door operators, but also operators mixing door-to-door volumes with feeder traffic. The idea behind this survey was threefold.

First, the operators are the customers of the ports. They are the beneficiaries of many port development measures such as on-shore power supply installations, LNG bunker facilities, deepening of port approaches, etc. In many cases, the operators also provide door-to-door services so they can also evaluate requirements regarding the ports' hinterland

connections. Therefore, the most direct and efficient way to find out about the future needs from an external perspective is to ask the operators.[7]

Second, most ports handle different types of traffic (short sea and deep sea traffic). Some projects may be urgent for the ports, but not for short sea operators and hence not within the scope of Motorways of the Sea as defined here. By directly asking the short sea operator, the needs of this traffic segment can be filtered out.

Third, while each port is planning its own development, the short sea operators have a comparative perspective. They may be very satisfied with some ports while pointing at problems in other ports. This comparative approach is useful in providing a more balanced perspective regarding the urgency of certain aspects or projects, which cannot be achieved by asking single individual ports.

For the present study, eight operators' replies including ro-ro operators as well as container door-to-door and container short sea/feeder carriers have been taken into account. Together, they represent a fleet of more than 100 vessels operating on intra-European short sea services connecting at least two member-states. The major issues raised were the needs for new vessels, specialised short sea terminals (in order to lower port costs) and easier customs procedures.

[7] see "Why Port User's Perception" in Port user perceptions measurement and indicators, PORTOPIA Deliverable 6.1, page 11

Figure 6 below illustrates the operators' replies in a tag cloud.

Figure 6: Areas of investment needs and further requirements mentioned by the short sea operators (tag cloud)

Source: ISL based on ship operator survey

By approaching the sample ports and port operators directly, the survey provides a candid, unconstrained angle to the analysis of bottlenecks and investment needs. It complements the desk research that looked into the achievements/conclusions and further research needs identified by the previous MoS projects. The MoS projects are, by definition, set within a pre-defined set of eligibility criteria and thus the results from that analysis are more limited in scope.

Together, the survey and the projects analysis draw an extensive picture of the priorities perceived by the main Motorways of the Sea actors, namely liner operators, seaports and public authorities. The related investment needs can be classified into port-related needs (sub-chapter 2.1) and needs related to the MoS links and the shortsea fleet (sub-chapter 2.2).

2.1. Port investment needs including sea-side and land-side infrastructure

Seaports serve as interfaces between maritime and hinterland traffic. Therefore, in order to guarantee a smooth flow of traffic, it is not sufficient

to have efficiently operating terminals with adequate handling capacity. Both the sea-side accessibility and the land-side infrastructure must live up to the transport flows transiting a port.

The following analysis of MoS investment needs regarding ports take this broader perspective and are grouped into four categories:

- 'Sea-side and quay-side access' covering the maritime infrastructure, i.e. the waterways between the main sea routes and the terminals, including the mooring basins
- 'Cargo handling infrastructure and superstructure' including the terminal area, cargo handling equipment both at the quay and on the terminal
- 'Quay-side services' that are not related to cargo handling, e.g. bunkering, waste reception, shore-side electricity, etc.
- 'Hinterland access' encompassing the connection between the terminal gates and the main inland network including – where relevant – intermodal terminal facilities in the port area.

For each category, the degree of adequacy is analysed with regard to different objectives.

2.1.1. *Sea-side and quay-side access*

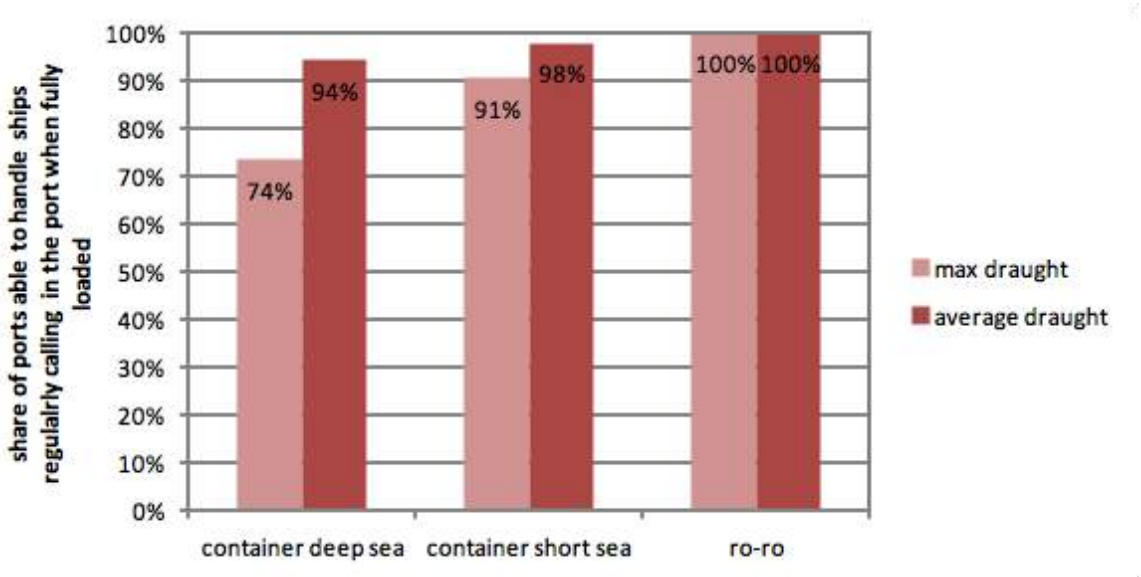
While sea-side accessibility is heatedly debated in the context of mega-carriers on the main intercontinental East-West container trades,[8] it is hardly an issue for intra-European short sea services. The reason is straightforward: the ships sailing on intra-European services are much smaller than those employed by the ocean carriers. Of course, operators take into account the physical restrictions when deploying their vessels on certain routes, but most often the maximum possible ship size is not used for short sea shipping.

While draught restrictions are not an issue for any of the regular ro-ro services in Europe, some ports are not able to handle the container vessels regularly calling in the port when they are fully loaded. This does not necessarily have to be an issue as most container services are multi-

[8] see, e.g., Olaf Merk et al.: The Impact of Mega-Ships: Case-Specific Policy Analysis, OECD, 2015 (www.itf-oecd.org/sites/default/files/docs/15cspa_mega-ships.pdf)

stop services so only the first or last port in a range needs to be able to handle these vessels at their full load line.

Figure 7: Share of comprehensive ports able to handle vessels regularly calling in the port when fully loaded (spring 2017)



Source: ISL

It may seem surprising that there is also a non-negligible number of ports that could face draught restrictions for short sea container services. This is due to two factors. On the one hand, larger Panamax and post-Panamax vessels are increasingly used on certain intra-European routes as charter rates for these vessel types have been very low recently. On the other hand, compared with deep sea traffic, a much higher number of ports – including many smaller regional ports – is handling short sea traffic.

The short sea container operators' survey reveals that the existing theoretical restrictions are not an issue for their business. None of the participants mentioned draught restrictions.

Besides the physical dimensions of the sea-side access – mostly an issue for deep sea traffic and hence not the focus of MoS – the efficient management of the access canals is of high importance in many ports with high-frequency short sea connections. This aspect is analysed in more detail in chapter 2.3.2 on vessel traffic management.

2.1.2. *Cargo handling infrastructure and superstructure*

The technical adequacy of terminal infrastructure and cargo-handling superstructure is hardly mentioned by short sea shipping operators as a bottleneck. For intra-European container shipping, this is easily explained:

most of the ports handling short sea traffic also handle deep sea traffic and are hence prepared for larger ships, but also for higher numbers of containers handled per ship call.

While container short sea operations are comparatively modest with regard to infrastructure and superstructure (no latest-generation gantry cranes needed, volumes handled per call comparatively small), several operators insist that their business is much more cost-sensitive than the deep sea business, particularly on coastal routes where it has to compete with land transport. High terminal handling charges make short sea shipping on shorter coastal distances impossible, hence limiting the potential for a shift from road to sea.

Short sea shipping is also more time-sensitive when it comes to port operations. Due to the shorter sea distances, delays cannot easily be compensated by increasing the vessel's speed. Here, it is not the speed of terminal operations creating an issue,[9] but rather waiting times. Where short sea vessels are using the same terminals as the deep sea vessels, the latter are normally given higher priority by the terminal operator.

Creating more dedicated short sea berth capacity could help relieve both the cost and the capacity issues. In many ports, older terminals that are no longer able to handle the latest generation of ocean-going vessels may be reconverted into short sea terminals. The lower infrastructure costs and possible savings on terminal equipment compared with modern deep-sea terminals can then be translated into lower terminal handling charges.[10]

For ro-ro traffic, liner operators see a need for faster and more efficient handling procedures. Given the often rather short sea distances for ro-ro traffic, the time at berth may have a relatively high share in the ship's total round trip duration. Therefore, faster handling procedures would not only contribute to shorter waiting times, but also to the cost effectiveness of short sea shipping vis-à-vis land transport. The actual scope of investment needs (new ro-ro ramps, more space for cargo operations, etc.) depends on the local situation in each port. While the minimum requirements for funding of maritime links according to the current

[9] except in special cases such as strike situations

[10] Other ways of reducing the costs of short sea shipping are measures concerning the vessels, e.g. developing and testing more fuel-efficient pilot vessels or new, more economic propulsion systems and the like (see chapter 2.2.2).

regulation (at least two ports from two Member States, involvement of ship operator) is open to measures concerning one link only, priority should be given to investments benefitting several players in a range, including the definition and achievement of common standards regarding loading operations.

When it comes to operational efficiency, improving the environmental performance of port equipment can contribute to the overall performance of MoS in terms of environmental impact. Electrification or alternative fuel use can improve the carbon footprint and hence contribute to transport's overall performance with regard to the Paris Agreement goals.

However, there is also a concern for pollution. Reducing the emissions of sulphur, particulate matter, and noise, all contribute to improving the local air quality and quality of life. Such improvements are particularly valuable in the case of ports situated in densely populated areas.

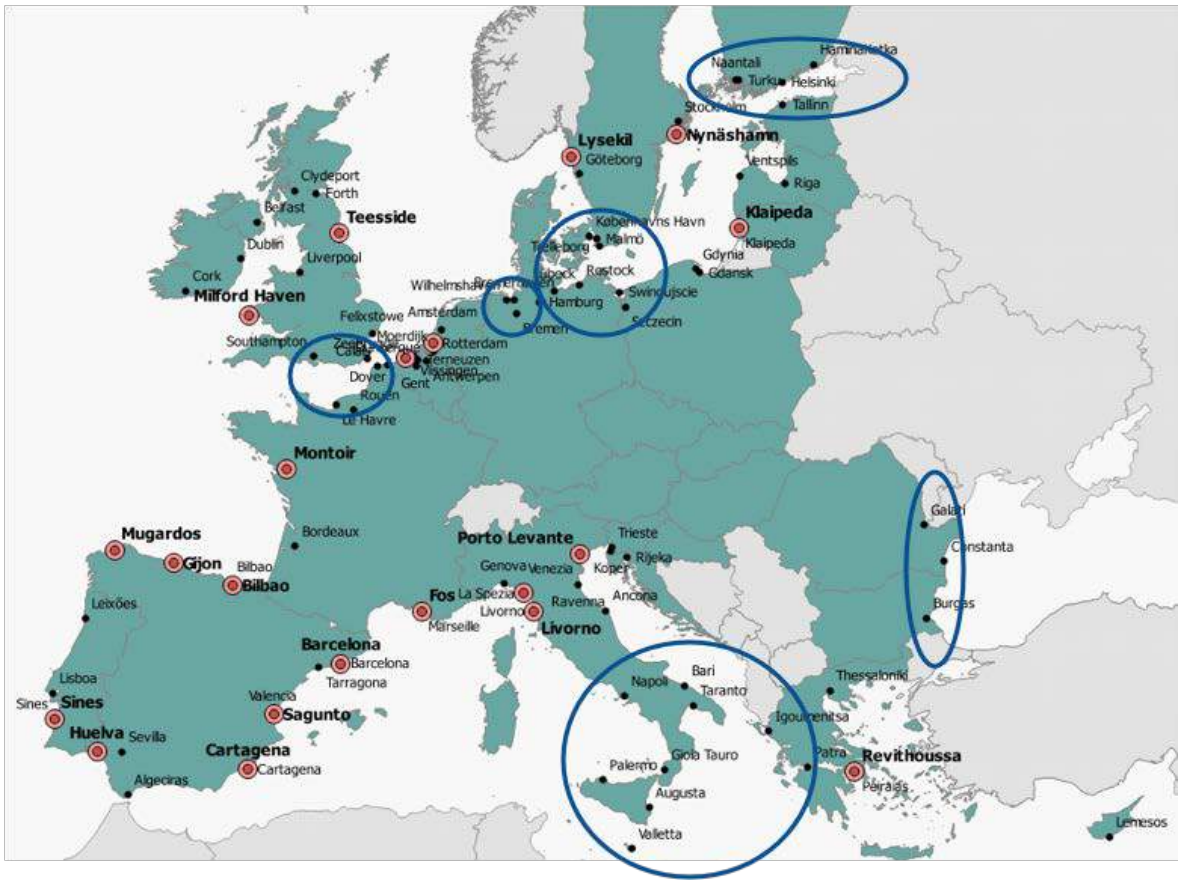
2.1.3. *Quay-side services*

The "greening" of the fleet (see 2.2.3) needs to go hand in hand with investments in the ports. In the ro-ro sector, ships are often designed specifically for one route or area and tend to serve on the same route for a long time. Therefore, operators of ro-ro vessels are willing to invest in their fleet if a sufficient number of ports (in some cases one is sufficient) provides the necessary infrastructure. Container vessels, by contrast, are often chartered in and are regularly changing not only the route, but also the trading area. Ship owners will therefore only inclined to invest in upgrades of their vessels if they can be sure that the necessary infrastructure will be available. If anything, this can only be guaranteed for ships owned by the operators themselves or in a long-term charter. This is currently rather the exception than the rule.

When it comes to LNG bunkering, there are still quite a few blank spots on the map where there is obvious need. In principle, LNG bunkering is possible in any port through the use of LNG bunkering vessels or trucks. However, the cost of such solutions increases with distance to the LNG terminal and LNG trucks are really only adequate for smaller volumes. If the use of LNG becomes more widespread in the future, the construction of additional fixed or floating LNG terminals may be necessary. Before each investment in new terminals, the demand potential must be estimated answering the following questions:

- Are there regular shipping lines calling in the port or the outreach area?
- Are the services prone to using LNG (e.g. ro-ro services or short sea container services)?
- What is the demand potential from these services?
- Given the demand potential, is an investment in a terminal justified? If yes, which size?

Figure 8: LNG terminals in the European Union 2016



Source: ISL

Similar questions apply to onshore power supply. Here, the cruise sector is leading since the time in port and the electricity demand result in a high total demand per port call. Ferry services spending less than an hour in one port, by contrast, will at most use onshore power supply when idle. On-shore power supply is a local solution, i.e. the terminal which is used for operations must provide the access. Due to a lack of standards, cooperation between port authorities, terminal operators and ship operators is necessary.

Finally, EU ports must provide reception facilities for various types of waste and residues from maritime shipping. When installing closed-loop scrubbers, ship operators depend on ports to dispose of the sludge. In general, discharge of waste at sea, as well as the management and handling of different waste steams (i.a. scrubber washwater and residues) is increasingly seen as a problematic issue. Ports play an active role in developing reception facilities and services in view of compliance with international and European legislation. This is in particular also relevant in the light of the entry into force, between 2019 and 2021, of the Baltic Sea special area[11] for sewage discharges from passenger ships[12], which will require all IMO-registered passenger vessels operating in the area to discharge all waste in port reception facilities. A review of the EU Port Reception Facilities Directive is also pending.

2.1.4. *Hinterland access*

Hinterland access – defined here as the connection between the terminal gate and the main network – is an issue in many European ports, particularly those situated in densely populated areas. In many cases, the connecting infrastructure is used for various cargo types and in some cases also passenger traffic. Wherever bottlenecks hinder the smooth connection of seaports with the land-based transport infrastructure, solutions should be developed and included in the Motorways of the Sea programme. Relevant bottlenecks mentioned in the port survey and in port development plans include:

- Rail infrastructure within port area (rail connection to main network, construction/extension of rail terminals and shunting yards)
- Road infrastructure in port area and access to port area (construction of new roads, bridges and tunnels)
- Road traffic management (including driver information systems, pre-gate parking, etc.)
- Rail operations and the related processes (e.g. shunting) within port area (mostly concerning large CNC ports)

[11] HELCOM: http://www.helcom.fi/news/Pages/Passenger-ship-sewage-discharges-into-the-Baltic-Sea-will-be-banned.aspx
[12] Under Annex IV or the MARPOL Convention

During the interviews of short sea operators with door-to-door services, hinterland connections were only mentioned sporadically and in the examples of single ports (road congestion). Where short sea shipping competes with direct land transport, road congestion in the port area hinders the shift from road to sea as it adds both time and costs to the short sea transport chain. The solutions to congestion issues must be developed in the ports and may include infrastructure upgrades, but also modal shift incentives and measures for port-internal traffic or intelligent road traffic management.

2.2. MoS links and investment needs in the European short sea fleet

Next to investments in ports, developing the European Motorways of the Sea network is a key priority. Motorways of the Sea are indispensable for connecting many European regions to the core network and hence for the functioning of the common market.

As illustrated in chapter 1, there is an extensive network of container and ro-ro services linking European ports among each other as well as with third countries. The connections with the highest frequency – Puttgarden-Rødby and Calais-Dover – are also the ones that are part of an existing core network corridor. They are complemented by parallel links. The high-frequency Rostock-Gedser link or the numerous links between South Sweden and the southern Baltic Sea coast complement the Puttgarden-Rødby service. Calais-Dover has even more parallel links with eight ro-ro services connecting France and Great Britain and further connections between Great Britain on the one hand and Belgium and the Netherlands on the other hand.

In the Mediterranean, the connections with highest frequency are those across the Strait of Gibraltar with the ports of Tarifa, Algeciras and Gibraltar on the northern side and Tanger, Tanger Med and Ceuta on the southern side. A considerable share of ro-ro connections in the Mediterranean connects islands such as the Balearic Islands, Corsica, Sardinia, Sicily, Malta, Crete and Cyprus with the mainland. In the Black Sea, ro-ro services connect Bulgaria and Romania with third countries in the Black Sea.

Given the high number of successful services, there is no doubt that these links can be operated commercially. However, the high concentration of traffic makes the ports and connecting infrastructure of these links an

important bottleneck in intra-European transport. The use of alternative fuels or fuel-saving technologies would have a particularly high impact here due to the sheer volume of traffic.

However, these high-frequency ro-ro links are only a tiny fraction of intra-European short sea services. Container services are mostly running on a weekly basis and are using multi-stop strategies to connect different ports within a range to each other or to other ranges. There are also many services (container and ro-ro) connecting islands or remote territories with the mainland. The vast majority of these services are connecting two or more ports of the same Member State. In the Mediterranean and in the Black Sea, connections with third countries are of particular importance – just as the connections between the EU mainland and Norway in the North.

While private commercial operators have been assuring the links on the major corridors for many years now, the volume of cargo on links towards remote and outermost regions as well as to neighbouring countries are generally much lower, making commercial operations more difficult and limiting possibilities for competition (bundling of total volume on one service in many cases). In order to promote territorial cohesion in the EU and close economic links with neighbouring countries, the focus on supporting new links should be on these peripheral axes.

As regards the existing links, 'greening' the fleet and making short sea shipping as safe as possible will be the most important tasks.

2.2.1. *New Motorways of the Sea links*

The identification of new Motorways of the Sea links that would be worthwhile exploring is one of the most challenging issues in the MoS context. The analysis must comprise at least an estimate of the total volume of intra-European trade for which this link would be competitive as well as a realistic estimate of the market share. In order to appraise the latter, the routes currently used and their costs must be analysed. With regard to fair competition, it must be made sure that the new links are not deviating considerable amounts of cargo from existing MoS links.

During the interviews, several short sea operators insisted on the fact that no support is required for establishing new routes or services. The reason for that is that if a route is economically viable in the long run, it is the role of the market to realise any such link. According to several operators, EU support could end up subsidising a new route which is not sustainable

in the long run or a link which is deviating volumes from other, non-subsidised routes. In general, a negative impact of subsidies on competition is perceived. In this context also the former Marco Polo programme was mentioned as a negative example for financial EU support.

Instead of directly subsidising or promoting new routes, operators propose to focus more on the most pressing horizontal issues, namely simplifying and streamlining customs and administrative procedures and contributing – if possible – to a more generalised reduction of costs for all players (e.g. simplifying terminal handlings for short sea container operations). In addition, most players agree that the European Commission can play an important role in promoting the greening of the fleet (see 2.2.3).

2.2.2. *Motorways of the Sea links with peripheral or outermost regions*

One aspect being put forth in the context of financing conditions is the non-eligibility of many maritime links connecting peripheral or outermost regions. While cohesion is an important objective of the European transport policy and is named first in Article 4 of the TEN-T regulation, the contribution of Motorways of the Sea towards the achievement of this goal has therefore been limited in the past.

Two conditions currently impede the inclusion of many such links in the Motorways of the Sea policy. First, many of the existing and possible future links do not involve core ports as they are situated in the geographical periphery. Second, the connection of outermost regions e.g. Ceuta or Melilla, the Canary Islands or the Azores) is traditionally provided by regular ship services between these regions and ports on the mainland of the respective ports. This is for a good reason: the exchange between the outermost regions is traditionally most intense with the respective national mainland so transport chains are optimised by using national ports. Therefore, the requirement to cover ports in two different Member States to be eligible for MoS funding cannot be met.

The major issue raised by survey respondents concerning the creation of new links is that EU support for certain routes introduces a competition bias and that these routes inevitably deviate cargo from existing routes. If peripheral and outermost regions do not have more connections, operators argue, it is because of a lack of demand. Part of the low demand, in turn, may be due to the high transport costs related to the low connectivity. Subsidies may hence be necessary to lower transport costs.

While subsidising ship operating costs is not possible in the MoS programme, an alternative might be to support the adaptation of vessels to the needs of a route. If ports and ship operators prepare a joint proposal, the competition bias remains an issue. Alternatively, ports in peripheral regions could initiate calls for proposals as part of a MoS project indicating the desired link (e.g. by providing a certain range of relevant corresponding ports), necessary infrastructure adaptation and minimum requirements for vessels with a maximum subsidy on the vessel investment costs – which are included in the MoS project. In this way, several operators could compete for this link under the same conditions without any severe distortions of competition, which was another essential criticism of the Marco Polo programme. This policy could help establishing new links that are less attractive from a commercial point of view, but desirable from a political point of view.

