International Transport Forum

Decarbonisation, Coastal Shipping and Multimodal Transport

Summary and Conclusions

192 Roundtable

Decarbonising Transport Initiative

Decarbonisation, Coastal Shipping and Multimodal Transport

Summary and Conclusions

192

Roundtable

The International Transport Forum

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The Annex lists the names and affiliations of the 31 Roundtable participants from 15 countries.

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Table of contents

Executive summary 6

What is coastal shipping and how does it work? 9

Coastal shipping activities 9
Regional coastal shipping markets 10
Concentration and vertical integration 11

Coastal shipping's role in multimodal transport networks 13

How multimodal freight networks function 13
Connections between coastal shipping and multimodal transport 14

Decarbonising coastal shipping 16

Coastal shipping as a decarbonisation testing ground 16
The role of ports in decarbonising coastal shipping 20
The role of governments in decarbonising coastal shipping 21
The declining relevance of mode-shift policies 22

Coastal shipping and regional development 23

The potential role of coastal shipping in regional development 23
Decarbonisation as a regional economic opportunity 24

Maritime cabotage reforms 26

Understanding maritime cabotage systems 26
Justifications for maritime cabotage restrictions 28
Maritime cabotage reform and decarbonisation 28

References 30

Annex. List of Roundtable participants 33

Tables

Table 1. Countries that exclude foreign-flagged vessels from maritime cabotage 26

Table 2. Conditions for allowing foreign-flagged vessels to conduct maritime cabotage 27

Glossary

Bulk shipping	Maritime transport of cargo that is unpackaged (non-unitised). It is transported, loaded and unloaded in unpackaged form, usually in large quantities. Examples of bulk cargo include oil, coal, ores and grains.
Cabotage	Maritime transport of cargo between ports in the same country.
Coastal shipping	Maritime transport that takes place between ports on the same continent. Also referred to as intra-continental shipping, short-sea shipping, marine highways, coastal trade and coast-wide trade.
Dead-weight tonnes	Deadweight tonnage (DWT) is a measure of how much weight a ship can carry.
Feedering	Intra-regional maritime transport from or to a transhipment hub that, as such, feeds into the main trans-oceanic shipping routes.
Island transport	Maritime transport between islands and the mainland of a country or between islands in the same country.
Lo/Lo vessel	Vessel transporting unitised cargo that is loaded on and loaded off the ship with shore-based cranes.
Ocean shipping	Maritime transport that takes place between ports on different continents.
OPS	Onshore power supply (OPS) allows ships at berth to switch off their auxiliary engines while they are at berth for loading and unloading. Also known as alternative marine power (AMP) in some parts of the world.
Ro/Pax vessel	A Ro/Ro-vessel that also transports passengers. This is the case for most ferries.
Ro/Ro vessel	Vessel transporting unitised cargo that is rolled on and rolled off the ship with vehicles (e.g. trucks).
TEU	Twenty-feet equivalent unit (TEU); refers to a standard container with a length of 20 feet.
Shipper	The owner of the cargo being transported; the firm that drives demand for maritime transport.
Synchro-modality	The possibility provided by transport systems to switch in real-time between transport modes tailored to available resources.

Executive summary

What we did

This report outlines the most pressing challenges the coastal shipping sector currently faces and provides governments and policy makers with concrete actions to help address them. Coastal shipping – maritime transport that takes place between ports on the same continent – represents around half of the global shipping market. It is also crucial to the connectivity of island regions and regional development. Decarbonising coastal shipping presents both challenges and opportunities, as does the growing concentration of ownership in the maritime transport sector.

What we found

Coastal shipping receives relatively little attention from academics and policy makers, yet it represents a significant part of the transport sector, is of crucial importance for the connectivity of island regions and can contribute positively to regional development. However, coastal shipping must deal with the need to decarbonise – a significant development which presents both a challenge and an opportunity.

The coastal shipping market has become more concentrated in recent years: the market share of the top 10 operators in the container sector grew from 60% in 2006 to 78% in 2021. This reflects the growing integration of ocean and coastal shipping: the five largest container-shipping companies are now all operating as coastal-shipping companies and are among the top 10 intra-European operators. Vertical integration has taken the form of both the integration of ocean and coastal shipping and the integration of terminal and other logistics activities with shipping operation.

Coastal shipping is an important part of a more extensive multimodal transport system that includes road, rail and inland waterway transport. Ports are key nodes to facilitate multimodal transport. Some ports, such as Gothenburg or Hamburg, provide excellent rail-network connectivity. An essential ingredient for this connectivity is the possibility of consolidating cargo from different port terminals in a well-located intermodal facility.

Decarbonising coastal shipping requires substantial investments in new fleets and port infrastructure. At the same time, due to its distinct characteristics, such as the shorter distances involved and localised reach, coastal shipping can be a promising testing ground for zero-emission technologies, including electric-powered ships and alternative fuels such as methanol, which could then be applied to ocean shipping. However, the widespread adoption of such technologies will require substantial investments to adapt port facilities, including refuelling and charging infrastructure.