2.2.3. *Investment needs concerning the European short sea fleet*

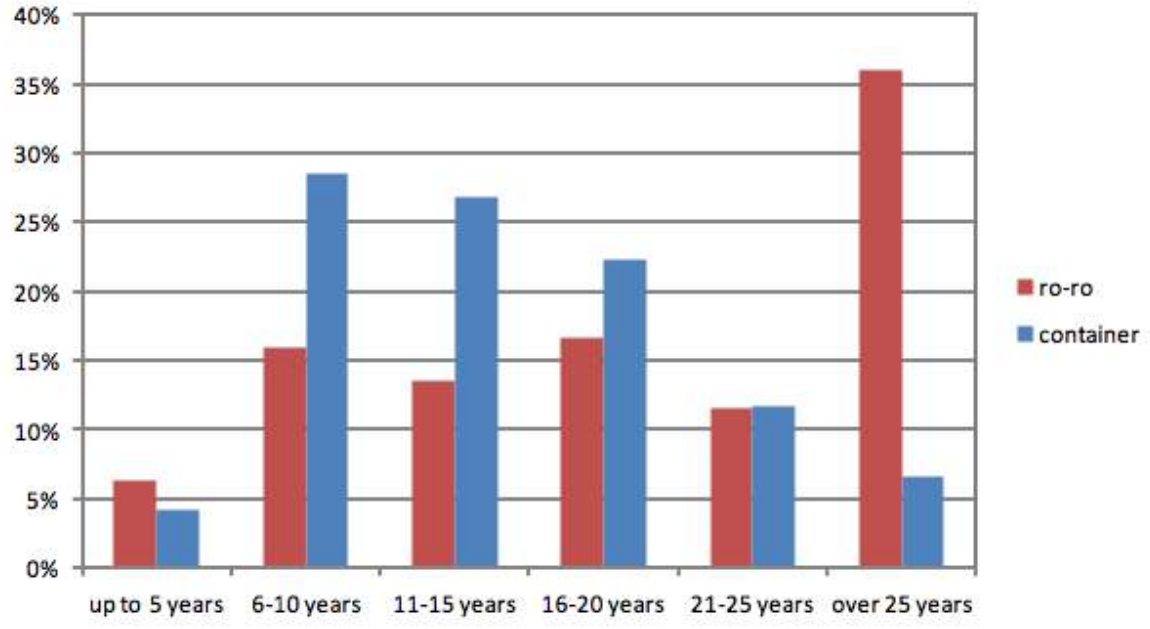
In order to assess the investment needs with regard to the European short sea fleet, one has to keep in mind that operators regularly renew their fleets as older units drop out of the market and need to be replaced by younger tonnage. Looking at the age structure of the fleet engaged in regular European short sea services, it is striking that there are only a few units that have been built during the past five years.

In the container sector, this is because there were very few new buildings in the lower size segments and, at the same time, many smaller units were replaced by larger tonnage However, these larger vessels are generally not adapted to the current state of the art of intra-European container shipping. In general, these vessels are not operated by their owners, so investments in retrofitting for cell guides for European 45-foot containers would need to involve both owner and operator and a long-term commitment. On the charter market, such a long-term commitment is difficult to achieve. Therefore, the sulphur cap issue is generally likely to be solved by using low-sulphur fuel. There has been a lot of ship-breaking in the container sector recently so few units older than 25 years are still in service.

In the ro-ro sector, many operators also own the vessels, so investments into the greening of the fleet can be organised more easily. While some players have been very active in the past most notably in the existing SECA areas, there are further investment needs particularly in the Mediterranean. More than one third of ro-ro vessels currently in service on

regular European short sea services are older than 25 years so there is a need for investments in new-buildings in this segment in the years to come.

Figure 9: Age structure of the ro-ro and container fleet employed on regular European short sea services (spring 2017)



The replacement of older tonnage by newer, more efficient tonnage is done by the market and does not need interference. However, the replacement can of course be an opportunity to introduce more environmentally friendly ships. In some cases, it may also be worthwhile to make younger vessels LNG-ready or install scrubbers.

When it comes to improving the environmental performance of the fleet, there is still a lot of potential for improvement. In the short term, preparing for the global sulphur cap of 0.50 % entering into force in 2020, investments in the fleet (scrubbers, alternative fuels) may be an alternative to using the more expensive low-sulphur fuel.

As regards the use of alternative fuels, operators are still hesitant to invest in new technologies. If LNG or other alternative fuels can prove to be cost-competitive, the market will adopt these technologies in the long run. By contrast, if the new technologies fail to be competitive in day-to-day business, they will become extinct.

Table 2: *LNG-ready ro-ro and container vessels mid-2017*

Ro-Ro services	
Total number of analysed services (regularly calling in European ports)	493 services (868 vessels)
- *Deepsea services*	*27* services *(55 vessels)*
- *National services*	*189* services *(351 vessels)*
Relevant Ro-Ro services	277 services (462 vessels)
LNG ready/electric	2 services (3 vessels)
Adequacy ratio (vessels)	1%
Container services	
Total number of analysed services (regularly calling in European ports)	471 services (1572 vessels)
- *Deepsea services*	*177* services *(1047 vessels)*
- *National services*	*19* services *(20 vessels)*
Relevant container services	275 services (505 vessels)
LNG ready/electric	1 service (1 vessel)
Adequacy ratio (vessels)	<1%

Source: ISL

By mid-2017, only three ro-ro vessels on intra-European services (excluding purely national services) were LNG-ready. Due to the long lifetime of ro-ro and container vessels, a complete change for the whole fleet from Heavy Fuel Oil (HFO) or Marine Gas Oil (MGO) to other fuels would take at least two decades even if initiated today. Conversions are possible, but are only commercially viable during the early phase of a vessel's lifetime.

Even though "greening" of the fleet is widely recognised as an uncontroversial issue, the financing of measures must also take into account competition aspects. Operators agree that the European

Commission can play an important role as a promoter of new technologies by supporting the development of pilots and prototypes. Co-financing the efficiency improvement of single ships or services, by contrast, is indeed controversial. A level playing field could be reached by reducing the administrative complexity and clarifying the conditions for applying for funding. This could, for instance, include introducing a 2-step procedure for MOS-funding applications, and revising the call documents.

2.3. Needs with regard to wider benefit projects

Wider benefit actions relate to projects that are not related or limited to a certain port or shipping line, but benefitting the sector as a whole. Next to pilot actions regarding port installations or the fleet, this includes e.g. simplifying administrative procedures, developing transferable ICT solutions or providing open training seminars or training material. In many cases, the benefits will also extend beyond the European Motorways of the Sea, even if the initiative comes from short sea shipping.

2.3.1. *Streamlining of administrative procedures*

One of the most recurring topics emerging from the operator interviews is the need for simplification of administrative procedures. The need of short sea operators to do customs declarations for intra-EU traffic is acknowledged as a competitive disadvantage vis-à-vis land transport. Moreover, customs procedures are additionally complicated by the presence of various national systems and no European-wide solution. Although exploring the possibility of adapting customs regulations in compliance with the new EU Customs Code (e.g. by providing certified secure transport corridors through international waters) should continue, solutions that reduce the workload of market players seem to be most promising in the short run. Specifically, a harmonised approach to international fast trade lanes (where logistics and customs information are simplified and digitalised across corridors) should be encouraged, i.a. by supporting the harmonisation of the e-manifest (in cooperation with DG TAXUD).

As regards fulfilling the maritime reporting requirements, the national single window initiative is welcome by the operators, but the phased introduction of the national single windows instead of a common start date as well as different reporting formats and procedures are mentioned as problems, such as the interface between the national single windows and the Port Community Systems.

2.3.2. *New ICT solutions*

The potential of intelligent sea traffic management solutions is manifold. They can help optimally utilising maritime infrastructures and hence increase the capacity without the need to invest in physical infrastructure. When extending the focus beyond single ports, real-time information can be used to optimise speed and routing of vessels approaching a port. In addition to the positive effects on the efficient use of infrastructure, it would also have beneficial effects for ship operators (by optimising speed and lowering waiting times) and for the environment (indicating slow steaming potential to vessel operators where adequate). Finally, collecting and integrating data on planned routes improves navigational safety and holds the potential for land-side intervention in case of potentially dangerous deviations from planned routes (risk of collisions or grounding). Particularly in the case of passenger shipping, such systems may have the potential to save lives. In this context, the development of software pilots and/or regional cooperation programmes for port-collaborative decision-making are among the most promising solutions.

Moreover, ICT pilots concerning the two issues mentioned in 2.3.1 should be further supported together with the measures indicated by the Digital Transport and Logistic Forum.

2.3.3. *Training*

The technological change which is at least in part fuelled by the Motorways of the Sea programme also generates new training needs. The safe handling of LNG and other alternative fuels or the manipulation of onshore power supply need special training. Therefore, promoting training standards and training activities in these areas is a logical extension of the physical investments.

In addition, training may also increase the efficiency and safety – both of which are TEN-T objectives – of Motorways of the Sea in other areas such as ship and cargo handling, emergency routines and training, etc.

The Observatory on Health, Safety and Security by the PORTOPIA project (Deliverable 3.1) may help assessing the degree of adequacy in the European landscape and the issues which should be tackled with priority.

2.3.4. Safety of navigation

Navigational safety is paramount to the functioning and competitiveness of shipping operations. As maritime traffic increases and sea and port

areas become more congested, the importance of precise and up to date hydrographical surveys cannot be underestimated.

Furthermore, new routes opening up in the Arctic pose challenges and opportunities for winter navigation in Northern Europe. In order to be able to fully exploit this potential, the Motorways of the Sea programme should continue to promote the safety of winter navigation, i.a. by contributing to the enhancement of ice-breaking capacity.

3. Estimating total costs per pillar of the Detailed Implementation Plan[13]

While Chapter 2 of the present study groups projects and measures according to areas of investment (ports, vessels and wider benefits), the Detailed Implementation Plan is structured according to three pillars which are more related to objectives:

- Environment
- Maritime transport integration in the logistics chain
- Safety, Traffic Management and the Human Element

In order to estimate the potential costs per pillar, an 'adequate' status is defined for each measure. In this context, 'adequate' means that the supply of infrastructure, superstructure and services meets the demand and/or the political aims set in each pillar for Motorways of the Sea. The proposed measures are hence regrouped according to these pillars. For measures falling under several categories, a main pillar is defined in order to avoid double counting.

Under each pillar, different types of future investments are identified. For each type of investment, the future costs are estimated based on the number of investments for reaching an 'adequate' state as defined in Chapter 2, multiplied by the cost per investment. The volume includes the total necessary amount of investment and does not differentiate between private, public and EU funds. In a first step, a long-term perspective up to 2050 is taken as some of the measures will take a longer period of time. The conclusions sketch a possible timeline for these investments.

3.1. Environment

A total of nine potential measure types has been regrouped under the Environment pillar, six of which are concerning ports and three are concerning vessels. In order to move from the status quo to full adequacy of Motorways of the Sea with regard to environmental goals (full coverage

[13] The figures have been estimated based on the needs/gap analysis (see chapter 2) defining the number of necessary projects together with an analysis of past and ongoing projects regarding the cost of certain measures (unit price). The results are shown in the first two columns of tables 3-5.

of LNG and cold ironing demand, greener fleet, etc.), the total investment need is estimated to be around EUR 3.7 billion.

Please see Table 3 below.

Table 3: *Investment needs by categories for pillar "Environment"*

	Total volume until 2050	Cost per unit (MEUR) [14]	CNC ports	Comprehen-sive ports	TOTAL (MEUR)
Ports					**1,940.0**
LNG terminals and local distribution	10	40.0	400.0		400.0
LNG bunker vessels	15	70.0	1050.0		1050.0
Onshore power supply systems [15]	200	2.0	160.0	240.0	400.0
Battery charging station [16]	1	5.0	5.0	-	5.0
New terminal handling equipment [17]	2	2.5	5.0	-	5.0
Waste/sludge reception facilities	80	1.0	10.0	70.0	80.0
Vessels/links					**1,800.0**
Piloting new vessel types	5	100.0	n/a	n/a	500.0
Conversions to alternative fuel types [18]	40	20.0	n/a	n/a	800.0
Scrubber installations	50	10.0	n/a	n/a	500.0

Source: ISL based on survey, data analysis and desk research

More than half of the investment sum is related to the costs of introducing alternative fuels. Assuring the availability of LNG in all major EU ports (see figure 8 above) requires an investment of roughly EUR 1.5 billion. A similar budget could help introducing technologies and solutions that help improving the environmental performance of the European short sea fleet. Given the average vessel lifetime, the availability of alternative fuels in the seaports and the structural parameters of the European Motorways of the Sea, a complete transfer of the short sea fleet to alternative fuel use will not be possible during the time horizon (see 2.2.3). However, a notable number of services – those most prone to the introduction of alternative fuels – can be adapted.

[14] in 2017 EUR
[15] related to terminals used by regular short sea shipping services
[16] pilot project only
[17] pilot projects only
[18] costs indicate additional costs for environmental installations beyond current norms only

Additional non-eligible investments (not listed here) will be necessary by the ship operators in order for them to comply with ever-stricter environmental regulations.

3.2. Maritime transport integration in the logistics chain

The investment needs for reaching adequacy on the integration of maritime transport in the logistics chain includes a budget for constructing new or upgrading existing intermodal facilities. As the analysis of sample ports (see chapter 2), this particularly concerns the core network corridor ports that need to handle ever-increasing amounts of intra-European short sea cargo traffic whose pre- and post-carriage is today still predominantly by road.

The cost for relieving the most urgent issue according to the ship operators – namely the simplification of administrative procedures – is estimated to be around EUR 240 million. The cost for investments in additional physical infrastructure, superstructure and regular maritime services is estimated at EUR 700 million until 2050. This sum takes into account the status quo of ports and maritime links and the supposed 'adequate' state for Motorways of the Sea, i.e. short sea shipping. The necessary investments for coping with increasing ship sizes and handling volumes per call in the deep sea container segment are – of course – much higher, but not included here.

Please see Table 4 below.

Table 4: *Investment needs by categories for pillar "Maritime transport integration in the logistics chain"*

	Total volume until 2050	Cost per unit (MEUR) [19]	CNC ports	Comprehen-sive ports	TOTAL (MEUR)
Ports					**300.0**
Intermodal facilities (new/upgrade)	10	30.0	240.0	60.0	300.0
Vessels/links					**400.0**
Promoting new or upgrading existing links/corridors	20	20.0	n/a	n/a	400.0
Wider benefits					**240.0**
Development of ICT standards and tools to facilitate administrative and customs procedures and interaction of actors on a port-centred logistic chain	60	4.0	n/a	n/a	240.0

Source: ISL based on survey, data analysis and desk research

3.3. Safety, Traffic Management, and the Human Element

Many ports are working on intelligent vessel traffic management as an answer to many issues that ports and vessel operators are facing: efficient use of infrastructure, avoiding waiting times, optimising speed using real-time information, increasing safety through planned route monitoring, etc. Instead of developing a variety of projects in different ports and in the different DIP pillars, an integrated approach should be taken, ideally developing data standards that can be used across Europe and beyond. The development of such intelligent traffic management solutions to improve the efficiency and safety of Motorways of the Sea adds EUR 200 million. The cost for specific pilot actions in ports needed to test new technologies are estimated to be around EUR 30 million.

Given the technological advancement, there will most likely be several projects building on one another in the future. In order to test and implement the tools, pilot actions requiring an investment need of 30 million will be necessary to reach a state of adequacy.

Please see Table 5 below.

[19] in 2017 EUR

Table 5: *Investment needs by categories for pillar "Safety and the Human Element"*

	Total volume until 2050	Cost per unit (MEUR) [20]	CNC ports	Comprehen-sive ports	TOTAL (MEUR)
Ports					**30.0**
Pilot actions for intelligent vessel traffic management	3	10.0	30.0	-	30.0
Wider benefits					**270.0**
Intelligent traffic management solutions (route planning and alerts, avoid collisions/grounding, etc.)	5	40.0	n/a	n/a	200.0
Training activities (LNG, OPS, safety, ...)	10	2.0	n/a	n/a	20.0
Ice-breaking activities	5	10.0	n/a	n/a	50.0

Source: ISL based on survey, data analysis and desk research

3.4. Conclusion: Total MoS investment needs and timeline

Based on the above estimates, the total MoS investment needs add up to almost five billion Euro in a long-term perspective (up to 2050). [21] Investment priorities must hence be set for the Motorways of the Sea programme taking into account the anticipated available budgets.

In the short term (next MoS call), the budget is rather limited and the period remaining until 2020 is too short for large infrastructure investments. Therefore, the Study concludes that the most salient issues to be addressed are the simplification of administrative procedures and preparing for the 2020 sulphur cap. The development of e-administration solutions and new digital tools towards a European Single Window and simplified customs procedures will certainly take more time as projects must partly build on one another. However, it is urgent to keep this development going as it is affecting the competitiveness of short sea shipping and has become one of the most important issues for short sea service operators. In the short term, around 10 % of the budget foreseen for IT solutions in this area could be used, i.e. EUR 25 million.

[20] in 2017 EUR

[21] Note that this does only include measures that are deemed necessary for Motorways of the Sea, i.e. mostly intra-European short sea shipping. Dredging for large container vessels or infrastructure upgrades for increasing deep sea container traffic are not included here. A recent report prepared for the European Seaports Organisation ('The infrastructure investment needs and financing challenge of European Ports') estimates investment needs totalling 48 billion Euro for the period 2018-2027 alone.

When it comes to exhaust cleaning technologies (e.g. installing scrubbers) and converting ships for alternative fuel use, by contrast, much can be achieved in a short period of time. Mature technical solutions are available and could be implemented on vessels trading in European waters. In parallel, LNG supply in the ports must be promoted as soon as possible. Assuming that 20 %-25 % of the projects can be implemented in a short period of time (including, e.g., one new pilot type), this would involve total investment of around EUR 800 million.

Not precluding projects and measures in other pillars and priorities, the total investment needs until the horizon 2020 would be roughly one billion Euro. Projects and measures that cannot be financed in this short period of time will have to be moved to the next period.

Until 2030, the adequacy of the Core Network Corridors needs to be in focus, in order to meet the 2030 deadline for the completion of the Core Network. Still, the role of Motorways of the Sea for regional cohesion should be re-emphasised, opening funding also to comprehensive ports, particularly in peripheral and outermost regions. The greening of the maritime fleet will remain an issue, although the focus will increasingly move from emissions reduction (scrubbers, SCR) to the deployment and uptake of alternative fuels including, if economically viable, hybrid and electric propulsion. The 2025 deadline for the mandatory provision adequate alternative fuels infrastructure will be a key driver for this.

Given the increasing pressure on the transport sector to deliver on decarbonisation and sulphur emissions, the improvement of the environmental performance must remain a top priority. The investment needs in this category that are obvious today should be tackled by 2030 so the budget needed between 2020 and 2030 is more than EUR 3 billion for this pillar alone.

Beyond 2030, and until 2050, the role of comprehensive network ports may increase further. With increasing volumes, but also possibly increasing risks due to climate change, alternative routes and synchro-modality may gain importance. In addition, physical capacity restrictions may persist on the Core Network Corridors even when the currently known bottlenecks are removed. Intelligent, capacity-based transport routing across all modes may hence increase the importance of comprehensive ports. The need for further investment – as far as it can be estimated today – amounts to around half a billion Euro.

To conclude, the Study proposes to tackle the most pressing issue regarding the competitiveness of Motorways of the Sea first: the simplification of customs procedures for short sea shipping and the promotion of electronic B/Ls. Coastal short sea services which directly compete with truck and rail transport would benefit most from progress in this field. There is a potential to shift cargo from road to sea on certain trades.

The much larger issue in terms of time and budget is the improvement of the environmental performance of Motorways of the Sea. Efforts in this field must continue in the years to come. Making short sea shipping more environmentally friendly will be increasingly important in order to keep up the political support for promoting its role in the European transport system.

An interesting finding of this study is the rather limited investment needs for physical infrastructure in the core and comprehensive network ports for Motorways of the Sea. The European short sea fleet does not face particular physical constraints regarding ship sizes and draught in most core network seaports and even most of the comprehensive network seaports. There may, however, be a need for new land-side infrastructure and equipment, e.g. for additional rail terminals or capacity expansions. Instead of a large investment programme to reach an adequate state, a continuous policy targeted towards bottlenecks is needed to keep the already high adequacy of ports with regard to the intra-European maritime cargo flows.

4. Summary

The Motorways of the Sea Detailed Implementation Plan (DIP) sketches the priorities for the future development of EU short sea shipping. The main pillars are:

- Environment
- Integration of maritime transport in the logistics chain
- Safety, traffic management and the human element

The present Motorways of the Sea Study complements the DIP. It gives an overview of the existing short sea fleet and the regular short sea ro-ro and container services. It shows how they complement and link the nine Core Network Corridors (CNCs). In addition, it highlights the role of each core and comprehensive network port in the European Motorways of the Sea network – including connections with neighbouring countries and the deep sea network.

As a second step, the characteristics of the European short sea fleet and the relevant ports are analysed in detail in order to identify gaps with regard to certain targets of objectives such as, for example, the EU-wide LNG bunkering network or simplified administrative procedures for short sea shipping. By analysing these gaps and the number of vessels and/or ports concerned, the total investment needs for Motorways of the Sea are identified. Based on past and current projects, costs for each type of investment are estimated.

The analysis shows that the total investment needs related to Motorways of the Sea up to 2050 are estimated to reach around EUR 5 billion. Compared with investment needs in ports alone as estimated by the European Sea Ports Organisation (ESPO), this investment need is rather modest as many of the very expensive infrastructure-related projects are targeted towards large vessels used on certain deep sea routes.

For Motorways of the Sea, environment-related investments represent by far the largest share. Roughly EUR 3.7 billion relate to investment needs falling under the Environment pillar. Costs related to the integration of maritime transport in the logistics chain add up to roughly EUR 1 billion while measures related to safety, traffic management and the human element contribute another EUR 300 million.