Coastal shipping provides regions with effective links to hub ports within the ocean shipping network, thus linking them effectively to global trade networks and playing an important role in supporting economic development. In the case of islands, coastal shipping is indispensable to get both access to global markets and the local goods, services and amenities that the mainland provides.

Decarbonisation could transform the regional development potential of coastal shipping. It will change the demand for maritime transport and lead to a global reconfiguration of energy flows. In this context, green energy production for alternative shipping fuels could provide a new development opportunity for some regions, especially those with potential for renewable energy generation. Demand for shipping fuels could complement local energy demand that could drive investments in renewable energy production.

The main operators in coastal shipping markets are large, vertically integrated shipping groups that operate on a global scale. Competition authorities face challenges to monitor and maintain competition in these concentrated shipping sectors, due to the global nature of the industry and the lack of data, mandate, and resources. In this context, many countries have been hesitant to liberalise maritime cabotage regulations, which have historically been adopted in pursuit of other policy goals, such as national security, but have sometimes reduced competition and service quality.

What we recommend

Include coastal shipping in national decarbonisation strategies

Given the significant role of coastal shipping in the broader maritime sector, and the sector's hard-to-decarbonise nature, governments should adopt decarbonisation policies for coastal shipping as part of their climate strategies. Governments should refer to coastal shipping in their Nationally Determined Contributions under the Paris Agreement and submit National Action Plans to the International Maritime Organisation.

Governments can help stimulate the demand for zero-emission coastal shipping by reforming their procurement processes, public service obligations, subsidies, and taxation policies. For example, subsidies to operators or public-service obligations could be made conditional on recipients meeting targets for the decarbonisation of the relevant coastal shipping fleets. Governments should also consider phasing out tax exemptions for conventional fuels in shipping and other sectors, as well as fiscal disincentives for zero-emission energy sources for shipping.

Support the sector's decarbonisation efforts by reducing investment uncertainty

The maritime shipping sector faces uncertainty regarding the decarbonisation of shipping. It is difficult to predict which energy source or sources will become dominant in the future, and the question of who will pay for the required infrastructure remains unanswered. Governments could enhance incentives for the decarbonisation of shipping by adopting more stringent levels of ambition at the intergovernmental level, particularly under the auspices of the International Maritime Organisation.

More specifically, governments can increase the commercial viability of zero-emission shipping by supporting the adoption of a global carbon-pricing scheme for shipping, in combination with a global fuel standard, which would provide clear guidance on the decarbonisation trajectory for the shipping sector. In addition, governments could spell out to what extent and under which conditions they will support investments in infrastructure required to deliver on decarbonisation targets, such as refuelling and recharging equipment in ports.

Harness the regional development potential of coastal shipping

Regional and local governments can play an important role in maximising the coastal shipping industry's contribution to regional development. Ports can play an important role in realising the goals of regional development strategies related to maritime service clusters, industrial development, and waterfront-based leisure. Ports, regional authorities, and other relevant stakeholders should align their strategies and planning processes to grasp the regional development potential of shipping.

For example, ports can attract the cargo flows necessary for economic activity, reserve dedicated space and equipment and guarantee smooth access to the appropriate port areas for the relevant land-based stakeholders. Regional and local governments can facilitate these strategies by introducing strategic zoning and land-use planning in the area around the port, creating networks of relevant stakeholders and enabling pilots and experiments.

Strengthen competition enforcement while leveraging maritime cabotage regulations

Governments should make sure that competition authorities are better equipped to monitor the state of competition in shipping and undertake enforcement activity as required, particularly considering the growing vertical integration of the sector. More international co-ordination between regulators could help prevent abuse of dominant market power in shipping, including in coastal shipping.

Stronger monitoring of competition in shipping could also increase pressure on countries to liberalise maritime cabotage. However, as most countries will likely keep the existing maritime cabotage regulations in place, these regulations could be better leveraged for economic development strategies and decarbonisation of coastal shipping. This could take different forms. For example, exemptions from cabotage restrictions could be granted to zero-emission ships, or other measures that use maritime cabotage regulation to decarbonise shipping fleets.

What is coastal shipping and how does it work?

This report defines coastal shipping as maritime transport that takes place between ports on the same continent (i.e., intra-continental shipping) in contrast to ocean shipping or trans-continental shipping that crosses oceans and connects different continents. Coastal shipping operations take place in many countries and in different market segments. This chapter briefly introduces the different types of coastal shipping according to their functions, cargo types and commodities. It then sets out some regional specifics and highlights the two main tendencies in coastal shipping markets: concentration and vertical integration.

Coastal shipping activities

There are three ways to categorise coastal shipping activities: according to their function, cargo type, and main commodities transported.

Functional categories

While coastal shipping represents around half of the total global shipping market in terms of tonnes transported (Garratt, Teodoro and Adshead, 2022), it is not a single market, but rather a collection of different markets with different functions. The two main functions of coastal shipping worldwide are feedering and intra-regional transport.