Annex 1: List of ports in the comprehensive network

Member State	Name of port	Core/Compreh.	CNCs*
Belgium	Antwerpen	Core	BFH
Belgium	Gent	Core	FH
Belgium	Oostende	Core	-
Belgium	Zeebrugge	Core	FH
Bulgaria	Burgas	Core	D
Bulgaria	Varna	Comprehensive	-
Croatia	Dubrovnik	Comprehensive	-
Croatia	Ploce	Comprehensive	-
Croatia	Pula	Comprehensive	-
Croatia	Rijeka	Core	C
Croatia	Sibenik	Comprehensive	-
Croatia	Split	Comprehensive	-
Croatia	Zadar	Comprehensive	-
Cyprus	Larnaka	Comprehensive	-
Cyprus	Limassol	Core	D
Denmark	Aalborg	Comprehensive	-
Denmark	Aarhus	Core	-
Denmark	Branden	Comprehensive	-
Denmark	Ebeltoft	Comprehensive	-
Denmark	Esbjerg	Comprehensive	-
Denmark	Fredericia	Comprehensive	-
Denmark	Frederikshavn	Comprehensive	-
Denmark	Fur	Comprehensive	-
Denmark	Gedser	Comprehensive	-
Denmark	Helsingør	Comprehensive	-
Denmark	Hirtshals	Comprehensive	-
Denmark	Kalundborg	Comprehensive	-
Denmark	København	Core	E
Denmark	Køge	Comprehensive	-
Denmark	Nordby	Comprehensive	-
Denmark	Odense	Comprehensive	-
Denmark	Rødby	Comprehensive	-
Denmark	Rønne	Comprehensive	-
Denmark	Sjællands Odde	Comprehensive	-
Denmark	Spodsbjerg	Comprehensive	-
Denmark	Tårs	Comprehensive	-
Denmark	Vejle	Comprehensive	-
Estonia	Heltermaa	Comprehensive	-
Estonia	Kuivastu	Comprehensive	-
Estonia	Pärnu	Comprehensive	-
Estonia	Paldiski South Harbor	Comprehensive	-

Member State	Name of port	Core/Compreh.	CNCs*
Estonia	Rohuküla	Comprehensive	-
Estonia	Sillamäe	Comprehensive	-
Estonia	Tallinn	Core	B
Estonia	Virtsu	Comprehensive	-
Finland	Eckero	Comprehensive	-
Finland	Hamina	Core	E
Finland	Hanko	Comprehensive	-
Finland	Helsinki	Core	BE
Finland	Kaskinen	Comprehensive	-
Finland	Kemi	Comprehensive	-
Finland	Sköldvik	Comprehensive	-
Finland	Kokkola	Comprehensive	-
Finland	Kotka	Core	E
Finland	Mariehamn	Comprehensive	-
Finland	Naantali	Core	E
Finland	Oulu	Comprehensive	-
Finland	Pietarsaari	Comprehensive	-
Finland	Pori	Comprehensive	-
Finland	Rauma	Comprehensive	-
Finland	Rautaruukki/Raahe	Comprehensive	-
Finland	Turku	Core	E
France	Ajaccio	Comprehensive	-
France	Bastia	Comprehensive	-
France	Bayonne	Comprehensive	-
France	Bordeaux	Core	G
France	Boulogne	Comprehensive	-
France	Brest	Comprehensive	-
France	Caen	Comprehensive	-
France	Calais	Core	H
France	Cayenne	Comprehensive	-
France	Cherbourg	Comprehensive	-
France	Dieppe	Comprehensive	-
France	Dunkerque	Core	H
France	Fort de France	Comprehensive	-
France	Fos-sur-Mer	Core	-
France	Guadeloupe	Comprehensive	-
France	La Rochelle	Comprehensive	-
France	Le Havre	Core	G
France	Lorient	Comprehensive	-
France	Marseille	Core	CH
France	Nantes	Core	-
France	Nantes Saint-Nazaire	Core	-
France	Nice	Comprehensive	-
France	Port Réunion	Comprehensive	-

Member State	Name of port	Core/Compreh.	CNCs*
France	Roscoff	Comprehensive	-
France	Rouen	Core	G
France	Sète	Comprehensive	-
France	Saint-Malo	Comprehensive	-
France	Toulon	Comprehensive	-
Germany	Bensersiel	Comprehensive	-
Germany	Brake	Comprehensive	-
Germany	Bremen	Core	BDE
Germany	Bremerhaven	Core	BD
Germany	Brunsbüttel	Comprehensive	-
Germany	Cuxhaven	Comprehensive	-
Germany	Emden	Comprehensive	-
Germany	Hamburg	Core	BDE
Germany	Helgoland	Comprehensive	-
Germany	Kiel	Comprehensive	-
Germany	Langeoog	Comprehensive	-
Germany	Lübeck	Core	E
Germany	Norddeich	Comprehensive	-
Germany	Nordenham	Comprehensive	-
Germany	Norderney	Comprehensive	-
Germany	Puttgarden	Comprehensive	-
Germany	Rostock	Core	DE
Germany	Sassnitz	Comprehensive	-
Germany	Stade-Bützfleth/Brunshausen	Comprehensive	-
Germany	Wilhemshaven	Core	BD
Germany	Wismar	Comprehensive	-
Greece	Chalkida	Comprehensive	-
Greece	Chios	Comprehensive	-
Greece	Elefsina	Comprehensive	-
Greece	Igoumenitsa	Core	D
Greece	Heraklion	Core	D
Greece	Kalamata	Comprehensive	-
Greece	Katakolo	Comprehensive	-
Greece	Kavala	Comprehensive	-
Greece	Kerkyra	Comprehensive	-
Greece	Kyllini	Comprehensive	-
Greece	Lavrio (Sounio)	Comprehensive	-
Greece	Mykonos	Comprehensive	-
Greece	Mytilini	Comprehensive	-
Greece	Naxos	Comprehensive	-
Greece	Paros	Comprehensive	-
Greece	Patras	Core	D
Greece	Piraeus	Core	D
Greece	Rafina	Comprehensive	-

Member State	Name of port	Core/Compreh.	CNCs*
Greece	Rodos	Comprehensive	-
Greece	Santorini	Comprehensive	-
Greece	Skiathos	Comprehensive	-
Greece	Souda	Comprehensive	-
Greece	Syros	Comprehensive	-
Greece	Thessaloniki	Core	D
Greece	Volos	Comprehensive	-
Ireland	Cork	Core	H
Ireland	Dublin	Core	H
Ireland	Rosslare	Comprehensive	-
Ireland	Shannon-Foynes	Core	-
Ireland	Waterford	Comprehensive	-
Italy	Ancona/Falconara Marittima	Core	E
Italy	Augusta	Core	E
Italy	Bari	Core	E
Italy	Brindisi	Comprehensive	-
Italy	Cagliari/Porto Foxi	Core	-
Italy	Carloforte	Comprehensive	-
Italy	Chioggia	Comprehensive	-
Italy	Civitavecchia	Comprehensive	-
Italy	Fiumicino	Comprehensive	-
Italy	Gaeta	Comprehensive	-
Italy	Gela	Comprehensive	-
Italy	Genova	Core	F
Italy	Gioia Tauro	Core	E
Italy	Golfo Aranci	Comprehensive	-
Italy	La Maddalena	Comprehensive	-
Italy	La Spezia	Core	E
Italy	Livorno	Core	E
Italy	Marina di Carrara	Comprehensive	-
Italy	Messina	Comprehensive	-
Italy	Milazzo	Comprehensive	-
Italy	Monfalcone	Comprehensive	-
Italy	Napoli	Core	E
Italy	Olbia	Comprehensive	-
Italy	Palau	Comprehensive	-
Italy	Palermo	Core	E
Italy	Piombino	Comprehensive	-
Italy	Porto Levante	Comprehensive	-
Italy	Porto Torres	Comprehensive	-
Italy	Portoferraio	Comprehensive	-
Italy	Portovesme	Comprehensive	-
Italy	Ravenna	Core	AC
Italy	Reggio Calabria	Comprehensive	-

Member State	Name of port	Core/Compreh.	CNCs*
Italy	Salerno	Comprehensive	-
Italy	Savona - Vado	Comprehensive	-
Italy	Siracusa/San Panagia	Comprehensive	-
Italy	Taranto	Core	E
Italy	Trapani	Comprehensive	-
Italy	Trieste	Core	AC
Italy	Venezia	Core	AC
Latvia	Liepāja	Comprehensive	-
Latvia	Rīga	Core	B
Latvia	Ventspils	Core	B
Lithuania	Klaipėda	Core	B
Malta	Cirkewwa	Comprehensive	-
Malta	Marsaxlokk	Core	E
Malta	Mgarr	Comprehensive	-
Malta	Valletta	Core	E
Netherlands	Amsterdam	Core	BFH
Netherlands	Beverwijk	Comprehensive	-
Netherlands	Delfzijl	Comprehensive	-
Netherlands	Den Helder	Comprehensive	-
Netherlands	Dordrecht	Comprehensive	-
Netherlands	Eemshaven	Comprehensive	-
Netherlands	Harlingen	Comprehensive	-
Netherlands	Moerdijk	Core	BFH
Netherlands	Rotterdam	Core	BFH
Netherlands	Terneuzen	Core	H
Netherlands	Velsen/Ijmuiden	Comprehensive	-
Netherlands	Vlaardingen	Comprehensive	-
Netherlands	Vlissingen	Core	F
Poland	Gdańsk	Core	A
Poland	Gdynia	Core	A
Poland	Police	Comprehensive	-
Poland	Świnoujście	Core	A
Poland	Szczecin	Core	A
Portugal	Aveiro	Comprehensive	-
Portugal	Horta	Comprehensive	-
Portugal	Lajes das Flores	Comprehensive	-
Portugal	Leixoes	Core	G
Portugal	Lisboa	Core	G
Portugal	Ponta Delgada	Comprehensive	-
Portugal	Portimão	Comprehensive	-
Portugal	Caniçal	Comprehensive	-
Portugal	Funchal	Comprehensive	-
Portugal	Porto Santo	Comprehensive	-
Portugal	Praia da Vitória	Comprehensive	-

Member State	Name of port	Core/Compreh.	CNCs*
Portugal	Setúbal	Comprehensive	-
Portugal	Sines	Core	G
Romania	Brăila	Comprehensive	-
Romania	Constanța	Core	I
Romania	Galați	Core	I
Romania	Sulina	Comprehensive	-
Romania	Tulcea	Comprehensive	-
Slovenia	Koper	Core	AC
Spain	Alicante	Comprehensive	-
Spain	Almería	Comprehensive	-
Spain	Arrecife	Comprehensive	-
Spain	Avilés	Comprehensive	-
Spain	Bahía de Algeciras	Core	CG
Spain	Bahía de Cádiz	Comprehensive	-
Spain	Barcelona	Core	C
Spain	Bilbao	Core	G
Spain	Cala Savina	Comprehensive	-
Spain	Carboneras	Comprehensive	-
Spain	Cartagena	Core	C
Spain	Castellón	Comprehensive	-
Spain	Ceuta	Comprehensive	-
Spain	Ferrol	Comprehensive	-
Spain	Gijón	Core	-
Spain	Huelva	Core	-
Spain	Ibiza	Comprehensive	-
Spain	A Coruña	Core	-
Spain	La Estaca	Comprehensive	-
Spain	Las Palmas	Core	-
Spain	Mahón	Comprehensive	-
Spain	Málaga	Comprehensive	-
Spain	Melilla	Comprehensive	-
Spain	Motril	Comprehensive	-
Spain	Palma de Mallorca	Core	-
Spain	Pasajes	Comprehensive	-
Spain	Puerto Rosario	Comprehensive	-
Spain	San Sebastián de la Gomera	Comprehensive	-
Spain	Sagunto	Comprehensive	-
Spain	San Cibrao	Comprehensive	-
Spain	Santa Cruz de La Palma	Comprehensive	-
Spain	Santa Cruz de Tenerife	Core	-
Spain	Santander	Comprehensive	-
Spain	Sevilla	Core	C
Spain	Tarragona	Core	C
Spain	Valencia	Core	C

Member State	Name of port	Core/Compreh.	CNCs*
Spain	Vigo	Comprehensive	-
Sweden	Gävle	Comprehensive	-
Sweden	Göteborg	Core	E
Sweden	Grisslehamn	Comprehensive	-
Sweden	Halmstad	Comprehensive	-
Sweden	Helsingborg	Comprehensive	-
Sweden	Kapellskär	Comprehensive	-
Sweden	Karlshamn	Comprehensive	-
Sweden	Karlskrona	Comprehensive	-
Sweden	Köping	Comprehensive	-
Sweden	Luleå	Core	-
Sweden	Malmö	Core	E
Sweden	Norrköping	Comprehensive	-
Sweden	Nynäshamn	Comprehensive	-
Sweden	Oskarshamn	Comprehensive	-
Sweden	Oxelösund	Comprehensive	-
Sweden	Stenungsund	Comprehensive	-
Sweden	Stockholm	Core	E
Sweden	Strömstad	Comprehensive	-
Sweden	Sundsvall	Comprehensive	-
Sweden	Trelleborg	Core	E
Sweden	Umeå	Comprehensive	-
Sweden	Varberg	Comprehensive	-
Sweden	Västerås	Comprehensive	-
Sweden	Visby	Comprehensive	-
Sweden	Ystad	Comprehensive	-
United Kingdom	Aberdeen	Comprehensive	-
United Kingdom	Belfast	Core	H
United Kingdom	Bristol	Core	-
United Kingdom	Cairnryan	Comprehensive	-
United Kingdom	Cardiff	Core	-
United Kingdom	Clyde	Core	H
United Kingdom	Cromarty Firth	Comprehensive	-
United Kingdom	Dover/Folkestone	Core	H
United Kingdom	Felixstowe	Core	H
United Kingdom	Fishguard	Comprehensive	-
United Kingdom	Forth	Core	H
United Kingdom	Glensanda	Comprehensive	-
United Kingdom	Goole	Comprehensive	-
United Kingdom	Grimsby & Immingham	Core	-
United Kingdom	Harwich	Core	-
United Kingdom	Heysham	Comprehensive	-
United Kingdom	Holyhead	Comprehensive	-
United Kingdom	Hull	Comprehensive	-

Member State	Name of port	Core/Compreh.	CNCs*
United Kingdom	Ipswich	Comprehensive	-
United Kingdom	Larne	Comprehensive	-
United Kingdom	Liverpool	Core	H
United Kingdom	London	Core	H
United Kingdom	London Gateway	Core	-
United Kingdom	Londonderry	Comprehensive	-
United Kingdom	Manchester	Comprehensive	-
United Kingdom	Medway	Comprehensive	-
United Kingdom	Milford Haven	Core	-
United Kingdom	Newport	Core	-
United Kingdom	Orkney	Comprehensive	-
United Kingdom	Plymouth	Comprehensive	-
United Kingdom	Poole	Comprehensive	-
United Kingdom	Port Salford	Comprehensive	-
United Kingdom	Port Talbot	Comprehensive	-
United Kingdom	Portsmouth	Comprehensive	-
United Kingdom	Ramsgate	Comprehensive	-
United Kingdom	River Hull & Humber	Comprehensive	-
United Kingdom	Scrabster	Comprehensive	-
United Kingdom	Southampton	Core	H
United Kingdom	Stornoway	Comprehensive	-
United Kingdom	Sullom Voe	Comprehensive	-
United Kingdom	Tees & Hartlepool	Core	-
United Kingdom	Tyne	Comprehensive	-
United Kingdom	Ullapool	Comprehensive	-
United Kingdom	Warrenpoint	Comprehensive	-
Core ports on Core Network Corridors:			84
Core ports not on Core Network Corridors:			22
Comprehensive ports:			225
TOTAL PORTS			**331**

- Core Network Corridor ports
- other Core Network ports
- Comprehensive Network ports

* A: Baltic-Adriatic, B: North Sea-Baltic, C: Mediterranean, D: Orient-East Mediterranean, E: Scandinavian-Mediterranean, F: Rhine-Alpine, G: Atlantic, H: North Sea- Mediterranean, I: Rhine-Danube

Source: ISL based on Regulation 1315/2013 and TENtec database

Annex 2: Comprehensive network ports' cargo traffic

Country	Name of port	CNC *	Notes	Container	Dry bulk	Liquid bulk	Other	Ro-Ro freight
BE	Antwerpen	BFH		95387	13910	66122	11890	2795
BE	Gent	FH		3	16814	3693	3563	2069
BE	Oostende	-			587	42	487	
BE	Zeebrugge	FH		2666	1284	4792	2681	12392
BG	Burgas	D		679	2885	11051	1418	45
BG	Varna	-		1574	7190	1247	893	182
HR	Ploce	-		234	1698	459	308	
HR	Rijeka	C		1202	1119	1	590	5
HR	Split	-		81	1600	409	34	327
CY	Larnaka	-			913	42	85	
CY	Limassol	D		2005	167	195	135	108
DK	Aalborg	-			1155	400	11	
DK	Aarhus	-		2896	2740	1486	115	468
DK	Esbjerg	-		205	1123	603	617	1692
DK	Fredericia	-		717	940	6597	120	256
DK	Frederikshavn	-						2168
DK	Gedser	-						1716
DK	Helsingør	-						4525
DK	Hirtshals	-					2	1499
DK	Kalundborg	-		73	825	162	49	36
DK	København	E		1347	2062	2752	294	309
DK	Køge	-			1025	47	176	435
DK	Odense	-			2251	21	81	

Country	Name of port	CNC *	Notes	Container	Dry bulk	Liquid bulk	Other	Ro-Ro freight
DK	Rødby	-						6675
DK	Rønne	-			790	61	23	538
EE	Pärnu	-			230		1570	
EE	Sillamäe	-		2	1387	3661	114	50
EE	Tallinn	B	includes Paldiski South Harbor	1742	3001	12679	541	4293
FI	Hamina	E	includes Kotka	3806	2344	2959	2615	1162
FI	Hanko	-					772	3399
FI	Helsinki	BE		3124	856	133	389	6912
FI	Kaskinen	-			391	67	444	
FI	Kemi	-		137	316	499	551	423
FI	Kokkola	-		141	4405	591	558	12
FI	Naantali	E			1088	3947	40	1794
FI	Oulu	-		271	467	1283	499	929
FI	Pietarsaari	-			154	130	550	
FI	Pori	-		162	1874	842	440	33
FI	Rauma	-		1841	1176	143	2226	301
FI	Rautaruukki/Raahe	-		4	4758	164	650	
FI	Sköldvik	-				20400	66	76
FI	Turku	E			71	110	436	1620
FR	Ajaccio	-				229	8	485
FR	Bastia	-				273	4	1254
FR	Bayonne	-			1138	348	841	
FR	Bordeaux	G		454	2682	5066	67	
FR	Boulogne	-			304			
FR	Brest	-		311	1184	696	126	
FR	Caen	-			537	18	25	1334

Country / Name of port		CNC *	Notes	Container	Dry bulk	Liquid bulk	Other	Ro-Ro freight
FR	Calais	H			163	53	61	19424
FR	Cherbourg	-		2	85		17	798
FR	Dieppe	-			449	75		722
FR	Dunkerque	H		2345	21833	4153	1329	7248
MQ	Fort de France	-		1322	196	1405	16	96
GP	Guadeloupe	-		1486	802	637	155	10
FR	La Rochelle	-		36	5818	3135	804	
FR	Le Havre	G		20465	1607	40070	398	409
FR	Lorient	-			1321	834	119	
FR	Marseille	CH	includes Fos-sur-Mer	9212	13895	49934	2567	1870
FR	Nantes Saint-Nazaire	-		1385	7048	15727	304	357
FR	Port Réunion	-		1761	1360	761	43	46
FR	Roscoff	-			74			82
FR	Rouen	G		685	11208	9619	766	5
FR	Saint-Malo	-		75	921	197	159	66
FR	Sète	-		6	1400	1685	226	278
FR	Toulon	-			5	104		1060
DE	Bensersiel	-		3	1		37	28
DE	Brake	-			4189	538	1838	
DE	Bremen	BDE		37	7335	1371	3968	
DE	Bremerhaven	BD		44127	125	330	5169	
DE	Brunsbüttel	-			3245	5010	23	
DE	Cuxhaven	-		322	598		798	809
DE	Emden	-		4	602	982	2586	
DE	Hamburg	BDE		73113	31250	14021	1790	
DE	Helgoland	-			3	6	26	

Country	Name of port	CNC *	Notes	Container	Dry bulk	Liquid bulk	Other	Ro-Ro freight
DE	Kiel	-		334	742	28	384	2356
DE	Langeoog	-		4			36	30
DE	Lübeck	E		1822	1047	16	845	12575
DE	Norddeich	-		9	106		79	195
DE	Nordenham	-			1839	145	76	
DE	Norderney	-		5	103		38	190
DE	Puttgarden	-						4733
DE	Rostock	DE			7416	2997	2114	7803
DE	Sassnitz	-			359		492	231
DE	Stade-Bützfleth/Brunshausen	-			2820	2649	2	
DE	Wilhemshaven	BD		6151	4575	16667	2	
DE	Wismar	-		2	2318	104	1277	
GR	Elefsina	-			2949	11152	479	7
GR	Heraklion	D		153	202	453	26	1801
GR	Igoumenitsa	D			75			2879
GR	Kavala	-			1073	289	243	113
GR	Lavrio (Sounio)	-		88	8	821	8	190
GR	Patras	D			112	239	21	2719
GR	Piraeus	D		33287	415	356	522	3738
GR	Thessaloniki	D		3097	3713	7483	420	
GR	Volos	-		216	4683	79	290	37
IE	Cork	H		1990	1568	5933	205	12
IE	Dublin	H		4724	1810	3850	152	11668
IE	Rosslare	-					25	2037
IE	Shannon-Foynes	-			9669	1045	157	

Country / Name of port		CNC *	Notes	Container	Dry bulk	Liquid bulk	Other	Ro-Ro freight
IE	Waterford	-		268	1100	10	120	
IT	Ancona/Falconara Marittima	E		1618	502	5044	278	2186
IT	Augusta	E		22	592	19258	65	8
IT	Bari	E		405	1760	4	23	1613
IT	Brindisi	-			4912	1786	499	2566
IT	Cagliari/Porto Foxi	-		7036	800	26029	51	3885
IT	Chioggia	-			1211	23	444	1
IT	Civitavecchia	-		758	5037	645	215	3371
IT	Fiumicino	-				2813		
IT	Gaeta	-			385	1641	124	
IT	Gela	-				1957		
IT	Genova	F		18894	1169	15090	286	7985
IT	Gioia Tauro	E		25075	31	916	101	15
IT	La Maddalena	-						1510
IT	La Spezia	E		13318	1452	632	45	2
IT	Livorno	E		7554	898	9513	2347	8990
IT	Marina di Carrara	-		2	826	1	543	5
IT	Messina	-			8	39	7	7870
IT	Milazzo	-			72	15170	277	60
IT	Monfalcone	-			1236		2344	848
IT	Napoli	E		3882	1005	6115	247	4999
IT	Olbia	-			92		11	4373
IT	Palau	-						1510
IT	Palermo	E		96	41	1916	49	5057
IT	Piombino	-			682	99	95	2185