Feedering is a term that describes intra-regional maritime transport from or to a transhipment hub that feeds into the main trans-oceanic shipping routes. Although the cargo transported might have crossed oceans, when it is transhipped from an ocean-going vessel to another ship (the feeder ship), the voyage of this last ship is regarded as intra-regional shipping. This illustrates that distinctions between different forms of coastal shipping are not always clear cut.

Intra-regional transport trades occur exclusively within the same region. In other words, the cargo's origin and destination are in the same region and the cargo does not cross oceans (in contrast to cargo transported via feeder shipping). Intra-regional transport includes cabotage – sea transport between at least two seaports located in the same country and island transport.

Island transport is defined as transport to and from islands within a given country. It is a distinct category because the traffic is captive, contrary to most other coastal shipping activity that competes – to a greater or lesser extent – with land transport modes, such as trucking and rail transport.

In practice, coastal shipping activities are often hybrids of these conceptual categories. For example, coastal shipping companies might transport feeder cargo, pure intra-regional cargo and cabotage cargo on the same ship. These hybrid activities make data collection complex. For this reason, it is currently impossible to calculate the exact shares of the different functional categories within the coastal shipping market.

Cargo types

Shipping cargo can be distinguished according to whether it is transported in packaged form (unitised), or unpackaged (as bulk cargo). An example of unitised cargo is containerised cargo, whereas examples of bulk cargo can be further grouped as liquid bulk (e.g. crude oil) or dry bulk (e.g. coal, ores and grains). Unitised cargo can be loaded on and off (Lo/Lo) ships with cranes. Ships with this load-on/load-off cargo are called Lo/Lo-ships. Unitised cargo can also be rolled on and off ships (e.g. in truck trailers). Ships with this roll-on/roll-off cargo are called Ro/Ro-ships. Ships that can combine Ro/Ro-traffic and passengers (including most ferries) are called Ro/Pax-vessels.

Bulk transport makes up a substantial part of coastal freight shipping activity. Bulk transport represented 78% of tonnes transported by coastal ships in 2021, with the remaining 22% comprising unitised cargo transported in containers or other standardised units. The most important bulk coastal trades are in dry bulk (28% of tonnes transported in coastal shipping), crude oil (13%), liquid bulk (13%) and gas (6%) (Garratt, Teodoro and Adshead, 2022). In addition, a considerable part of coastal shipping is dedicated to passenger transport, often in combination with cargo.

Commodity groups

A third way to categorise coastal shipping is according to the main commodity group, using the Standard International Trade Classification (SITC) as elaborated by the United Nations Statistics Division (UN, n.d.). Around 41% of tonnage transported by coastal shipping in 2021 was “mineral fuels, lubricants and related materials”. Other important categories included “crude materials inedible except fuels” (18%), manufactured goods (15%), chemicals and related products (10%) and food and live animals (10%) (UN, n.d.).

Regional coastal shipping markets

Europe and the Mediterranean comprises the world’s largest coastal shipping market. In 2021, activities in this region represented around 3 billion tonnes in intra-regional cargo, approximately 46% of the total world market for coastal shipping. Other smaller markets were the Far East (23%), North America (17%) and the Gulf region and the Indian subcontinent (9%). Latin America (3%) and Sub-Saharan Africa (2%) were the regions with the smallest amounts of coastal shipping in 2021 (Garratt, Teodoro and Adshead, 2022).

One of the most likely reasons for Europe’s large coastal shipping market is the fact that European Union operators may provide coastal shipping services everywhere in Europe. Their sphere of activity also includes maritime transport between two or more ports in the same country (maritime cabotage), an activity that is traditionally highly protected.

Since 2006, the regions with the fastest growth in coastal shipping have been the Gulf region and Indian subcontinent, where volumes have tripled in size, and the Far East, with a 60% increase (Garratt, Teodoro and Adshead, 2022). Overall, the coastal shipping market has increased by around 40% in terms of tonnes transported. During the same period, ocean shipping grew by 60%.

The growth of coastal shipping in the period 2006-21 was driven by strong growth in dry bulk, unitised cargo, liquid bulk and general cargo, whereas crude oil and gas volumes remained flat (Garratt, Teodoro and Adshead, 2022). In the unitised intra-European sea cargo market, the Lo/Lo-sector showed considerable growth. Between 2006 and 2021, its annual deployed capacity increased by 41%, compared to 15% for the Ro/Ro-sector.

Concentration and vertical integration

The coastal shipping market has become more concentrated in recent years, particularly in the Lo/Lo and Ro/Ro segments. In the Lo/Lo-sector, the market share of the top 10 operators grew from 60% to 78% in the period 2006-21. In the Ro/Ro-sector, the top 10 market share increased from 51% to 67% over the same period. The three largest Lo/Lo-operators (in terms of deployed capacity) are MSC, CMA-CGM and Maersk. The three largest Ro/Ro-operators (including RoPax) are DFDS, Stena and DP World (through P&O Ferries). (Garratt, Teodoro and Adshead, 2022).