Country / Name of port		CNC *	Notes	Container	Dry bulk	Liquid bulk	Other	Ro-Ro freight
IT	Porto Torres	-			824	985		1330
IT	Portoferraio	-			1	16		1293
IT	Portovesme	-			865	226	9	136
IT	Ravenna	AC		2531	11341	5419	4535	1461
IT	Reggio Calabria	-			121		8	5609
IT	Salerno	-		2622	335	81	409	3912
IT	Savona - Vado	-		330	1928	8229	1479	198
IT	Siracusa/San Panagia	-				7913		
IT	Taranto	E		15	9596	4153	1355	3366
IT	Trieste	AC		5336	582	34528	3373	5316
IT	Venezia	AC		5408	8063	8691	1972	1007
LV	Liepāja	-		45	3890	354	665	613
LV	Rīga	B		3834	22624	10581	2255	68
LV	Ventspils	B			5310	14081	428	1710
LT	Klaipėda	B		3609	16660	9414	2218	2549
MT	Marsaxlokk	E		669	52	890	115	3
MT	Valletta	E		48	663	454	186	601
NL	Amsterdam	BFH	includes Velsen/Ijmuiden	272	42715	43862	11274	655
NL	Delfzijl	-	includes Eemshaven	119	4368	331	1190	110
NL	Den Helder	-			64		232	
NL	Dordrecht	-		2	1820	667	362	
NL	Harlingen	-		2	129	133	140	
NL	Moerdijk	BFH		1858	1194	1792	685	24
NL	Rotterdam	BFH		105282	82691	216573	20882	11504
NL	Vlaardingen	-		2	1260	2369	304	4880
PL	Gdańsk	A		7507	8547	14992	507	131

Country / Name of port		CNC *	Notes	Container	Dry bulk	Liquid bulk	Other	Ro-Ro freight
PL	Gdynia	A		5551	6339	838	654	2008
PL	Police	-			1647	74	4	
PL	Świnoujście	A		5	3879	1687	639	5553
PL	Szczecin	A		510	4801	1258	1707	
PT	Aveiro	-			1942	1025	1686	
PT	Caniçal	-		646	63	290	23	
PT	Leixoes	G		4809	2376	7666	1041	582
PT	Lisboa	G		3865	4977	1422	253	12
PT	Ponta Delgada	-		603	288	308	24	
PT	Setúbal	-		1023	2766	314	3115	
PT	Sines	G		13714	5850	21537	118	1
RO	Constanța	I		5594	21773	5891	3018	
RO	Galați	I			423	86	848	
SI	Koper	AC		7218	7082	3286	2127	221
ES	A Coruña	-			4913	8057	938	
ES	Alicante	-		982	1246	71	272	28
ES	Almería	-	includes Carboneras	49	5760	23	188	195
ES	Avilés	-			3260	631	1215	
ES	Bahía de Algeciras	CG		46162	2130	27345	3253	487
ES	Bahía de Cádiz	-		481	1622	296	181	348
ES	Barcelona	C		14739	4490	11903	2151	4752
ES	Bilbao	G		5213	4529	18259	2773	199
ES	Cartagena	C		913	5555	25740	118	57
ES	Castellón	-		2854	4605	8655	178	
ES	Ceuta	-		69	25	562		353
ES	Ferrol	-	includes San Cibrao	5	9839	2192	664	1

Country / Name of port		CNC *	Notes	Container	Dry bulk	Liquid bulk	Other	Ro-Ro freight
ES	Gijón	-		659	18896	914	590	
ES	Huelva	-		104	5137	21601	239	136
ES	Las Palmas	-	includes Arrecife and Puerto Rosario	8142	473	6487	760	1544
ES	Málaga	-		341	1254	92	64	366
ES	Melilla	-		188	3	70	1	336
ES	Motril	-			451	1162	123	99
ES	Palma de Mallorca	-	includes Cala Savina, Ibiza and Mahón	431	1159	1523	296	4099
ES	Pasajes	-		31	1696		1836	11
ES	Santa Cruz de Tenerife	-	includes La Estaca, San Sebastián de la Gomera and Santa Cruz de La Palma	1680	406	5564	122	1625
ES	Santander	-		16	3519	271	1167	327
ES	Sevilla	C		878	2072	274	780	188
ES	Tarragona	C		748	8392	22320	1256	43
ES	Valencia	C	includes Sagunto	42862	2684	3815	7988	207
ES	Vigo	-		1899	287	60	1050	229
SE	Gävle	-		1191	643	2756	985	
SE	Göteborg	E		7265	194	20846	785	8725
SE	Grisslehamn	-						32
SE	Halmstad	-		443	570	478	429	
SE	Helsingborg	-		1743	779	878	240	4528
SE	Kapellskär	-					16	2302
SE	Karlshamn	-		1	839	1614	606	1574
SE	Karlskrona	-		3	32		7	1782
SE	Köping	-			686	205	124	
SE	Luleå	-			7401	361	153	
SE	Malmö	E		244	750	2022	497	4108

Country / Name of port		CNC *	Notes	Container	Dry bulk	Liquid bulk	Other	Ro-Ro freight
SE	Norrköping	-		324	1050	1652	535	
SE	Oskarshamn	-			122	62	286	322
SE	Oxelösund	-		172	3887	1077	659	54
SE	Stenungsund	-			373	2940		
SE	Stockholm	E		371	801	2558	181	3653
SE	Strömstad	-						209
SE	Sundsvall	-		140	321	738	354	563
SE	Trelleborg	E			36			10910
SE	Umeå	-		129	127	349	848	378
SE	Varberg	-		54	104	38	935	661
SE	Västerås	-		148	564	478	287	
SE	Visby	-			15	68	46	593
SE	Ystad	-			100		19	2959
GB	Aberdeen	-		147	483	2182	1281	280
GB	Belfast	H		1607	6603	2254	664	5573
GB	Bristol	-		810	4821	2069	1065	113
GB	Cairnryan	-						2548
GB	Cardiff	-		143	321	1073	255	
GB	Clyde	H		630	4861	6767	226	
GB	Cromarty Firth	-			107	100	58	
GB	Dover/Folkestone	H			14		215	27068
GB	Felixstowe	H		24684		70	21	3197
GB	Fishguard	-				10	3	362
GB	Forth	H		2178	971	23107	308	509
GB	Glensanda	-			5598			
GB	Goole	-			345	39	943	

Country	Name of port	CNC *	Notes	Container	Dry bulk	Liquid bulk	Other	Ro-Ro freight
GB	Grimsby & Immingham	-		1798	18928	21302	2805	14271
GB	Harwich	-		4	40	341	183	3983
GB	Heysham	-				31	93	4432
GB	Holyhead	-				16		4437
GB	Hull	-		1549	2724	1779	1525	2456
GB	Ipswich	-			2028	56	208	
GB	Larne	-			2	6		2549
GB	Liverpool	H		5169	6429	11358	1143	7152
GB	London	H		9856	13948	11876	2585	7163
GB	Londonderry	-			917	705	135	
GB	Manchester	-		5	1140	5309	73	
GB	Medway	-		1184	3173	2547	2163	21
GB	Milford Haven	-			60	36745	14	860
GB	Newport	-			1052		1518	
GB	Orkney	-		48	17	3689	7	184
GB	Plymouth	-			791	1336	5	84
GB	Poole	-			319		131	134
GB	Port Talbot	-			8111		1	
GB	Portsmouth	-		210	349		635	2579
GB	Ramsgate	-			24			1
GB	River Hull & Humber	-			502	7529	233	
GB	Southampton	H		10563	2074	22826	2150	45
GB	Sullom Voe	-			5	6114		
GB	Tees & Hartlepool	-		2021	7595	21856	2535	1840
GB	Tyne	-		317	3616	37	722	301
GB	Warrenpoint	-		461	536		246	1679

Country / Name of port	CNC *	Notes	Container	Dry bulk	Liquid bulk	Other	Ro-Ro freight
Volume of ports on Core Network Corridors							
A: Baltic-Adriatic Corridor			34066	50634	70699	15514	15697
B: North Sea-Baltic Corridor			338536	232246	407626	61491	30510
C: Mediterranean Corridor			137209	67405	193256	30710	15614
D: Orient-East Med Corridor			162649	58270	55163	15585	19093
E: Scandinavian-Mediterranean Corridor			143831	71842	102627	18765	86411
F: Rhine-Alpine Corridor			224362	159777	351924	51261	37424
G: Atlantic Corridor			95367	35359	130984	8669	1695
H: North Sea-Mediterranean Corridor			278426	232777	479015	62601	120368
I: Rhine-Danube Corridor			5594	22196	5977	3866	0
Total Core Network Corridor ports			***736204***	***498153***	***951974***	***135739***	***257318***
Total all comprehensive network ports			**796347**	**778537**	**1300626**	**206551**	**415635**

- Core Network Corridor ports
- other Core Network ports
- Comprehensive Network ports

* A: Baltic-Adriatic, B: North Sea-Baltic, C: Mediterranean, D: Orient-East Mediterranean, E: Scandinavian-Mediterranean, F: Rhine-Alpine, G: Atlantic, H: North Sea- Mediterranean, I: Rhine-Danube

** Ports situated on more than one Core Network Corridor are counted once only in the sum

Source: ISL based on Eurostat

Annex 3: CNC ports and their regular container connections 2017

4.1. Baltic-Adriatic Corridor

Figure 10: International maritime links of the Baltic-Adriatic Corridor (North) 2017

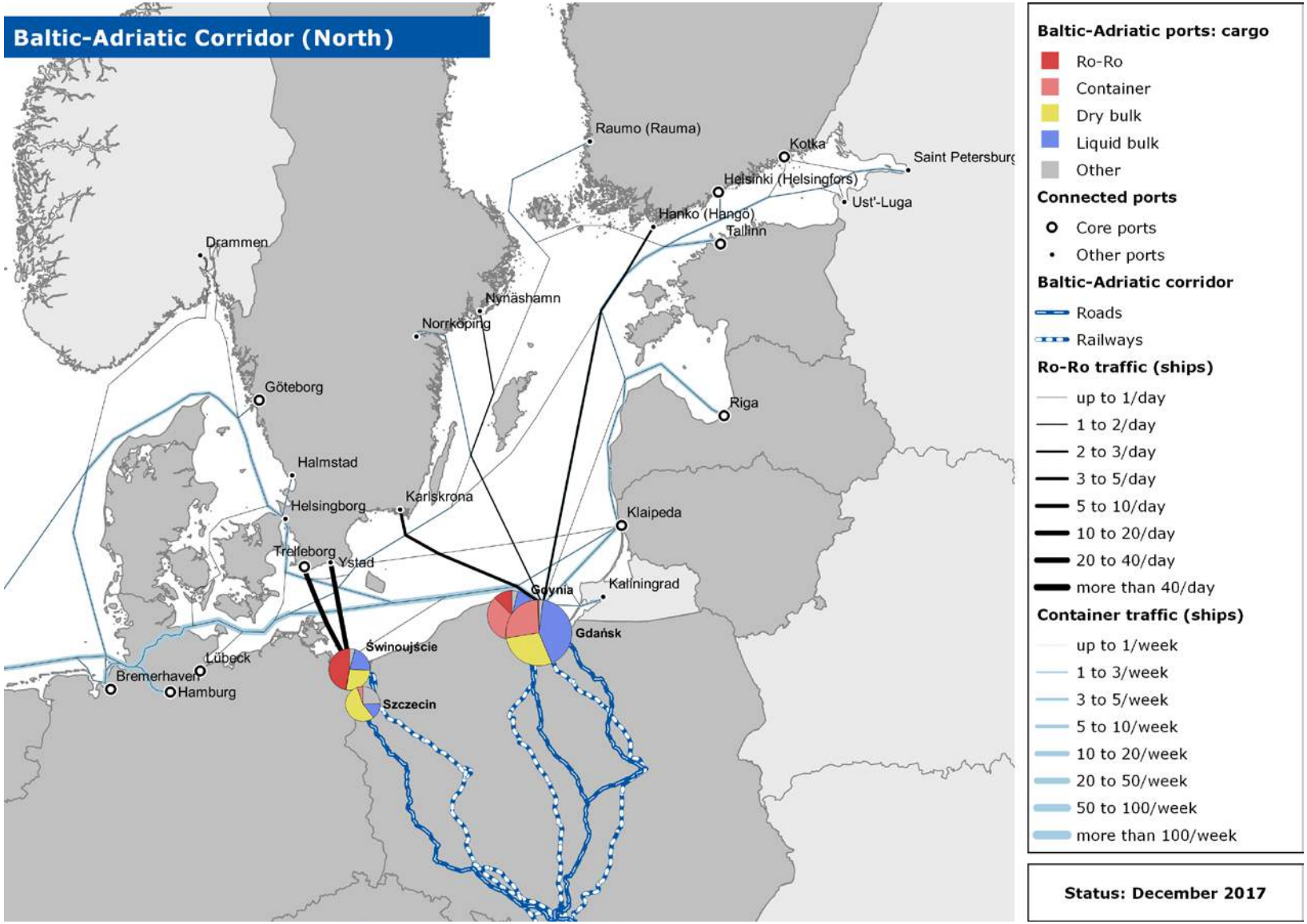
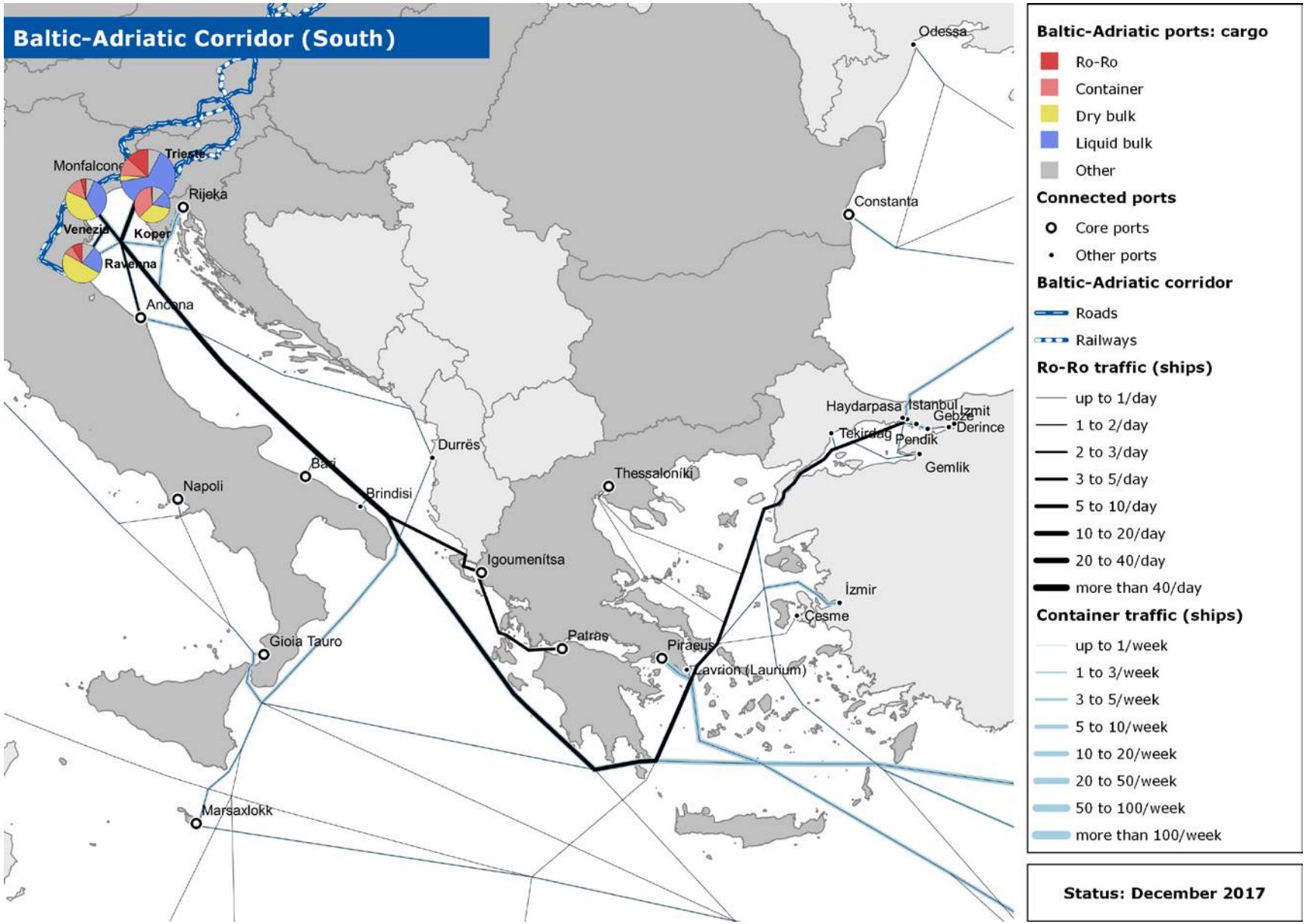


Figure 11: International maritime links of the Baltic-Adriatic Corridor (South) 2017



Range	Name of port	No. of services	Conn. ports		Baltic-Adriatic	North Sea-Baltic	Mediterranean	Orient-East Med	Scandinavian-Mediterranean	Rhine-Alpine	Atlantic	North Sea-Mediterranean	Rhine-Danube
Baltic	Gdańsk	7	32	16	Gdynia	Antwerpen, Bremerh., Hamburg, Klaipėda, Rīga, Rotterdam, Tallinn	Bahía de Algeciras	Bremerh., Hamburg	Göteborg, Hamburg	Antwerpen, Rotterdam	Bahía de Algeciras	Antwerpen, Felixstowe, Rotterdam, Southampton	
	Gdynia	12	32	22	Gdańsk, Szczecin	Antwerpen, Bremen, Bremerh., Hamburg, Helsinki, Klaipėda, Rīga, Rotterdam, Tallinn		Bremen, Bremerh., Hamburg	Bremen, Hamburg, Helsinki, Kotka	Antwerpen, Rotterdam	Bilbao, Le Havre	Antwerpen, Felixstowe, Rotterdam	
	Świnoujście	2	21	21					Turku				
	Szczecin	2	7	7	Gdynia	Hamburg, Klaipėda		Hamburg	Hamburg			Felixstowe	
Adriatic	Koper	13	46	32	Ravenna, Trieste, Venezia		Ravenna, Rijeka, Trieste, Venezia	Limassol, Piraeus, Thessaloniki	Ancona/ Falconara Marittima, Bari, Gioia Tauro, Marsaxlokk				Constanța
	Ravenna	12	24	23	Koper, Trieste, Venezia		Koper, Rijeka, Trieste, Venezia	Limassol, Piraeus	Ancona/Falconara Marittima, Gioia Tauro, Marsaxlokk				Constanța
	Trieste	11	38	24	Koper, Ravenna, Venezia		Koper, Ravenna, Rijeka, Venezia	Limassol, Piraeus	Ancona/Falconara Marittima, Gioia Tauro, Marsaxlokk				Constanța
	Venezia	19	52	38	Koper, Ravenna, Trieste	Antwerpen, Hamburg	Koper, Ravenna, Rijeka, Trieste	Hamburg, Limassol, Piraeus, Thessaloniki	Ancona/Falconara Marittima, Bari, Gioia Tauro, Hamburg, Marsaxlokk, Napoli	Antwerpen, Genova	Bilbao	Antwerpen	Constanța

4.2. North Sea-Baltic Corridor

Figure 12: International maritime links of the North Sea-Baltic Corridor (West) 2017