This increased market concentration is related to the integration of ocean and coastal shipping. The five largest container shipping companies (MSC, Maersk, CMA CGM, COSCO and Hapag Lloyd) all operate as coastal shipping companies – and feature in the top 10 intra-Europe operators. These five operators all strongly increased their coastal shipping capacity between 2006 and 2021, either by investing in ships deployed on the intra-Europe trade, or by acquiring coastal shipping operators. For example, in 2018, CMA CGM acquired the intra-Europe operator Containerships (CMA CGM, 2018).

Increases in the average size of ships used for containerised ocean shipping have cascaded down to coastal shipping. Since 2006, the average ship size has more than doubled from 776 standard containers, as measured in 20-feet equivalents (TEU), to 1 652 TEU in 2021. On average, the largest containerships used for coastal shipping are now active in Latin America (where the average capacity is 2 081 TEU) and the Gulf region and Indian subcontinent (with an average TEU capacity of 1 809 in 2021).

In addition to the integration of ocean and coastal shipping, terminal activities have also experienced vertical integration. In the container segment, the main carriers (or their subsidiaries) have all emerged as major terminal operators: Maersk via APM Terminals, MSC via TIL, CMA CGM via CMA CGM Ports and Terminal Link, and COSCO via COSCO Ports. In the Ro/Ro-sector, the main shipping operators – such as DFDS and Stena – also operate their own terminals. An atypical example of vertical integration in the coastal shipping segment is the activity of terminal operator DP World, which managed to secure top-10 market shares in both the Lo/Lo- and Ro/Ro-sector by acquiring Unifeeder and P&O Ferries.

Integration of coastal shipping activities is part of a wider trend of vertical integration. It is essentially driven by large ocean-container carriers that have extended their operations from shipping and terminal operations to port services (particularly towage), logistics operations, warehousing, e-commerce, freight forwarding, hinterland transport and even air freight. Even if the large carriers do not operate all these activities themselves, they often have huge leverage. For example, the members of the 2M Alliance (Maersk and MSC) directly or indirectly contract for 50% of the United Kingdom's container rail services. Some terminal operators (e.g. Hutchison Ports and MSC) are active in hinterland transport, whereas others (e.g. PSA) have chosen to become active in logistics and forwarding.

Vertical integration can improve the efficiency of the transport chain but can also reduce competition. Integration can improve interfaces (e.g. between ocean and coastal shipping), leading to smoother networks with shorter waiting times. In the coastal shipping sector, integration with the ocean shipping sector implies that feeder operations will get priority over pure intra-region trades. Therefore, the results for shippers could be mixed, depending on whether they predominantly export to or source from within a single continent or across continents.

Moreover, vertical integration entails the risk that firms will use their market dominance in one sector (e.g. containerised ocean shipping) to force their customers to buy their services in another market (e.g. coastal shipping). The main container carriers have been clear about their ambitions to become global integrators in the container sector, providing integrated door-to-door solutions. This could limit shippers' choices. Vertical integration could lead to less transparent pricing of coastal shipping, as vertically integrated carriers will offer a "door-to-door"-price in which coastal shipping is not necessarily priced separately.

Coastal shipping's role in multimodal transport networks

Coastal shipping is part of a wider multimodal transport system, bringing together different transport modes that partly compete with and complement each other. The challenge for transport policy makers is to ensure that the users (shippers) have access to efficient and cost-effective transport options while managing safety, congestion, and environmental issues (including climate change). This section discusses the structures that enable this multimodal transport network to function. It outlines the costs of different modes, coastal shipping's connection to multi-modal land transport, and the levers policy makers have at their disposal to address safety and environmental issues.

How multimodal freight networks function

Intra-regional freight networks can combine up to six freight transport modes: road, rail, inland waterways, short-sea shipping, short-haul air transport, and pipelines. Although many policy initiatives have sought to promote specific transport modes (e.g. coastal shipping) and discourage others (e.g. road transport) via mode-shift policies, shippers and logistics providers usually face a choice between different logistics solutions that combine several modes.

Containerisation has increased the potential for multimodal transport, as it has reduced the time and costs of transferring cargo from one freight transport mode to another. Some places try to design transport systems and networks that enable transport stakeholders to switch in real-time between transport modes tailored to available resources (synchro-modality); this could increase the resilience of a transport network, as it would enable operators to shift mode in case of delays or disruptions to a specific infrastructure. In this situation, modal combinations and operational schedules can be changed after the shipment is on the way, in response to new information (ITF, 2022a).

Studies on the transport demands of shippers identify costs, transit time, reliability and frequency as the main determinants of transport mode choice (ITF, 2022a). The extent to which these demands can be met depends on geography and on infrastructure supply, which cannot be changed in the short term, but can be influenced by government policies. Such policies can have different aims, including fostering connectivity, environmental sustainability, safety, and economic development.