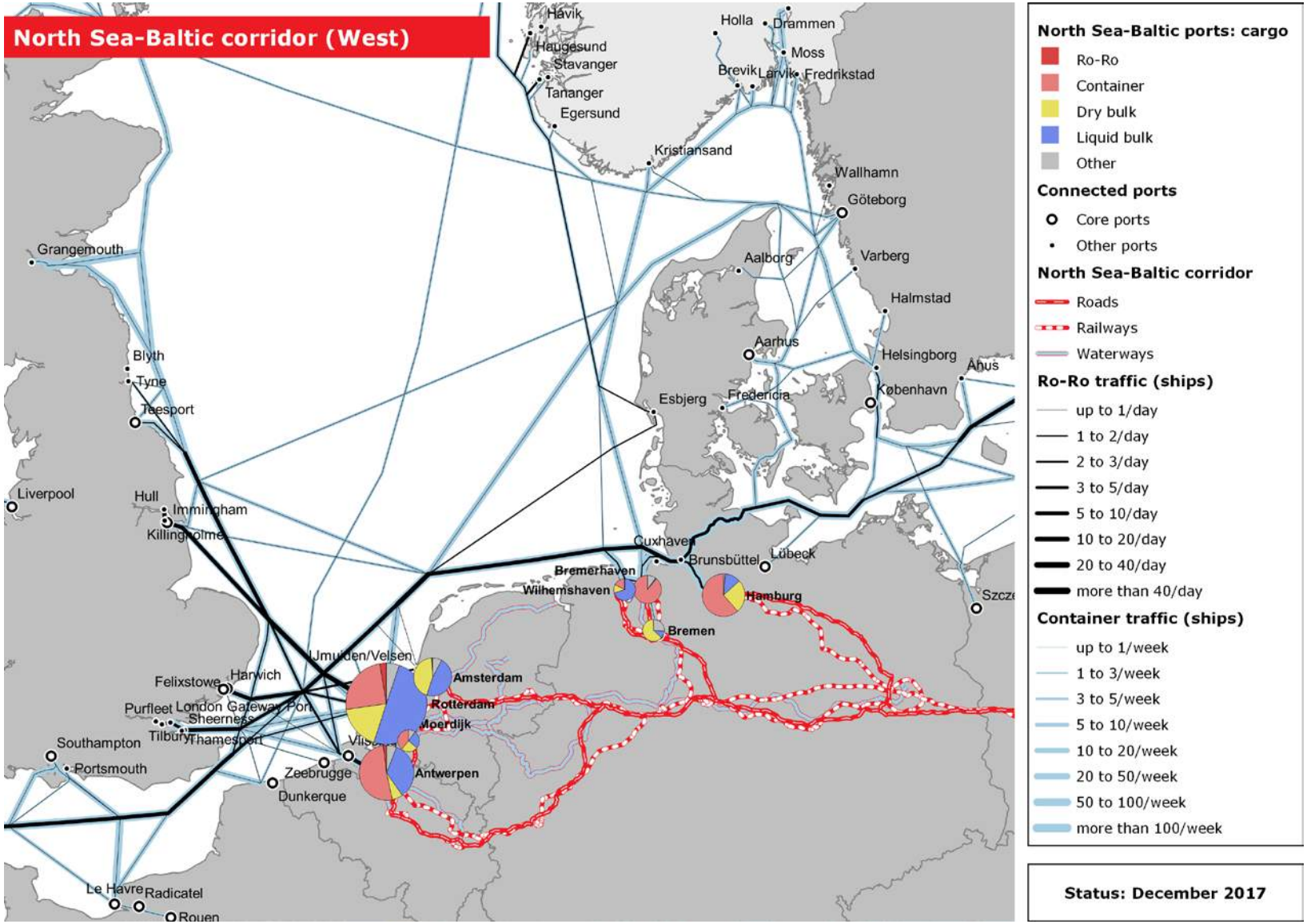
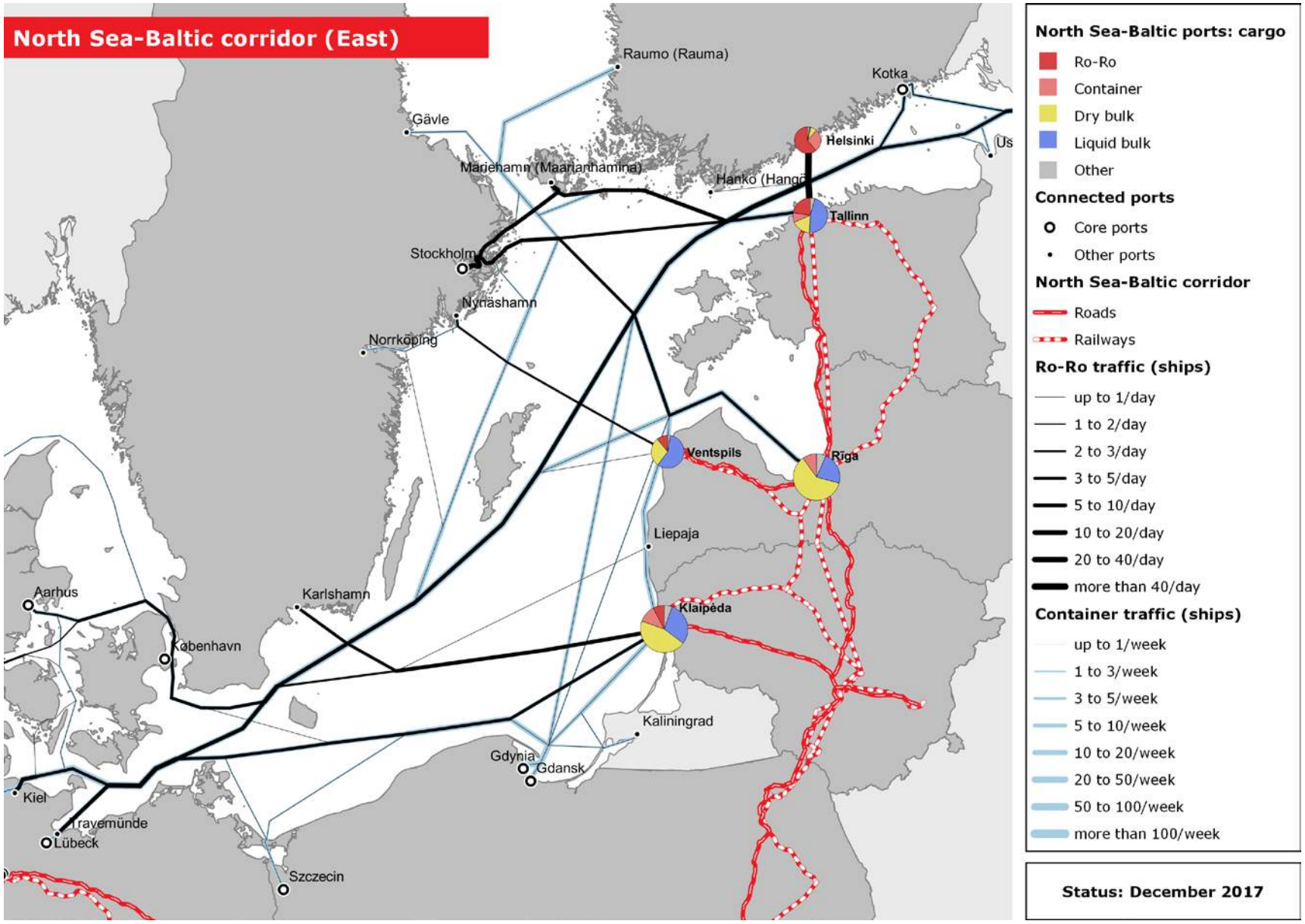


Figure 13: International maritime links of the North Sea-Baltic Corridor (East) 2017



Range	Name of port	No. of services	Conn. ports		Baltic-Adriatic	North Sea-Baltic	Mediterranean	Orient-East Med	Scandinavian-Mediterranean	Rhine-Alpine	Atlantic	North Sea-Mediterranean	Rhine-Danube
North Sea	Antwerpen	113	263	113	Gdańsk, Gdynia, Venezia	Amsterdam, Bremen, Bremerh., Hamburg, Helsinki, Klaipėda, Moerdijk, Rīga, Rotterdam, Tallinn, Wilhelmsh.	Algeciras, Barcelona, Cartagena, Valencia, Venezia	Bremen, Bremerh., Hamburg, Limassol, Piraeus, Thessaloniki, Wilhelmsh.	Bremen, Gioia Tauro, Göteborg, Hamburg, Helsinki, Kotka, La Spezia, Marsaxlokk, Napoli	Amsterdam, Genova, Moerdijk, Rotterdam, Vlissingen	Algeciras, Bilbao, Le Havre, Leixoes, Lisboa, Rouen, Sines	Amsterdam, Belfast, Clyde, Cork, Dublin, Dunkerque, Felixstowe, Forth, Liverpool, London, Moerdijk, Rotterdam, Southampton	
	Bremen	6	24	19	Gdynia	Antwerpen, Hamburg, Rotterdam	Cartagena	Hamburg, Piraeus, Thessaloniki	Hamburg	Antwerpen, Rotterdam	Leixoes	Antwerpen, Rotterdam	
	Bremerh.	65	166	91	Gdańsk, Gdynia	Antwerpen, Hamburg, Helsinki, Klaipėda, Rīga, Rotterdam, Tallinn, Wilhelmsh.	Algeciras, Valencia	Hamburg, Limassol, Piraeus, Wilhelmsh.	Göteborg, Hamburg, Helsinki, København, Kotka, Marsaxlokk, Stockholm	Antwerpen, Rotterdam	Algeciras, Bilbao, Le Havre, Lisboa, Sines	Antwerpen, Cork, Felixstowe, Liverpool, London, Rotterdam, Southampton	
	Hamburg	85	214	112	Gdańsk, Gdynia, Szczecin, Venezia	Antwerpen, Bremen, Bremerh., Helsinki, Klaipėda, Rīga, Rotterdam, Tallinn, Wilhelmsh.	Algeciras, Barcelona, Cartagena, Valencia, Venezia	Bremen, Bremerh., Piraeus, Thessaloniki, Wilhelmsh.	Bremen, Gioia Tauro, Göteborg, Helsinki, København, Kotka, Marsaxlokk, Napoli, Stockholm	Antwerpen, Genova, Rotterdam	Algeciras, Bilbao, Le Havre, Leixoes, Lisboa, Rouen, Sines	Antwerpen, Dunkerque, Felixstowe, Liverpool, London, Rotterdam, Southampton	
	Wilhelmsh.	6	31	15		Antwerpen, Bremerh., Hamburg, Helsinki, Rotterdam, Tallinn	Algeciras	Bremerh., Hamburg	Göteborg, Hamburg, Helsinki, Kotka	Antwerpen, Rotterdam	Algeciras	Antwerpen, Felixstowe, Rotterdam	
	Amsterdam	3	7	7		Antwerpen, Rotterdam				Antwerpen, Rotterdam		Antwerpen, Rotterdam	

Range	Name of port	No. of services	Conn. ports		Baltic-Adriatic	North Sea-Baltic	Mediterranean	Orient-East Med	Scandinavian-Mediterranean	Rhine-Alpine	Atlantic	North Sea-Mediterranean	Rhine-Danube
	Moerdijk	6	14	14		Antwerpen, Rotterdam				Antwerpen, Rotterdam	Leixoes, Lisboa	Antwerpen, Felixstowe, Rotterdam	
	Rotterdam	127	266	133	Gdańsk, Gdynia	Amsterdam, Antwerpen, Bremen, Bremerh., Hamburg, Helsinki, Klaipėda, Moerdijk, Rīga, Tallinn, Wilhelmsh.	Algeciras, Cartagena, Valencia	Bremen, Bremerh., Hamburg, Limassol, Piraeus, Thessaloniki, Wilhelmsh.	Bremen, Gioia Tauro, Göteborg, Hamburg, Helsinki, Kotka, La Spezia, Lübeck, Marsaxlokk, Napoli	Amsterdam, Antwerpen, Genova, Moerdijk, Vlissingen, Zeebrugge	Algeciras, Bilbao, Le Havre, Leixoes, Lisboa, Rouen, Sines	Amsterdam, Antwerpen, Belfast, Cork, Dublin, Dunkerque, Felixstowe, Forth, Liverpool, London, Moerdijk, Southampton, Terneuzen, Zeebrugge	
Baltic	Helsinki	10	19	19	Gdynia	Antwerpen, Bremerh., Hamburg, Klaipėda, Rīga, Rotterdam, Tallinn, Wilhemshaven		Bremerh., Hamburg, Wilhemshaven	Hamburg, Kotka, Lübeck	Antwerpen, Rotterdam, Zeebrugge		Antwerpen, Rotterdam, Zeebrugge	
	Rīga	8	22	22	Gdańsk, Gdynia	Antwerpen, Bremerh., Hamburg, Helsinki, Klaipėda, Rotterdam, Tallinn		Bremerh., Hamburg	Hamburg, Helsinki, Kotka, Lübeck, Stockholm	Antwerpen, Rotterdam, Zeebrugge		Antwerpen, Rotterdam, Zeebrugge	
	Ventspils	0	0	0									
	Klaipėda	9	17	17	Gdańsk, Gdynia, Szczecin	Antwerpen, Bremerh., Hamburg, Helsinki, Rīga, Rotterdam, Tallinn		Bremerh., Hamburg	Hamburg, Helsinki	Antwerpen, Rotterdam	Le Havre	Antwerpen, Felixstowe, Rotterdam	

Range	Name of port	No. of services	Conn. ports		Baltic-Adriatic	North Sea-Baltic	Mediterranean	Orient-East Med	Scandinavian-Mediterranean	Rhine-Alpine	Atlantic	North Sea-Mediterranean	Rhine-Danube
	Tallinn	8	15	15	Gdańsk, Gdynia	Antwerpen, Bremerh., Hamburg, Helsinki, Klaipėda, Rīga, Rotterdam, Wilhemshaven		Bremerh., Hamburg, Wilhemshaven	Hamburg, Helsinki, Kotka	Antwerpen, Rotterdam		Antwerpen, Rotterdam	

4.3. Mediterranean Corridor

Figure 14: International maritime links of the Mediterranean Corridor (West) 2017

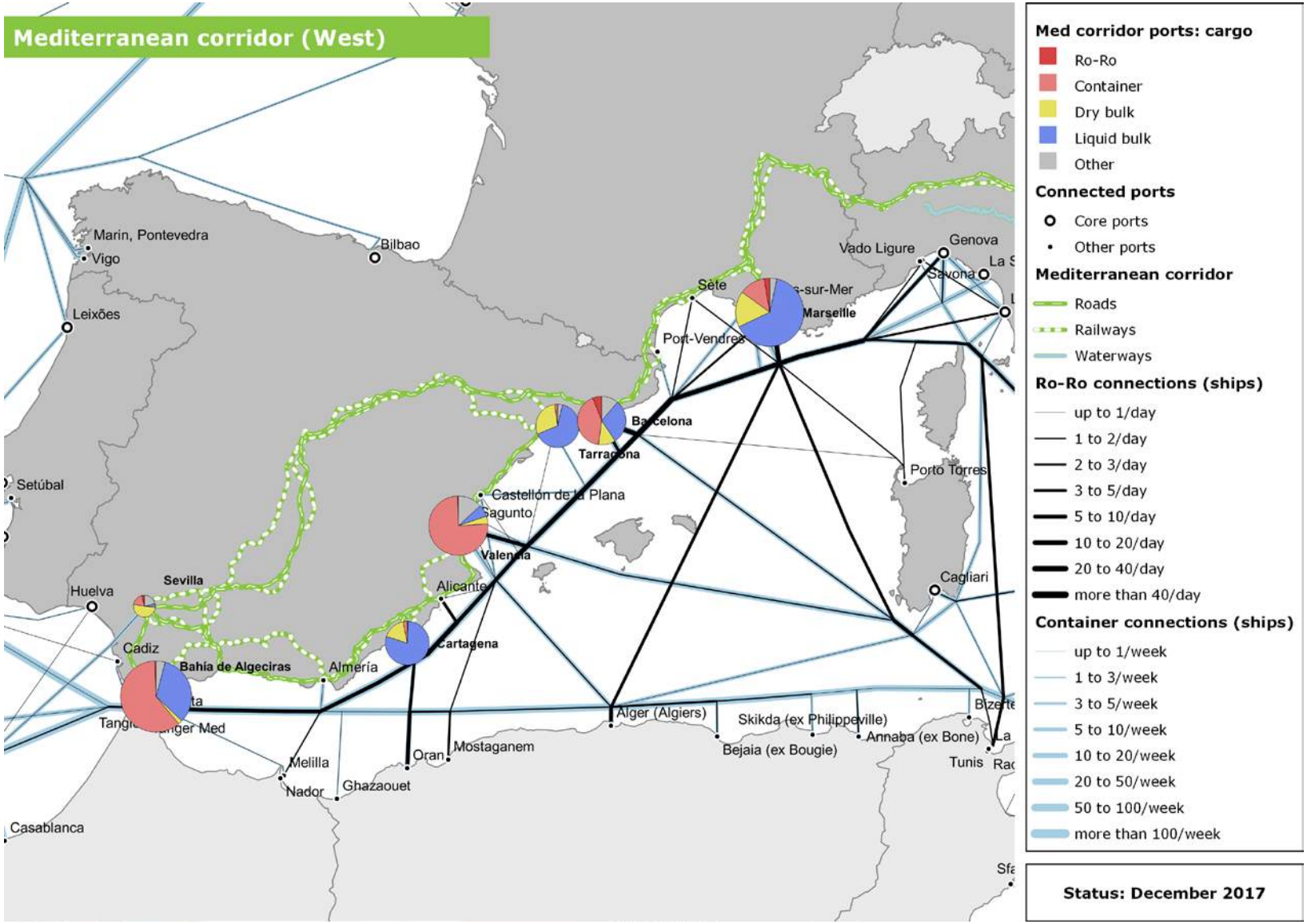
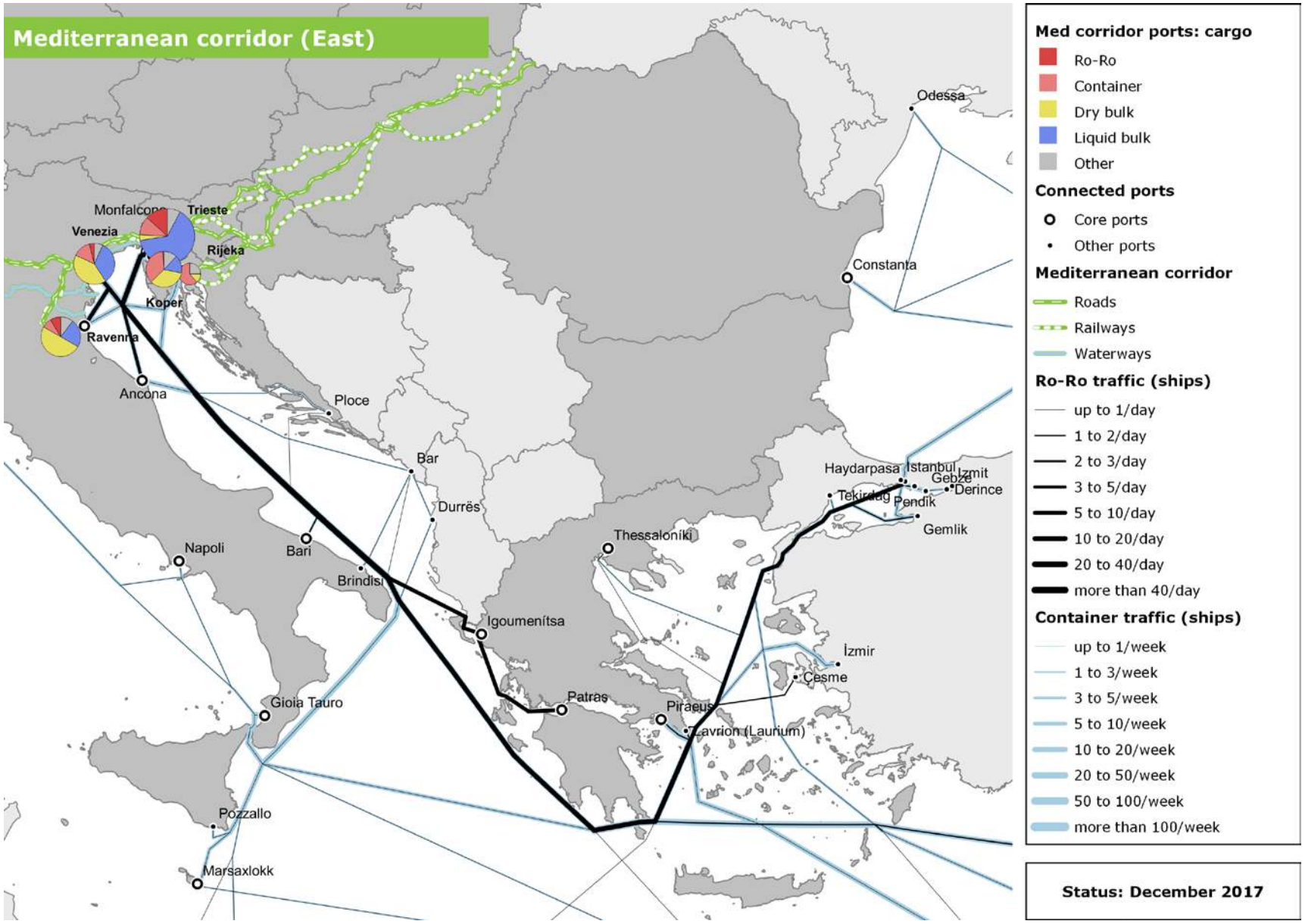


Figure 15: International maritime links of the Mediterranean Corridor (East) 2017



Range	Name of port	No. of services	Conn. ports	*short sea*	Baltic-Adriatic	North Sea-Baltic	Mediterranean	Orient-East Med	Scandinavian-Mediterranean	Rhine-Alpine	Atlantic	North Sea-Mediterranean	Rhine-Danube
West Med	Marseille	3	12	12			Barcelona	Limassol, Piraeus		Genova			
	Algeciras	52	16 9	65	Gdańsk	Antwerpen, Bremerh., Hamburg, Rotterdam, Wilhemsh.	Barcelona, Sevilla, Tarragona, Valencia	Bremerh., Hamburg, Wilhemsh.	Gioia Tauro, Hamburg, La Spezia, Livorno, Marsaxl., Napoli	Antwerpen, Genova, Rotterdam, Vlissingen	Bilbao, Le Havre, Leixoes, Lisboa, Sines	Antwerpen, Dublin, Dunkerque, Felixstowe, Liverpool, London, Rotterdam, Southampt.	
	Barcelona	46	14 3	64		Antwerpen, Hamburg	Algeciras, Cartagena, Marseille, Tarragona, Valencia	Hamburg, Limassol, Piraeus, Thessalo-niki	Gioia Tauro, Hamburg, La Spezia, Livorno, Marsaxl., Napoli	Antwerpen, Genova	Algeciras, Le Havre, Leixoes, Lisboa, Sines	Antwerpen, Marseille	
	Cartagena	4	24	24		Antwerpen, Bremen, Hamburg, Rotterdam	Barcelona, Tarragona, Valencia	Bremen, Hamburg	Bremen, Hamburg, Marsaxlokk	Antwerpen, Rotterdam	Leixoes	Antwerpen, Rotterdam	
	Sevilla	2	8	8			Algeciras				Algeciras, Leixoes, Lisboa		
	Tarragona	7	44	30			Algeciras, Barcelona, Cartagena, Valencia	Piraeus	La Spezia, Livorno, Napoli	Genova	Algeciras, Leixoes, Lisboa		
	Valencia	54	16 3	66		Antwerpen, Bremerh., Hamburg, Rotterdam	Algeciras, Barcelona, Cartagena, Tarragona	Bremerh., Hamburg, Limassol, Piraeus, Thessaloni ki	Gioia Tauro, Hamburg, La Spezia, Livorno, Marsaxl., Napoli	Antwerpen, Genova, Rotterdam	Algeciras, Le Havre, Leixoes, Lisboa, Sines	Antwerpen, Felixstowe, London, Rotterdam	

Range	Name of port	No. of services	Conn. ports	*short sea*	Baltic-Adriatic	North Sea-Baltic	Mediterranean	Orient-East Med	Scandinavian-Mediterranean	Rhine-Alpine	Atlantic	North Sea-Mediterranean	Rhine-Danube
East Med	Rijeka	7	36	24	Koper, Ravenna, Trieste, Venezia		Koper, Ravenna, Trieste, Venezia	Limassol, Piraeus, Thessalo-niki	Ancona, Bari, Gioia Tauro, Marsaxlokk				
	Ravenna	12	24	23	Koper, Trieste, Venezia		Koper, Rijeka, Trieste, Venezia	Limassol, Piraeus	Ancona, Gioia Tauro, Marsaxlokk				Constanța
	Trieste	11	38	24	Koper, Ravenna, Venezia		Koper, Ravenna, Rijeka, Venezia	Limassol, Piraeus	Ancona, Gioia Tauro, Marsaxlokk				Constanța
	Venezia	19	52	38	Koper, Ravenna, Trieste	Antwerpen, Hamburg	Koper, Ravenna, Rijeka, Trieste	Hamburg, Limassol, Piraeus, Thessalo-niki	Ancona, Bari, Gioia Tauro, Hamburg, Marsaxl., Napoli	Antwerpen, Genova	Bilbao	Antwerpen	Constanța
	Koper	13	46	32	Ravenna, Trieste, Venezia		Ravenna, Rijeka, Trieste, Venezia	Limassol, Piraeus, Thessaloni ki	Ancona, Bari, Gioia Tauro, Marsaxlokk				Constanța

4.4. Orient-East Med Corridor

Figure 16: International maritime links of the Orient-East Med Corridor (North) 2017

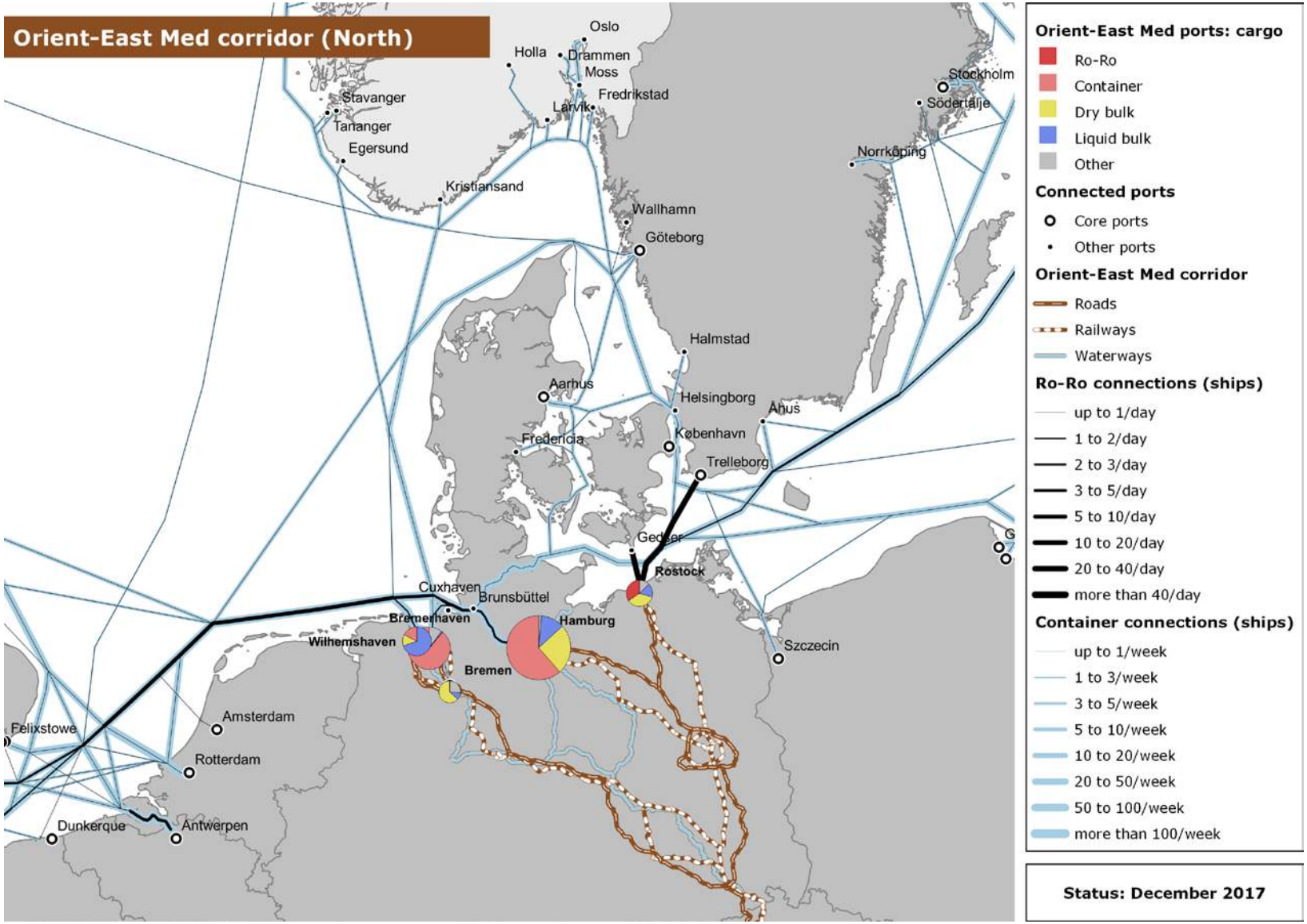
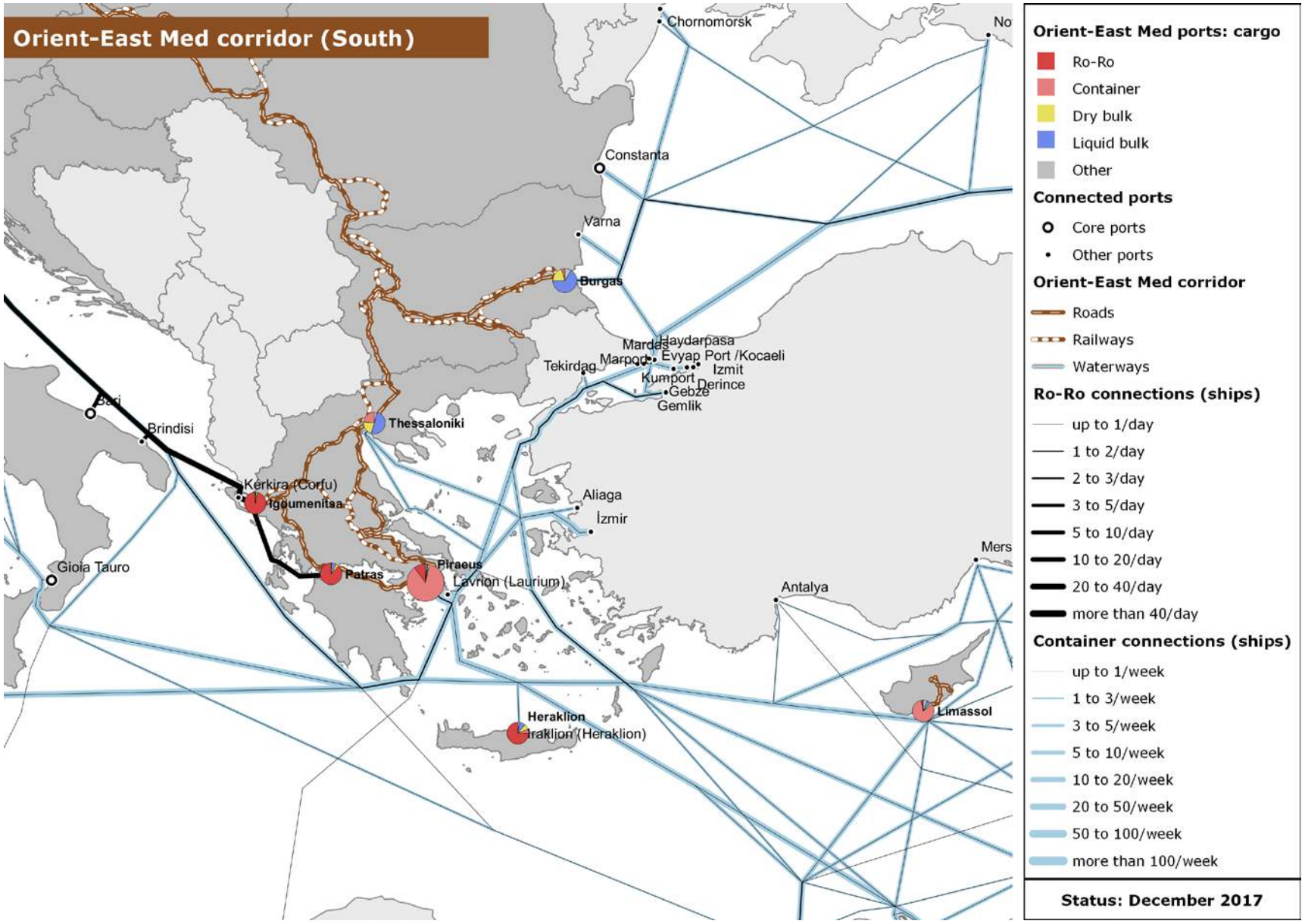


Figure 17: International maritime links of the Orient-East Med Corridor (South) 2017



Range	Name of port	No. of services	Conn. ports	*short sea*	Baltic-Adriatic	North Sea-Baltic	Mediterranean	Orient-East Med	Scandinavian-Mediterranean	Rhine-Alpine	Atlantic	North Sea-Mediterranean	Rhine-Danube
North Sea	Bremen	6	24	19	Gdynia	Antwerpen, Hamburg, Rotterdam	Cartagena	Hamburg, Piraeus, Thessaloniki	Hamburg	Antwerpen, Rotterdam	Leixoes	Antwerpen, Rotterdam	
	Bremerh.	65	166	91	Gdańsk, Gdynia	Antwerpen, Hamburg, Helsinki, Klaipėda, Rīga, Rotterdam, Tallinn, Wilhelmsh.	Algeciras, Valencia	Hamburg, Limassol, Piraeus, Wilhelmsh.	Göteborg, Hamburg, Helsinki, København., Kotka, Marsaxl., Stockholm	Antwerpen, Rotterdam	Algeciras, Bilbao, Le Havre, Lisboa, Sines	Antwerpen, Cork, Felixstowe, Liverpool, London, Rotterdam, Southampt.	
	Hamburg	85	214	112	Gdańsk, Gdynia, Szczecin, Venezia	Antwerpen, Bremen, Bremerh., Helsinki, Klaipėda, Rīga, Rotterdam, Tallinn, Wilhelmsh.	Algeciras, Barcelona, Cartagena, Valencia, Venezia	Bremen, Bremerh., Piraeus, Thessaloniki, Wilhelmsh.	Bremen, Gioia Tauro, Göteborg, Helsinki, København., Kotka, Marsaxl., Napoli, Stockholm	Antwerpen, Genova, Rotterdam	Algeciras, Bilbao, Le Havre, Leixoes, Lisboa, Rouen, Sines	Antwerpen, Dunkerque, Felixstowe, Liverpool, London, Rotterdam, Southampt.	
	Rostock	2	6	6					Hamina, Kotka			Clyde	
	Wilhelmsh.	6	31	15		Antwerpen, Bremerh., Hamburg, Helsinki, Rotterdam, Tallinn	Algeciras	Bremerh., Hamburg	Göteborg, Hamburg, Helsinki, Kotka	Antwerpen, Rotterdam	Algeciras	Antwerpen, Felixstowe, Rotterdam	
Med.	Burgas	4	13	11					Gioia Tauro				Constanța

Range	Name of port	No. of services	Conn. ports	*short sea*	Baltic-Adriatic	North Sea-Baltic	Mediterranean	Orient-East Med	Scandinavian-Mediterranean	Rhine-Alpine	Atlantic	North Sea-Mediterranean	Rhine-Danube
	Limassol	13	40	40	Koper, Ravenna, Trieste, Venezia	Antwerpen, Bremerh., Rotterdam	Barcelona, Koper, Marseille, Ravenna, Rijeka, Trieste, Valencia, Venezia	Bremerh., Piraeus, Thessalo-niki	Ancona, Gioia Tauro, La Spezia, Napoli	Antwerpen, Genova, Rotterdam	Leixoes	Antwerpen, Dublin, Felixstowe, Liverpool, Marseille, Rotterdam	
	Igoume-nitsa	0	0	0									
	Patras	0	0	0									
	Piraeus	40	98	71	Koper, Ravenna, Trieste, Venezia	Antwerpen, Bremen, Bremerh., Hamburg, Rotterdam	Barcelona, Koper, Marseille, Ravenna, Rijeka, Tarragona, Trieste, Valencia, Venezia	Bremen, Bremerh., Hamburg, Heraklion, Limassol, Thessalo-niki	Ancona, Bari, Bremen, Gioia Tauro, Hamburg, La Spezia, Livorno, Marsaxl., Napoli	Antwerpen, Genova, Rotterdam	Leixoes	Antwerpen, Dublin, Felixstowe, Liverpool, Marseille, Rotterdam	Constanța
	Heraklion	1	5	5				Piraeus					
	Thessaloni ki	11	36	36	Koper, Venezia	Antwerpen, Bremen, Hamburg, Rotterdam	Barcelona, Koper, Rijeka, Valencia, Venezia	Bremen, Hamburg, Limassol, Piraeus	Ancona, Bremen, Hamburg, Marsaxlokk	Antwerpen, Rotterdam		Antwerpen, Felixstowe, Rotterdam	Constanța

4.5. Scandinavian-Mediterranean Corridor

Figure 18: International maritime links of the Scandinavian-Mediterranean Corridor (North) 2017

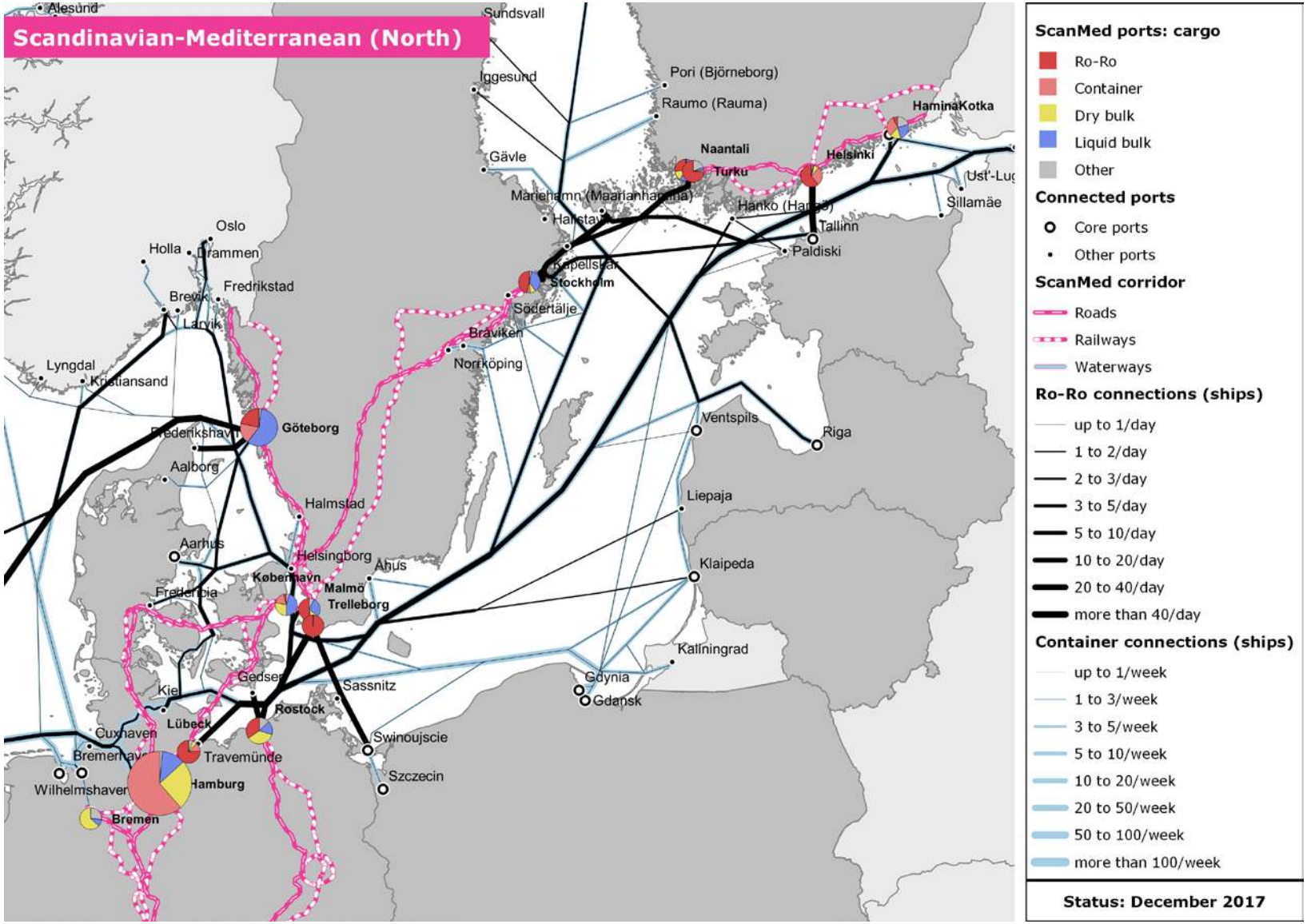
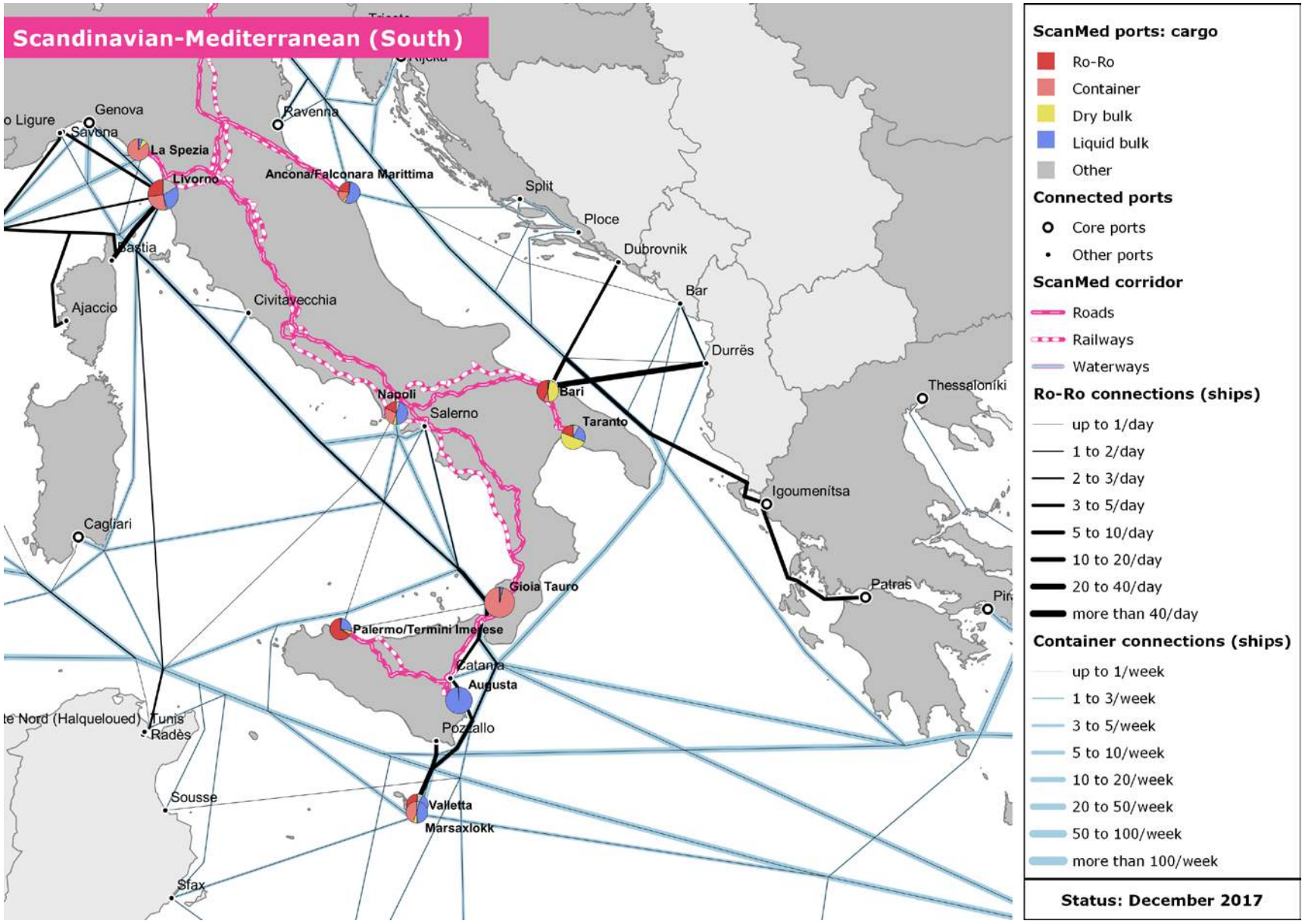


Figure 19: International maritime links of the Scandinavian-Mediterranean Corridor (South) 2017



Range	Name of port	No. of services	Conn. ports	*short sea*	Baltic-Adriatic	North Sea-Baltic	Mediterranean	Orient-East Med	Scandinavian-Mediterranean	Rhine-Alpine	Atlantic	North Sea-Mediterranean	Rhine-Danube
North	København	4	9	9		Bremerh., Hamburg		Bremerh., Hamburg	Göteborg, Hamburg				
	Hamina	1	3	3				Rostock	Rostock				
	Helsinki	10	19	19	Gdynia	Antwerpen, Bremerh., Hamburg, Klaipėda, Rīga, Rotterdam, Tallinn, Wilhelmsh.		Bremerh., Hamburg, Wilhelmsh.	Hamburg, Kotka, Lübeck	Antwerpen, Rotterdam, Zeebrugge		Antwerpen, Rotterdam, Zeebrugge	
	Kotka	10	19	19	Gdynia	Antwerpen, Bremerh., Hamburg, Helsinki, Rīga, Rotterdam, Tallinn, Wilhelmsh.		Bremerh., Hamburg, Rostock, Wilhelmsh.	Göteborg, Hamburg, Helsinki, Rostock	Antwerpen, Rotterdam	Le Havre	Antwerpen, Clyde, Felixstowe, Rotterdam	
	Naantali	0	0	0									
	Turku	1	7	7	Świnouj-ście								
	Bremen	6	24	19	Gdynia	Antwerpen, Hamburg, Rotterdam	Cartagena	Hamburg, Piraeus, Thessaloniki	Hamburg	Antwerpen, Rotterdam	Leixoes	Antwerpen, Rotterdam	

Range	Name of port	No. of services	Conn. ports	*short sea*	Baltic-Adriatic	North Sea-Baltic	Mediterranean	Orient-East Med	Scandinavian-Mediterranean	Rhine-Alpine	Atlantic	North Sea-Mediterranean	Rhine-Danube
	Hamburg	85	214	112	Gdańsk, Gdynia, Szczecin, Venezia	Antwerpen, Bremen, Bremerh., Helsinki, Klaipėda, Rīga, Rotterdam, Tallinn, Wilhelmsh.	Algeciras, Barcelona, Cartagena, Valencia, Venezia	Bremen, Bremerh., Piraeus, Thessaloniki, Wilhelmsh.	Bremen, Gioia Tauro, Göteborg, Helsinki, København, Kotka, Marsaxlokk, Napoli, Stockholm	Antwerpen, Genova, Rotterdam	Algeciras, Bilbao, Le Havre, Leixoes, Lisboa, Rouen, Sines	Antwerpen, Dunkerque, Felixstowe, Liverpool, London, Rotterdam, Southampton	
	Rostock	2	6	6					Hamina, Kotka			Clyde	
	Göteborg	14	38	25	Gdańsk	Antwerpen, Bremerh., Hamburg, Rotterdam, Wilhelmsh.		Bremerh., Hamburg, Wilhelmsh.	Hamburg, København, Kotka	Antwerpen, Rotterdam	Le Havre, Leixoes, Lisboa	Antwerpen, Felixstowe, Forth, Liverpool, Rotterdam, Southampton	
	Malmö	0	0	0									
	Stockholm	3	7	7		Bremerh., Hamburg, Rīga		Bremerh., Hamburg	Hamburg				
	Trelleborg	0	0	0									
	Lübeck	3	9	9		Helsinki, Rīga, Rotterdam			Helsinki	Rotterdam, Zeebrugge		Rotterdam, Zeebrugge	
South	Ancona	9	26	26	Koper, Ravenna, Trieste, Venezia		Koper, Ravenna, Rijeka, Trieste, Venezia	Limassol, Piraeus, Thessaloniki	Bari, Gioia Tauro, Marsaxlokk				
	Augusta	0	0	0									