Various countries have formulated targeted multimodal policies. These have supported rail transport, inland water transport and coastal shipping via financial incentives, regulation, infrastructure provision and other measures. Many government policies aim to reduce the cost differences between road transport and alternative transport modes. These policies frequently compensate for the fact that external costs vary between different transport modes. Instruments to accomplish this objective include financial incentives such as subsidies (e.g. mode-shift subsidies), taxation (e.g. fuel taxes), charges (e.g. road tolls), pricing (e.g. congestion charges) and regulating externalities (e.g. fuel-emission standards).

However, these policies are not always aligned. Despite measures aimed at stimulating non-road modes, most governments simultaneously continue to support road-freight transport by applying fuel-tax exemptions and failing to levy adequate charges to recover the high costs of pavement damage caused by heavy-goods vehicles. While numerous countries have formulated multimodal policies that aim to shift cargo from road to other transport modes, only a few ITF countries – notably Austria, Italy, and Slovenia – have managed to increase the share of non-road modes in freight transport (ITF, 2022a).

The competitiveness of certain combinations of transport modes is highly dependent on the specific characteristics of the cargo and cargo flow, such as the distance between origin and destination, the commodity type and shipment size. For example, rapid transit times are essential to shippers (cargo owners) of time-sensitive goods. These include perishable goods (e.g. fresh food), goods that rapidly lose market value over time (e.g. clothing and computer components), and goods where urgent delivery is required (e.g. Covid-19 masks or replacement parts). These goods are typically transported by the more rapid transport modes, such as aviation and road transport. Rail and sea transport are generally slower modes, used for less time-sensitive goods. The reliability of transport services is of great importance for shippers deploying just-in-time supply chain strategies (ITF, 2022a).

Road transport often corresponds well to the demands of shippers in terms of reliability, flexibility, accessibility, and shipment size. Rail freight is often cheaper per transported tonne but can also create additional costs in the logistics systems of shippers. Rail transport is attractive mostly for bulk commodities carried over long distances, while trucking demand is for shorter distances. Longer distances facilitate economies of scale and the bundling of flows. They also generate fewer intermodal handling costs (changing from one mode to another) relative to the total voyage cost. In addition, large cargo volumes make it possible to realise economies of scale in capital-intensive vehicles. In other words, multi-modal transport is feasible for short and medium distances if the volume is large and if the drayage distances (i.e. distance from port to destination) at origin and destination are low (ITF, 2022a).

Within coastal shipping, Lo/Lo- and Ro/Ro-transport have different characteristics that make them appropriate for different cargo types. These different characteristics have consequences for the various multimodal transport possibilities. Ro/Ro-transport, for instance, is generally more regular and frequent than Lo/Lo transport. At the same time, containers are generally easy to load on train wagons with twist locks, whereas the rail technology needed for transporting semi-trailers (used in Ro/Ro-transport) is more complex, requiring costly additional equipment (Woxenius and Bergqvist, 2011).

Connections between coastal shipping and multimodal transport

The quality of infrastructure networks is determined by the way in which modal and nodal infrastructures are linked together. Modal infrastructure includes roads, railroads, inland waterways and fairways, whereas nodal infrastructure refers to the points at which modal shift occurs, including terminals, ports, airports and dry ports. The potential effectiveness of multimodal transport is often largely dependent on how well nodes are connected to modal infrastructure. For example, several ferry companies, such as Stena Line and CLdN Cargo, can connect the sea voyage with train connections to the hinterland. Ports without on-dock railway connections or barge terminals will have considerably more difficulties shifting port hinterland cargo to trains or barges than ports with such connections.

Ports are crucial nodes that facilitate multimodal transport. Some ports, such as Gothenburg and Hamburg, have managed to create excellent connectivity with rail networks, resulting in most of the containerised hinterland cargo being transported via rail. Other ports, such as Antwerp and Rotterdam, transport a large share of their hinterland cargo via inland waterways. The essential ingredient for this type of sustainable hinterland connectivity is the ability to consolidate cargo from different terminals in a well-located intermodal facility. The recent terminal reconfiguration in the port of Gothenburg has improved its ability to act as a node.

Further information exchange and digitalisation could improve the connectivity between coastal shipping and multimodal inland transport. Stakeholders in the maritime transport chain have launched digitalisation initiatives to improve information exchange and resolve bottlenecks, including in connectivity (Tradelens, 2019; DCSA, 2019).

For example, the Digital Container Shipping Association (DCSA) initiated the Just-in-Time Port Call Programme to establish digital standards for the port call process. The Port of Hamburg cluster, consisting of the Hamburg Port Authority, the Hamburg Vessel Coordination Center, CMA CGM, Evergreen and Hapag Lloyd, has implemented the programme's first proof of concept. Digitalisation projects such as this could be leveraged towards improving the connectivity of coastal shipping and land-based transport modes (Bagge, Zuesongdham and Hirt, 2022).

Vertical integration could also help to improve connectivity between coastal shipping and other modes of transport. It eliminates transaction costs and improves the interfaces between different parts of the transport chain, including digital data integration. It could facilitate the smooth interface between different transport modes when these are controlled or operated by the same operator.

At the same time, vertical integration could also reduce the flexibility and resilience of the same chain. Moreover, it may create dominant market positions if a pivotal component of the supply chain (i.e. the carrier) controls upstream and/or downstream activities of the chain, therefore reducing competitiveness of non-integrated market players (Merk, Hoffmann and Haralambides, 2022).

Decarbonising coastal shipping

The climate emergency manifests itself in a rapidly increasing number of extreme weather events with devastating consequences in many parts of the world. There is also increasing evidence that the world has reached crucial climate tipping points that could imply accelerated global temperature rises and accompanying extreme weather events (UN, 2022; OECD, 2022). Mitigating climate change will require decarbonisation of many economic sectors – including coastal shipping.

Shipping, both coastal and inter-continental, is often described as difficult to decarbonise. The reason for this difficulty is that the shipping sector consists of a large amount of capital-intensive fixed assets with long lifespans, which makes a transition to zero emissions both long and costly. In addition, while alternative-fuels for light road vehicles are at an advanced stage of development, it remains unclear which fuel or fuels will provide practical and competitive alternatives to traditional ship fuels. Nevertheless, the urgent need to act to address the climate crisis implies that action must be taken in all sectors, including those that are hard to decarbonise.

Ocean and coastal shipping share many common features and interlinkages. However, coastal shipping has distinct characteristics that make it a fruitful “laboratory” for experimentation with zero-emission technologies that could subsequently be adopted in ocean shipping. Port adaptations are essential to coastal shipping’s ability to play this role as a decarbonisation frontrunner. At the same time, the decarbonisation of other freight transport modes, including road and rail freight, is also accelerating. If shipping fails to decarbonise, arguments for modal shift from road to coastal shipping – and the justification for mode-shift policies – will become less valid. However, decarbonising the coastal shipping sector requires fundamental, systemic change.

Coastal shipping as a decarbonisation testing ground

Coastal shipping is more suited to decarbonisation than ocean shipping for at least two reasons. First, the shorter distances involved imply that coastal ships can refuel (or recharge, in the case of batteries) more frequently. This means that the cargo space taken up by fuel tanks or batteries can be smaller than would be necessary on ocean-going ships. This difference is significant because many alternative fuels have less energy density than conventional ship fuels, meaning that tanks for alternative fuels need more onboard space. Consequently, ships engaged in coastal shipping activities could potentially deploy certain technological solutions that are not immediately feasible for ocean shipping.

A second reason why coastal shipping is more suited to decarbonisation is that coastal shipping markets are regional, and often local. This means that individual countries have much more leverage over these markets than they have over ocean shipping, which is a global market requiring global regulation. Whereas regulations on the decarbonisation of international shipping require the consent of International Maritime Organisation (IMO) member states, decarbonising coastal shipping requires the co-ordination of several countries at most.

However, two features of coastal shipping may make decarbonisation more difficult. The first is coastal shipping's competition with land-based transport modes, and its consequently higher demand elasticity, relative to ocean shipping. Coastal shipping often struggles to be cost-competitive with trucks (ITF, 2022a) and decarbonisation will likely increase the costs of coastal shipping. This may make it still more challenging to compete with trucks, although the road-freight sector may well face similar (or higher) costs due to decarbonisation policies.

A second feature, especially relevant for ferries, is coastal shipping's more direct links with customers. As a substantial share of customers care about environmental and social corporate responsibility, ferry companies will need to advance on decarbonisation to remain attractive to these customers. The pressure from customers can be an important driver of decarbonisation measures for ferry lines (Christodoulou and Cullinane, 2021). However, other customer demands, such as reasonable cost, reliability, and high service frequency, must be balanced against this decarbonisation imperative.

Despite these complicating factors, coastal shipping's distinct characteristics make it a promising testing ground for zero-emission technologies that could subsequently be applied to ocean shipping. Indeed, there are several examples of innovations that were pioneered in coastal shipping, including liquified natural gas (LNG)-propelled vessels and biofuels, as well as container shipping and steam shipping (ITF, 2018a, 2018b). The crucial question is which emerging decarbonisation measures can be applied most effectively in the coastal shipping sector.

Decarbonisation measures in the ocean shipping sector have so far essentially focused on improving the energy efficiency of ships. At the international level, this has taken the form of energy efficiency regulation for new ships (in place since 2015) and existing ships (to be operational in 2023), as regulated by the International Maritime Organisation (ITF, 2022c). Other measures with significant potential to further decarbonise shipping relate to ship speeds and alternative propulsion systems. Measures to reduce ship speeds could be deployed in the short term, whereas the transition to low- or zero-emission fuels and energy sources will take more time but will potentially have more significant emission-reduction effects. The following subsections explore each of these measures in turn.

Reducing ship speeds

Lower speeds reduce fuel consumption and emissions. Ship operators can have incentives to slow down as this reduces their fuel costs, particularly if fuel prices are high and freight rates are low. At the same time, operators often also have contractual obligations in terms of lead times, which limits the possibility of slowing down. Moreover, when speed is reduced, additional vessels might also be required to maintain annual transport capacity (ITF, 2018).