Range	Name of port	No. of services	Conn. ports	*short sea*	Baltic-Adriatic	North Sea-Baltic	Mediterranean	Orient-East Med	Scandinavian-Mediterranean	Rhine-Alpine	Atlantic	North Sea-Mediterranean	Rhine-Danube
	Bari	2	8	8	Koper, Venezia		Koper, Rijeka, Venezia	Piraeus	Ancona				
	Gioia Tauro	21	113	54	Koper, Ravenna, Trieste, Venezia	Antwerpen, Hamburg, Rotterdam	Algeciras, Barcelona, Koper, Ravenna, Rijeka, Trieste, Valencia, Venezia	Burgas, Hamburg, Limassol, Piraeus	Ancona, Hamburg, La Spezia, Livorno, Marsaxlokk, Napoli, Palermo	Antwerpen, Genova, Rotterdam	Algeciras, Le Havre, Sines	Antwerpen, Dunkerque, Felixstowe, London, Rotterdam, Southampton	Constanța
	La Spezia	19	91	37		Antwerpen, Rotterdam	Algeciras, Barcelona, Tarragona, Valencia	Limassol, Piraeus	Gioia Tauro, Livorno, Marsaxlokk, Napoli	Antwerpen, Genova, Rotterdam	Algeciras, Le Havre, Sines	Antwerpen, Felixstowe, London, Rotterdam	
	Livorno	19	88	30			Algeciras, Barcelona, Tarragona, Valencia	Piraeus	Gioia Tauro, La Spezia, Marsaxlokk, Napoli	Genova	Algeciras, Lisboa, Sines		
	Napoli	12	68	37	Venezia	Antwerpen, Hamburg, Rotterdam	Algeciras, Barcelona, Tarragona, Valencia, Venezia	Hamburg, Limassol, Piraeus	Gioia Tauro, Hamburg, La Spezia, Livorno, Marsaxlokk	Antwerpen, Genova, Rotterdam	Algeciras, Le Havre, Lisboa, Sines	Antwerpen, Felixstowe, London, Rotterdam	
	Palermo	1	2	2					Gioia Tauro				
	Taranto	0	0	0									

Range	Name of port	No. of services	Conn. ports	*short sea*	Baltic-Adriatic	North Sea-Baltic	Mediterranean	Orient-East Med	Scandinavian-Mediterranean	Rhine-Alpine	Atlantic	North Sea-Mediterranean	Rhine-Danube
	Marsaxlokk	32	12 1	69	Koper, Ravenna, Trieste, Venezia	Antwerpen, Bremerh., Hamburg, Rotterdam	Algeciras, Barcelona, Cartagena, Koper, Ravenna, Rijeka, Trieste, Valencia, Venezia	Bremerh., Hamburg, Piraeus, Thessaloniki	Ancona, Gioia Tauro, Hamburg, La Spezia, Livorno, Napoli	Antwerpen, Genova, Rotterdam	Algeciras, Le Havre	Antwerpen, Dunkerque, Felixstowe, London, Rotterdam, Southampton	Constanța
	Valletta	0	0	0									

4.6. hine-Alpine Corridor

Figure 20: International maritime links of the Rhine-Alpine Corridor (North) 2017

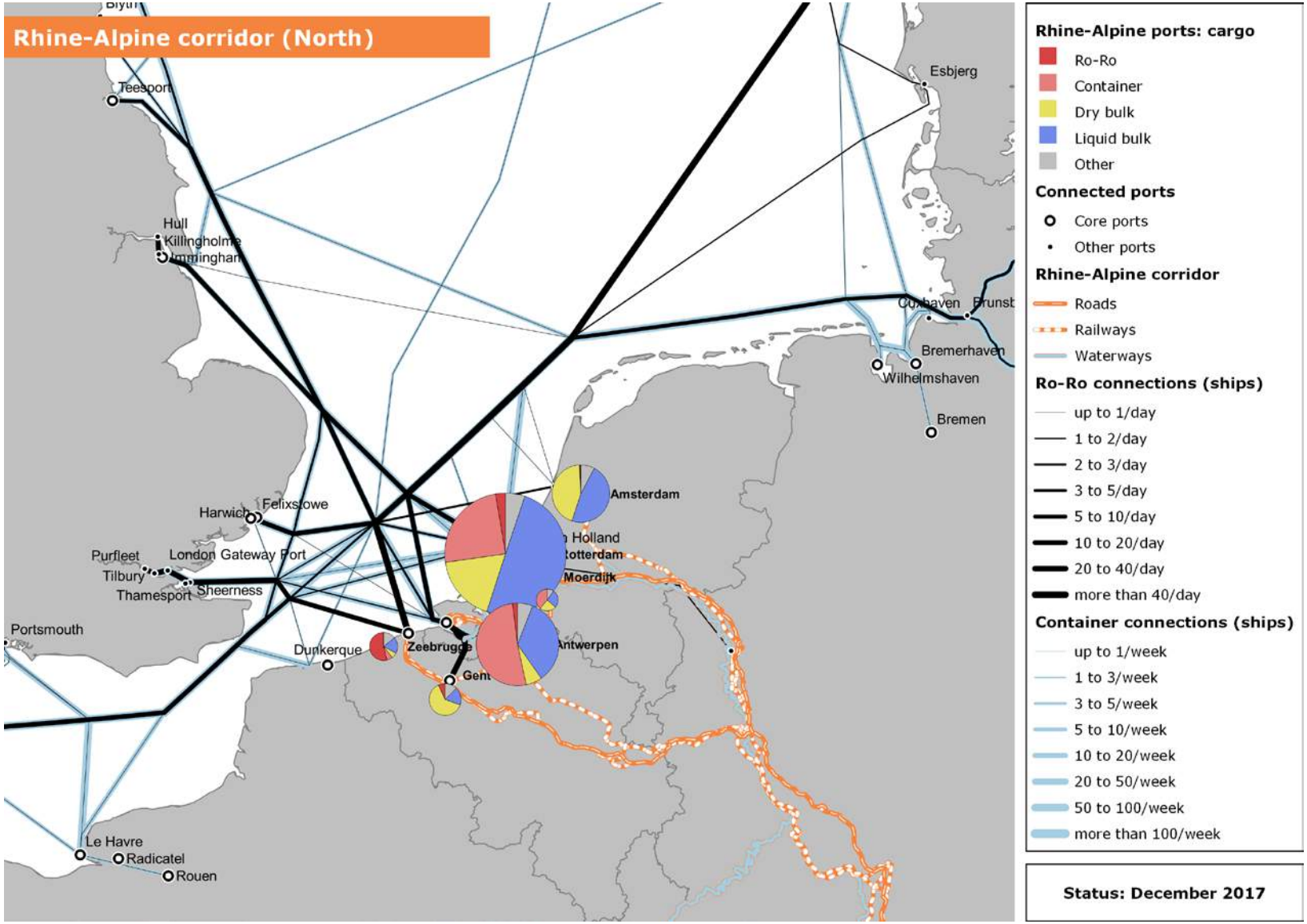
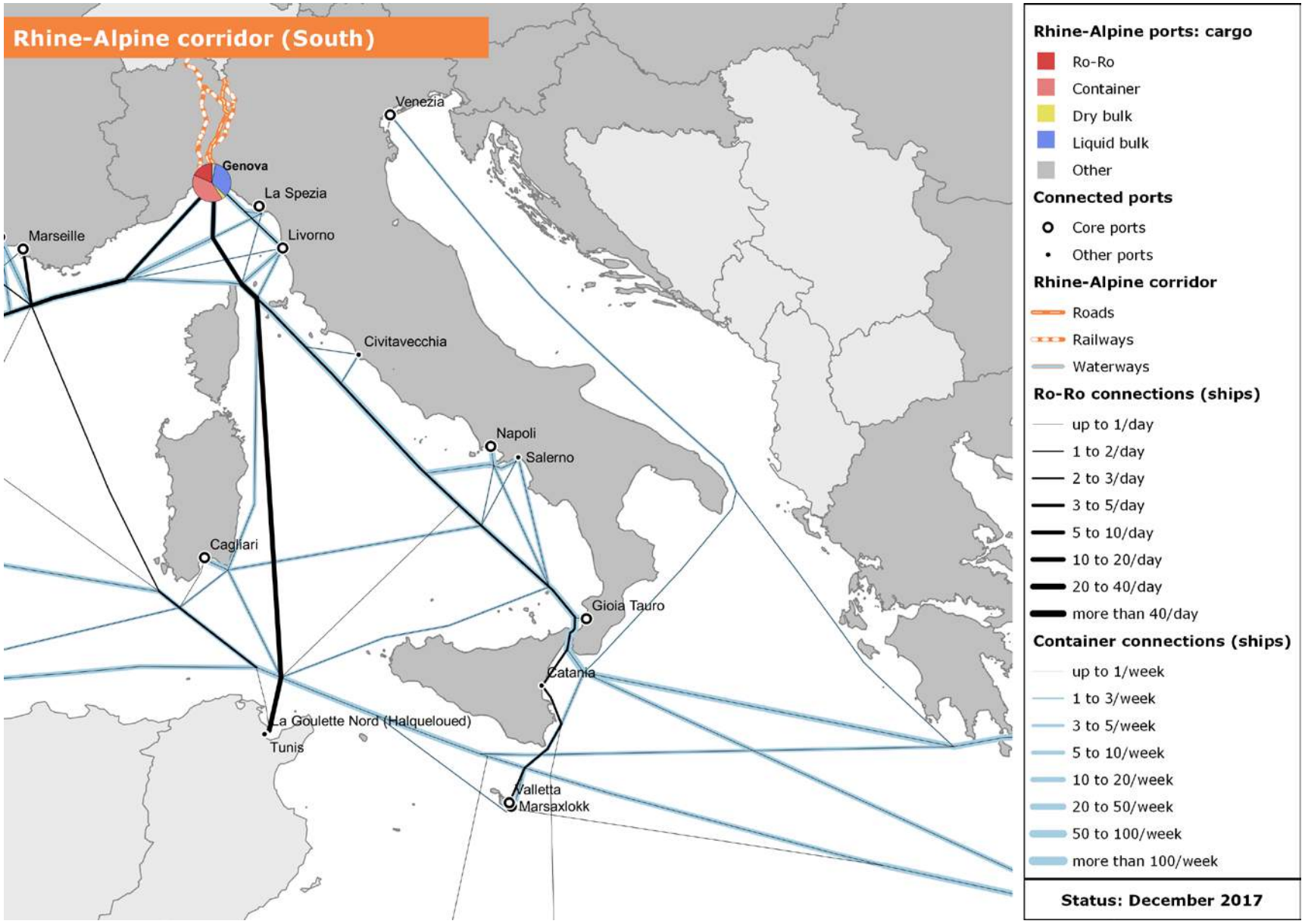


Figure 21: International maritime links of the Rhine-Alpine Corridor (South) 2017

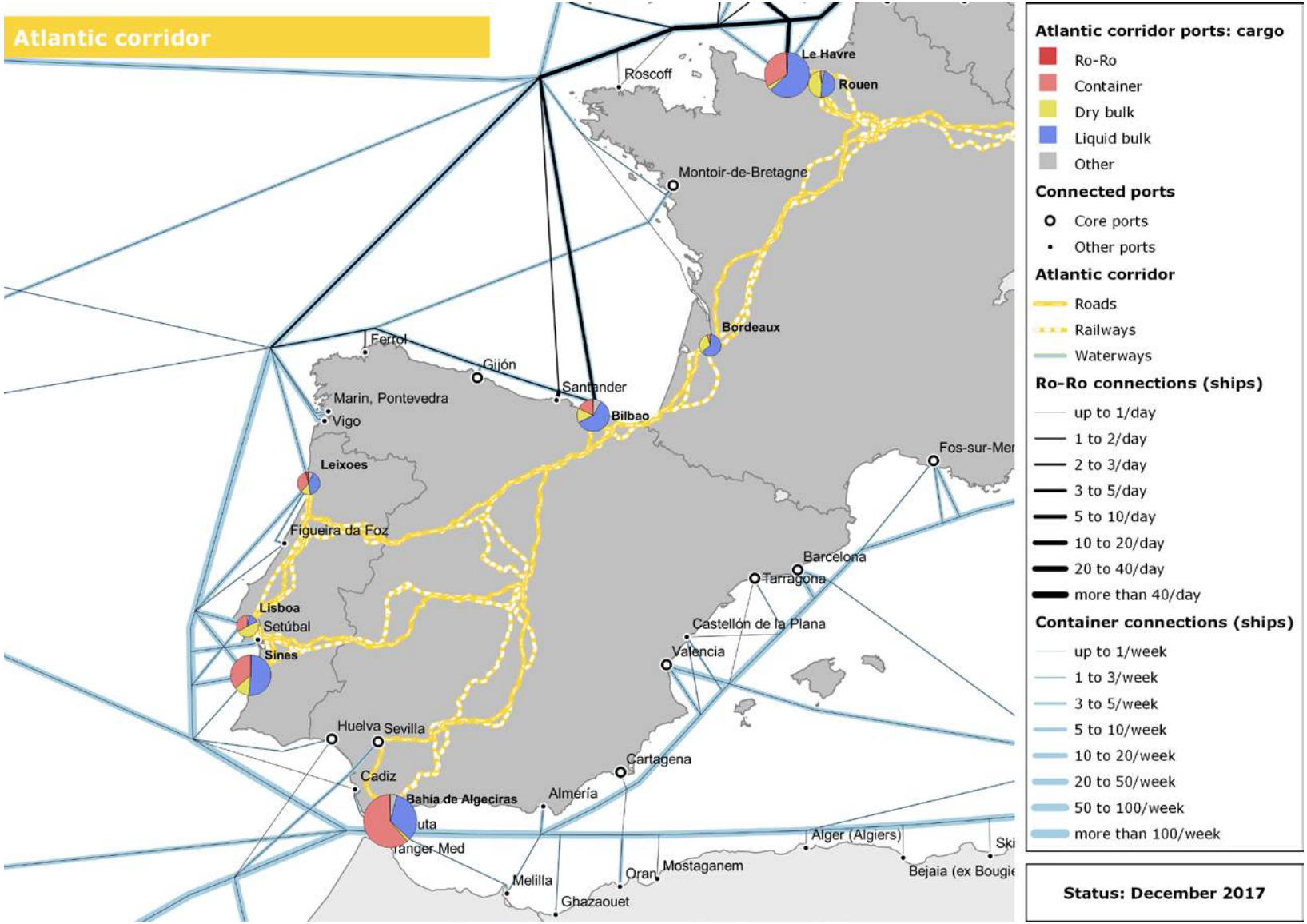


Range	Name of port	No. of services	Conn. ports	*short sea*	Baltic-Adriatic	North Sea-Baltic	Mediterranean	Orient-East Med	Scandinavian-Mediterranean	Rhine-Alpine	Atlantic	North Sea-Mediterranean	Rhine-Danube
North Sea	Antwerpen	113	263	113	Gdańsk, Gdynia, Venezia	Amsterdam, Bremen, Bremerh., Hamburg, Helsinki, Klaipėda, Moerdijk, Rīga, Rotterdam, Tallinn, Wilhelmsh.	Algeciras, Barcelona, Cartagena, Valencia, Venezia	Bremen, Bremerh., Hamburg, Limassol, Piraeus, Thessaloniki, Wilhelmsh.	Bremen, Gioia Tauro, Göteborg, Hamburg, Helsinki, Kotka, La Spezia, Marsaxlokk, Napoli	Amsterdam, Genova, Moerdijk, Rotterdam, Vlissingen	Algeciras, Bilbao, Le Havre, Leixoes, Lisboa, Rouen, Sines	Amsterdam, Belfast, Clyde, Cork, Dublin, Dunkerque, Felixstowe, Forth, Liverpool, London, Moerdijk, Rotterdam, Southampt.	
	Gent	0	0	0									
	Zeebrugge	4	21	14		Helsinki, Rīga, Rotterdam			Helsinki, Lübeck	Rotterdam	Rouen	Dunkerque, Felixstowe, Rotterdam, Southampt.	
	Amsterdam	3	7	7		Antwerpen, Rotterdam				Antwerpen, Rotterdam		Antwerpen, Rotterdam	
	Moerdijk	6	14	14		Antwerpen, Rotterdam				Antwerpen, Rotterdam	Leixoes, Lisboa	Antwerpen, Felixstowe, Rotterdam	
	Vlissingen	5	30	20		Antwerpen, Rotterdam	Algeciras			Antwerpen, Rotterdam	Algeciras, Bilbao, Le Havre	Antwerpen, Dunkerque, Liverpool, Rotterdam	

Range	Name of port	No. of services	Conn. ports	*short sea*	Baltic-Adriatic	North Sea-Baltic	Mediterranean	Orient-East Med	Scandinavian-Mediterranean	Rhine-Alpine	Atlantic	North Sea-Mediterranean	Rhine-Danube
	Rotterdam	127	266	133	Gdańsk, Gdynia	Amsterdam, Antwerpen, Bremen, Bremerh., Hamburg, Helsinki, Klaipėda, Moerdijk, Rīga, Tallinn, Wilhelmsh.	Algeciras, Cartagena, Valencia	Bremen, Bremerh., Hamburg, Limassol, Piraeus, Thessaloniki, Wilhelmsh.	Bremen, Gioia Tauro, Göteborg, Hamburg, Helsinki, Kotka, La Spezia, Lübeck, Marsaxlokk, Napoli	Amsterdam, Antwerpen, Genova, Moerdijk, Vlissingen, Zeebrugge	Algeciras, Bilbao, Le Havre, Leixoes, Lisboa, Rouen, Sines	Amsterdam, Antwerpen, Belfast, Cork, Dublin, Dunkerque, Felixstowe, Forth, Liverpool, London, Moerdijk, Southampt., Terneuzen, Zeebrugge	
Med.	Genova	41	154	51	Venezia	Antwerpen, Hamburg, Rotterdam	Algeciras, Barcelona, Marseille, Tarragona, Valencia, Venezia	Hamburg, Limassol, Piraeus	Gioia Tauro, Hamburg, La Spezia, Livorno, Marsaxlokk, Napoli	Antwerpen, Rotterdam	Algeciras, Le Havre, Lisboa, Sines	Antwerpen, London, Marseille, Rotterdam	

4.7. Atlantic Corridor

Figure 22: International maritime links of the Atlantic Corridor 2017



Range	Name of port	No. of services	Conn. ports	*short sea*	Baltic-Adriatic	North Sea-Baltic	Mediterranean	Orient-East Med	Scandinavian-Mediterranean	Rhine-Alpine	Atlantic	North Sea-Mediterranean	Rhine-Danube
North Sea	Bordeaux	1	3	3							Le Havre		
	Le Havre	40	158	52	Gdynia	Antwerpen, Bremerh., Hamburg, Klaipėda, Rotterdam	Algeciras, Barcelona, Valencia	Bremerh., Hamburg	Gioia Tauro, Göteborg, Hamburg, Kotka, La Spezia, Marsaxlokk, Napoli	Antwerpen, Genova, Rotterdam, Vlissingen	Algeciras, Bilbao, Bordeaux, Leixoes, Lisboa, Rouen, Sines	Antwerpen, Belfast, Clyde, Dunkerque, Felixstowe, Liverpool, London, Rotterdam, Southampt.	
	Rouen	8	48	17		Antwerpen, Hamburg, Rotterdam		Hamburg	Hamburg	Antwerpen, Rotterdam, Zeebrugge	Bilbao, Le Havre, Leixoes	Antwerpen, Dunkerque, Rotterdam, Zeebrugge	
Iberia	Sines	17	90	37		Antwerpen, Bremerh., Hamburg, Rotterdam	Algeciras, Barcelona, Valencia	Bremerh., Hamburg	Gioia Tauro, Hamburg, La Spezia, Livorno, Napoli	Antwerpen, Genova, Rotterdam	Algeciras, Bilbao, Le Havre, Leixoes, Lisboa	Antwerpen, Felixstowe, Liverpool, London, Rotterdam, Southampt.	
	Algeciras	52	169	65	Gdańsk	Antwerpen, Bremerh., Hamburg, Rotterdam, Wilhelmsh.	Barcelona, Sevilla, Tarragona, Valencia	Bremerh., Hamburg, Wilhelmsh.	Gioia Tauro, Hamburg, La Spezia, Livorno, Marsaxlokk, Napoli	Antwerpen, Genova, Rotterdam, Vlissingen	Bilbao, Le Havre, Leixoes, Lisboa, Sines	Antwerpen, Dublin, Dunkerque, Felixstowe, Liverpool, London, Rotterdam, Southampt.	
	Bilbao	20	63	29	Gdynia, Venezia	Antwerpen, Bremerh., Hamburg, Rotterdam	Algeciras, Venezia	Bremerh., Hamburg	Hamburg	Antwerpen, Rotterdam, Vlissingen	Algeciras, Le Havre, Lisboa, Rouen, Sines	Antwerpen, Clyde, Dublin, Dunkerque, Liverpool, Rotterdam	

Range	Name of port	No. of services	Conn. ports	*short sea* Baltic-Adriatic	North Sea-Baltic	Mediterranean	Orient-East Med	Scandinavian-Mediterranean	Rhine-Alpine	Atlantic	North Sea-Mediterranean	Rhine-Danube
	Leixoes	25	81	60	Antwerpen, Bremen, Hamburg, Moerdijk, Rotterdam	Algeciras, Barcelona, Cartagena, Sevilla, Tarragona, Valencia	Bremen, Hamburg, Limassol, Piraeus	Bremen, Göteborg, Hamburg	Antwerpen, Moerdijk, Rotterdam	Algeciras, Le Havre, Lisboa, Rouen, Sines	Antwerpen, Dublin, Dunkerque, Felixstowe, Forth, Liverpool, Moerdijk, Rotterdam	
	Lisboa	25	74	44	Antwerpen, Bremerh., Hamburg, Moerdijk, Rotterdam	Algeciras, Barcelona, Sevilla, Tarragona, Valencia	Bremerh., Hamburg	Göteborg, Hamburg, Livorno, Napoli	Antwerpen, Genova, Moerdijk, Rotterdam	Algeciras, Bilbao, Le Havre, Leixoes, Sines	Antwerpen, Felixstowe, Forth, Moerdijk, Rotterdam	

4.8. North Sea-Mediterranean Corridor

Figure 23: International maritime links of the North Sea-Mediterranean Corridor (North) 2017