One advantage of measures to reduce ship speeds is that they can be implemented in the short term. However, the suitability of such measures varies according to the coastal shipping segment. For example, the lion's share of coastal shipping is in bulk shipping. Most bulk products are not time-sensitive, so bulk shipping operators would not risk losing assignments. Moreover, speed reductions could help reduce overcapacity (where it exists) in this segment.

By contrast, there are few possibilities to reduce ferry ships' speeds. They work with detailed and well-planned timetables and customers appreciate speedy and punctual travel. Similarly, Ro/Ro-shipping generally competes with trucks or is part of intermodal transport packages with trucks. Therefore, speed reductions would reduce the attractiveness of this segment. Finally, the transport of perishable and refrigerated goods is highly time-sensitive, so would not lend itself to substantial speed reductions.

Several policy tools exist which could be used to implement this measure. First, the IMO's 2018 Initial GHG Strategy – which is the official strategy of the IMO and its member countries to reduce greenhouse gas (GHG) emissions from shipping – identified global regulation of ship speed as a short-term candidate measure for reducing the sector's greenhouse gas emissions (IMO, 2018). Despite support from a substantial number of IMO members for this measure, no consensus was reached, as numerous countries feared its negative impacts on the competitiveness of their exports of perishable agricultural goods.

Second, individual jurisdictions can introduce local regulation of ship speed in ports and territorial waters. For example, various ports in the United States, such as Los Angeles, New York/New Jersey and San Diego, have established vessel speed-reduction zones, extending 20 to 40 nautical miles from the port area, with speed limits between 10 and 15 knots.

A third type of measure involves indirectly facilitating speed reduction. For example, carbon pricing would likely slow down the speed of ships engaged in global shipping operations. This, in turn, could lead to a 50% reduction in emissions from the global shipping sector (ITF, 2022c). The emission-reducing effects of carbon pricing are more significant if the geographical coverage of the carbon price is global. In the case of regional schemes, ships slow down in the region where a carbon price is applied but make up for lost time by speeding up outside that region (ITF, 2022c).

Finally, ship-speed optimisation aims to reduce waiting times, by ensuring that ships adjust their speeds to arrive just in time for assigned slots for port services and terminal handling. This measure would reduce the energy consumption of auxiliary engines during these waiting periods. But it would require flexible planning, better collaboration and data exchange between the main stakeholders. The advantage of introducing ship speed optimisation in coastal shipping is that the risk of unpredictable delays (both at sea and in foreign ports) is less than it would be for ocean shipping. However, with schedule reliability at 30% and average ship delays of seven days (ITF, 2022b), ship speed optimisation in global container shipping seems, for the moment, to be a distant prospect.

Electric-powered fleets

Like reductions in ship speeds, the electrification of ships using batteries or fuel cells is a measure that can be implemented immediately. Electric-powered ships offer the possibility to fully decarbonise shipping – provided the electricity and fuel-cell fuels come from renewable sources. Battery-powered ships are relatively feasible for coastal shipping, particularly for ferries, which have regular patterns connecting only a few ports. Therefore, the required investments are relatively small and predictable. Moreover, distances are short, and ships are relatively small, so the space onboard that is lost to batteries is also minimal.

In recent years, numerous ferry connections have been electrified in Asia, Europe and the United States. Norway currently has around 40 electrified ferry connections, with battery-powered ships and charging systems in ports. Two other Scandinavian countries, Denmark and Sweden, have also introduced battery-powered ferries. Electrification is not limited to ferry connections. In China, Shanghai Pan-Asia Shipping will operate electric feeder container vessels on the Yangtze River in 2023. The 120-metre-long ships will have a capacity of 700 TEU and will be powered by batteries located in 36 20-foot containers that can be charged with 50 000 kilowatt-hours (kWh) of electricity using shore power (Chambers, 2022).

There are currently two methods for charging ship batteries. The first method involves replacing batteries when the ship is in port, with battery blocks placed in containers that can be easily loaded and unloaded. The second method consists of charging the batteries – that are fixed onboard – when the ship is in port. This method requires rapid charging equipment in the port and is particularly relevant for ferries that operate on fixed-time schedules with relatively limited time in ports. Installing electric charging systems in ports poses challenges related to extending access to the grid and ensuring that it can support the charging demand.

Batteries on ships can be charged using onshore power supply (OPS), also known as alternative marine power (AMP) in some parts of the world. OPS allows ships at berth to switch off their auxiliary engines while they are at berth for loading and unloading. OPS systems were first installed in ports in the 1990s and their use has rapidly expanded over the past two decades. The main objective of OPS is to reduce ships' air emissions in ports, and it has been effective in ports where ships have used such facilities. However, shore power also has important co-benefits: switching off auxiliary ship engines reduces the nuisance from ship noise for both citizens and animals, including dolphins and whales (Merk, 2014).