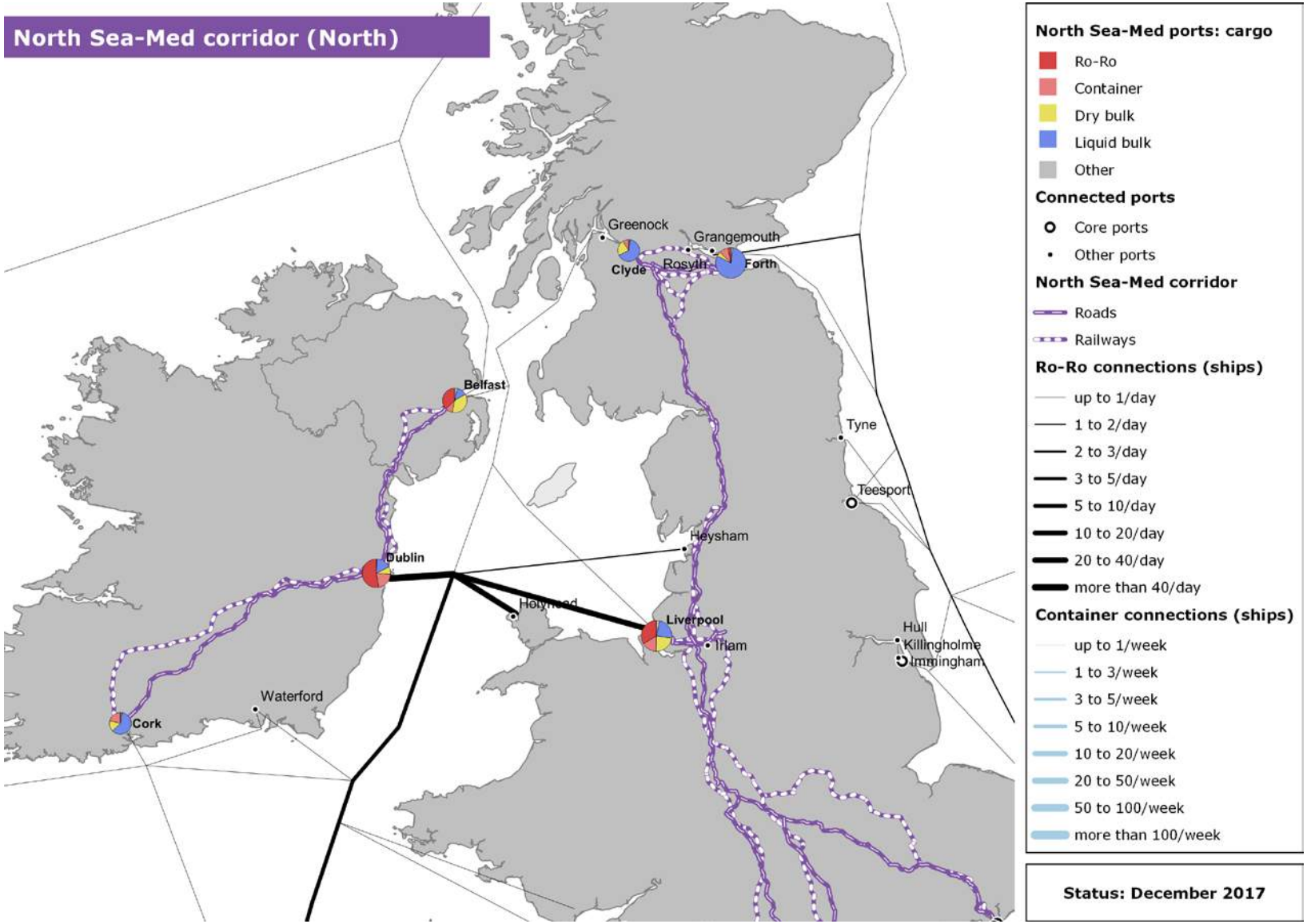


Figure 24: International maritime links of the North Sea-Mediterranean Corridor (Central) 2017

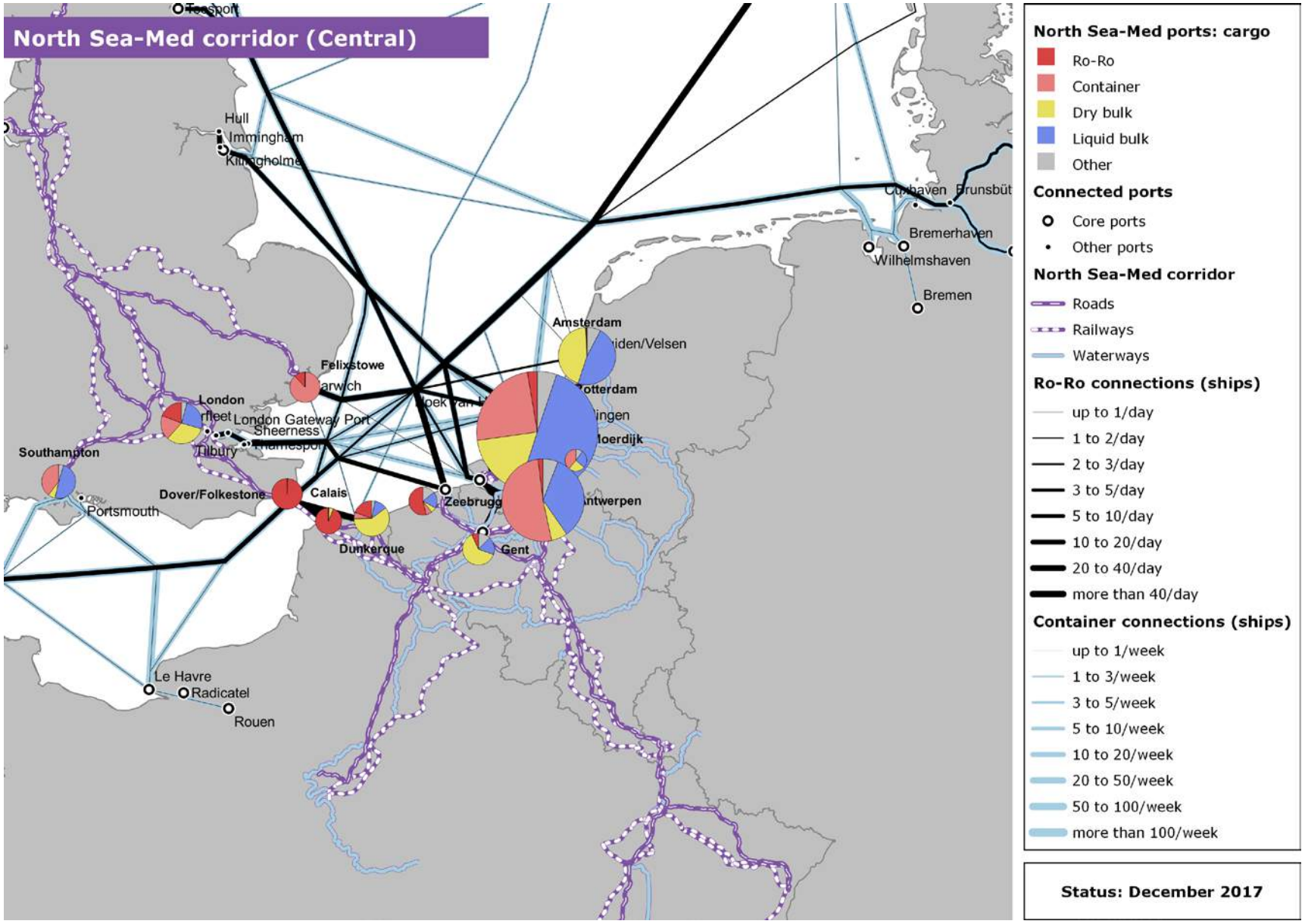
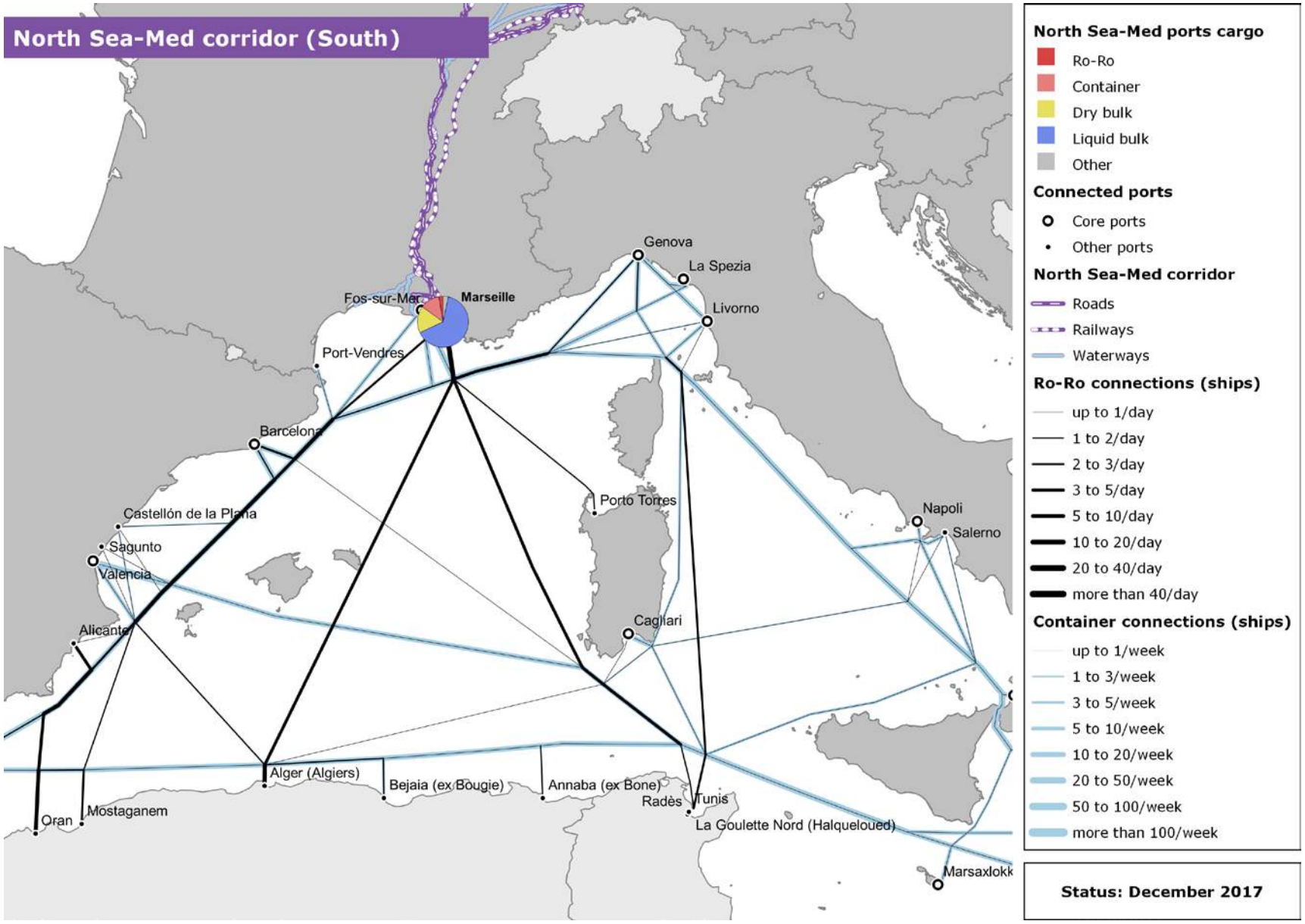


Figure 25: International maritime links of the North Sea-Mediterranean Corridor (South) 2017



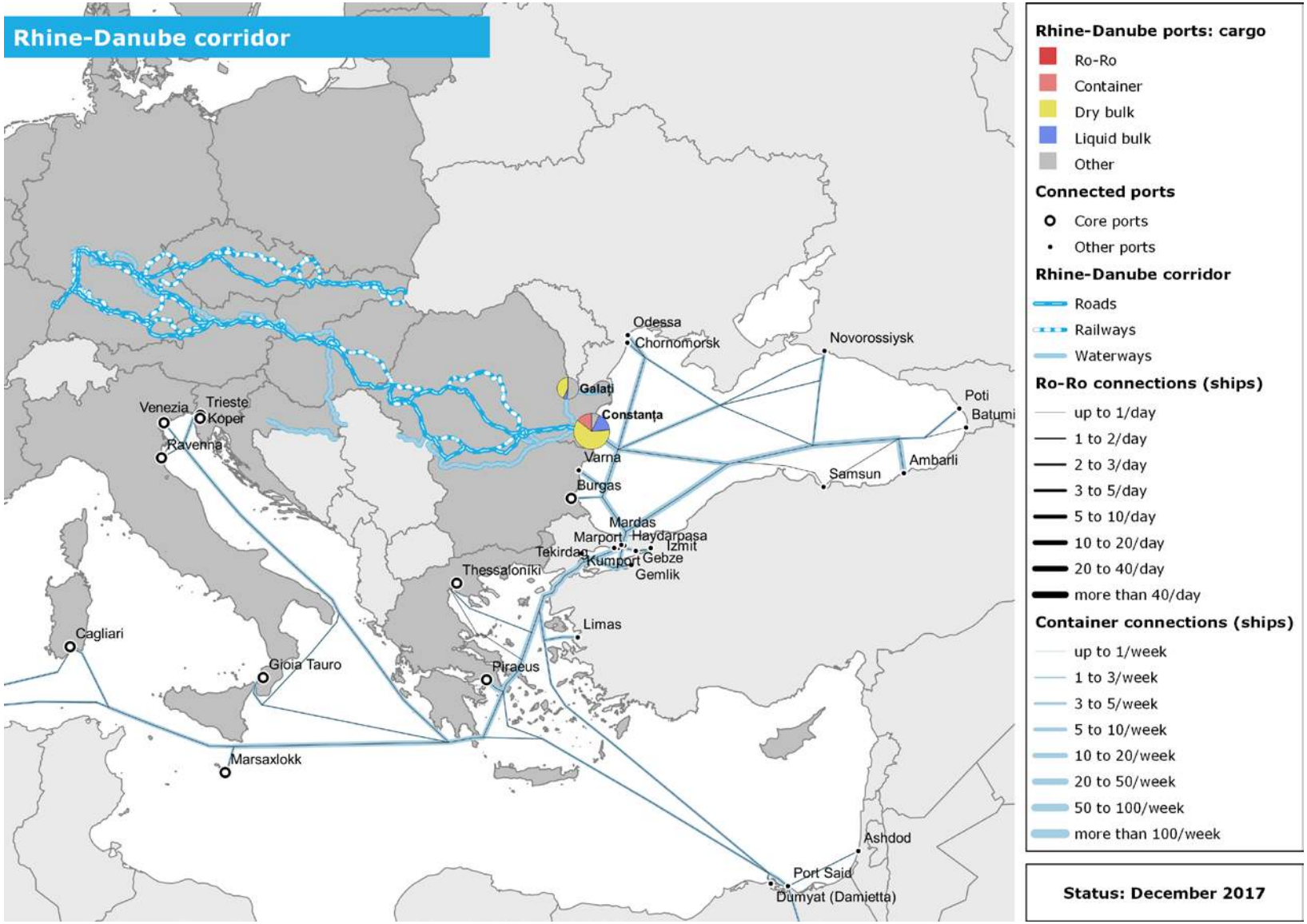
Range	Name of port	No. of services	Conn. ports	*short sea*	Baltic-Adriatic	North Sea-Baltic	Mediterranean	Orient-East Med	Scandinavian-Mediterranean	Rhine-Alpine	Atlantic	North Sea-Mediterranean	Rhine-Danube
North Sea	Antwerpen	113	263	113	Gdańsk, Gdynia, Venezia	Amsterdam, Bremen, Bremerh., Hamburg, Helsinki, Klaipėda, Moerdijk, Rīga, Rotterdam, Tallinn, Wilhelmsh.	Algeciras, Barcelona, Cartagena, Valencia, Venezia	Bremen, Bremerh., Hamburg, Limassol, Piraeus, Thessaloniki, Wilhelmsh.	Bremen, Gioia Tauro, Göteborg, Hamburg, Helsinki, Kotka, La Spezia, Marsaxlokk, Napoli	Amsterdam, Genova, Moerdijk, Rotterdam, Vlissingen	Algeciras, Bilbao, Le Havre, Leixoes, Lisboa, Rouen, Sines	Amsterdam, Belfast, Clyde, Cork, Dublin, Dunkerque, Felixstowe, Forth, Liverpool, London, Moerdijk, Rotterdam, Southampton	
	Gent	0	0	0									
	Zeebrugge	4	21	14		Helsinki, Rīga, Rotterdam			Helsinki, Lübeck	Rotterdam	Rouen	Dunkerque, Felixstowe, Rotterdam, Southampton	
	Calais	0	0	0									
	Dunkerque	10	69	27		Antwerpen, Hamburg, Rotterdam	Algeciras	Hamburg	Gioia Tauro, Hamburg, Marsaxlokk	Antwerpen, Rotterdam, Vlissingen, Zeebrugge	Algeciras, Bilbao, Le Havre, Leixoes, Rouen	Antwerpen, Felixstowe, Rotterdam, Southampton , Zeebrugge	
	Cork	5	11	7		Antwerpen, Bremerh., Rotterdam		Bremerh.		Antwerpen, Rotterdam		Antwerpen, Dublin, Rotterdam, Southampton	
	Dublin	16	26	26		Antwerpen, Rotterdam	Algeciras	Limassol, Piraeus		Antwerpen, Rotterdam	Algeciras, Bilbao, Leixoes	Antwerpen, Belfast, Clyde, Cork, Liverpool, Rotterdam, Southampton	

Range	Name of port	No. of services	Conn. ports	*short sea*	Baltic-Adriatic	North Sea-Baltic	Mediterranean	Orient-East Med	Scandinavian-Mediterranean	Rhine-Alpine	Atlantic	North Sea-Mediterranean	Rhine-Danube
	Amsterdam	3	7	7		Antwerpen, Rotterdam				Antwerpen, Rotterdam		Antwerpen, Rotterdam	
	Moerdijk	6	14	14		Antwerpen, Rotterdam				Antwerpen, Rotterdam	Leixoes, Lisboa	Antwerpen, Felixstowe, Rotterdam	
	Terneuzen	1	2	2		Rotterdam				Rotterdam		Rotterdam	
	Belfast	4	8	8		Antwerpen, Rotterdam				Antwerpen, Rotterdam	Le Havre	Antwerpen, Clyde, Dublin, Liverpool, Rotterdam, Southampton	
	Dover/Folkestone	0	0	0									
	Felixstowe	32	106	57	Gdańsk, Gdynia, Szczecin	Antwerpen, Bremerh., Hamburg, Klaipėda, Moerdijk, Rotterdam, Wilhelmsh.	Algeciras, Valencia	Bremerh., Hamburg, Limassol, Piraeus, Thessaloniki, Wilhelmsh.	Gioia Tauro, Göteborg, Hamburg, Kotka, La Spezia, Marsaxlokk, Napoli	Antwerpen, Moerdijk, Rotterdam, Zeebrugge	Algeciras, Le Havre, Leixoes, Lisboa, Sines	Antwerpen, Dunkerque, Forth, Moerdijk, Rotterdam, Southampton, Zeebrugge	
	Liverpool	14	41	32		Antwerpen, Bremerh., Hamburg, Rotterdam	Algeciras	Bremerh., Hamburg, Limassol, Piraeus	Göteborg, Hamburg	Antwerpen, Rotterdam, Vlissingen	Algeciras, Bilbao, Le Havre, Leixoes, Sines	Antwerpen, Belfast, Clyde, Dublin, Rotterdam, Southampton	
	Clyde	6	11	11		Antwerpen		Rostock	Kotka, Rostock	Antwerpen	Bilbao, Le Havre	Antwerpen, Belfast, Dublin, Liverpool, Southampton	
	Forth	6	10	10		Antwerpen, Rotterdam			Göteborg	Antwerpen, Rotterdam	Leixoes, Lisboa	Antwerpen, Felixstowe, Rotterdam	

Range	Name of port	No. of services	Conn. ports	*short sea*	Baltic-Adriatic	North Sea-Baltic	Mediterranean	Orient-East Med	Scandinavian-Mediterranean	Rhine-Alpine	Atlantic	North Sea-Mediterranean	Rhine-Danube
	Southampton	19	68	20	Gdańsk	Antwerpen, Bremerh., Hamburg, Rotterdam	Algeciras	Bremerh., Hamburg	Gioia Tauro, Göteborg, Hamburg, Marsaxlokk	Antwerpen, Rotterdam, Zeebrugge	Algeciras, Le Havre, Sines	Antwerpen, Belfast, Clyde, Cork, Dublin, Dunkerque, Felixstowe, Liverpool, Rotterdam, Zeebrugge	
	London	10	65	20		Antwerpen, Bremerh., Hamburg, Rotterdam	Algeciras, Valencia	Bremerh., Hamburg	Gioia Tauro, Hamburg, La Spezia, Marsaxlokk, Napoli	Antwerpen, Genova, Rotterdam	Algeciras, Le Havre, Sines	Antwerpen, Rotterdam	
	Rotterdam	127	266	133	Gdańsk, Gdynia	Amsterdam, Antwerpen, Bremen, Bremerh., Hamburg, Helsinki, Klaipėda, Moerdijk, Rīga, Tallinn, Wilhelmsh.	Algeciras, Cartagena, Valencia	Bremen, Bremerh., Hamburg, Limassol, Piraeus, Thessaloniki, Wilhelmsh.	Bremen, Gioia Tauro, Göteborg, Hamburg, Helsinki, Kotka, La Spezia, Lübeck, Marsaxlokk, Napoli	Amsterdam, Antwerpen, Genova, Moerdijk, Vlissingen, Zeebrugge	Algeciras, Bilbao, Le Havre, Leixoes, Lisboa, Rouen, Sines	Amsterdam, Antwerpen, Belfast, Cork, Dublin, Dunkerque, Felixstowe, Forth, Liverpool, London, Moerdijk, Southampton, Terneuzen, Zeebrugge	
Med	Marseille	3	12	12			Barcelona	Limassol, Piraeus		Genova			

4.9. Rhine-Danube Corridor

Figure 26: International maritime links of the Rhine-Danube Corridor 2017



Range	Name of port	No. of services	Conn. ports	*short sea*	Baltic-Adriatic	North Sea-Baltic	Mediterranean	Orient-East Med	Scandinavian-Mediterranean	Rhine-Alpine	Atlantic	North Sea-Mediterranean	Rhine-Danube
Black Sea	Constanța	12	37	29	Koper, Ravenna, Trieste, Venezia		Koper, Ravenna, Trieste, Venezia	Burgas, Piraeus, Thessaloniki	Gioia Tauro, Marsaxlokk				
	Galați	0	0	0									

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