Wind-powered vessels

The uptake of wind-assisted vessels is increasing. There were 25 wind-assisted vessels in operation by the end of 2022. This number will double in 2023, reaching around 3 million deadweight tonnes of shipping capacity. In 2024 the first ship with wind as its primary energy source will become operational. The emission reductions from wind-assisted ships can be considerable, particularly for large rotor sails on routes with favourable winds. Projects with Scandlines and Sea-Cargo with rotor sails of 30 metres and 35 metres, respectively, showed possible emission reductions of up to 20-25% in favourable conditions. Like batteries, wind-assisted equipment has seen falling prices and increased optimisation.

Liquified natural gas-powered fleets

An increasing number of operators are using LNG to propel coastal ships, particularly in Japan and Northern Europe. LNG was first used in coastal shipping in the 2000s before being deployed on longer routes and ocean shipping. LNG can reduce carbon dioxide (CO_2) emissions from ships by between 5% and 30% compared to heavy fuel oil (Bouman et al., 2017).

However, the handling and combustion of LNG releases unburnt methane (via a process known as methane slip) which can diminish its overall environmental advantages. Methane is a very potent GHG with global warming potential 28 times higher than CO_2 for 100 years and 84 times higher over 20 years (Anderson, Salo and Fridell, 2015). Levels of atmospheric methane rose rapidly during the 2010s, with five-year average growth rates not seen since the 1980s. In addition, annual anthropogenic methane emissions are projected to be about 25-40 megatonnes larger in 2030 than in 2020 (UNEP/CCAC, 2022).

Methane slip can occur either during the bunkering phase or upstream in fuel production, processing and transmission, further lowering its GHG-mitigation potential. For this reason, many observers have cautioned against using LNG and considered LNG-propelled vessels to be "stranded assets". In addition, the shift in Europe from Russian gas to other suppliers has meant an increase in methane slip, as new gas supplies (e.g. US shale gas) are associated with higher upstream methane slip.

Methanol-powered fleets

Methanol is a promising future marine fuel. Most methanol is currently produced from natural gas and can reduce CO_2 emissions by around 25% compared to heavy fuel oil on a tank-to-wake basis. However, methanol can also be produced from renewable energy resources, which could reduce its GHG emissions to zero. Methanol is convenient because it is similar to current fuels in several respects, requiring only minor modifications to ships and bunkering infrastructure. Methane can also be used in the type of combustion engines with which most ships are already equipped (ITF, 2018b).

One coastal shipping company, Stena, has been at the forefront of developing methanol-powered ships. With support from the EU’s Motorways of the Seas programme, Stena converted a RoPax vessel, the *Stena Germanica* operating between Gothenburg and Kiel, into a methanol-powered vessel in 2015 and provided bunkering facilities in ports. In addition, the company partnered with Wärtsilä for engine retrofitting and installed new tanks using void spaces at the bottom of the ship. This is considered a safety concern with conventional fuel but does not pose a risk when using methanol (ITF, 2018a).

For the project to get the go-ahead, the IMO had to include methanol as ship fuel in the International Gas Carrier Code (IGC Code) for ships. Although the conversion cost EUR 22 million, Stena expects significant cost reductions, amounting to around two-thirds of fuel costs once it applies the conversion and retrofitting to several ships at the same time. It is currently looking into ways to develop production based on biomass so that it fully achieves its GHG-emission reduction potential. The company has also developed a toolkit for converting ships to methanol to support replication (ITF, 2018a). Since the pilot project, ended several shipping companies have ordered methanol-powered ships.

Ammonia-powered fleets

Ammonia is considered one of the key alternative shipping fuels of the future. Many shipping companies have ordered ships that will be able to run on ammonia, often as a hybrid solution with conventional fuels. Ammonia is considered attractive because of its high emission-abatement potential in combination with its relatively low costs, aiding its commercial viability.

Despite its perceived commercial attractiveness, there are significant safety issues with ammonia. It is highly toxic, and leakage of even small quantities can have lethal effects. Demolition of ammonia carriers at the end of their life cycle has resulted in significant toxic waste. There are also serious concerns related to the safety of seafarers and the environmental impacts of the leakage of ammonia. The number of accidents involving ammonia in the refrigeration industry is also not reassuring (Luo et al. 2022).

Considering the safety concerns related to ammonia, it seems unlikely that it can be deployed on most coastal shipping routes that are, almost by definition, close to inhabited areas. At the current stage, it appears highly risky to utilise ammonia as ship fuel on passenger ships or to have ammonia-fuelled ships call ports close to cities – which are often the smaller ports and ports used for coastal shipping.

The role of ports in decarbonising coastal shipping

Ports are major stakeholders in decarbonising coastal shipping because they can provide the necessary refuelling and charging infrastructure. This infrastructure is necessary because ships cannot operate on zero-emission fuels or batteries without regular refuelling or recharging. The existing refuelling infrastructure can only be used or adapted to a limited extent. In fact, it is appropriate for the current conventional ship fuels (heavy fuel oil and marine distillates), but not for alternative fuels such as hydrogen and ammonia (ITF, 2018a; Raucci et al., 2020; World Bank, 2021).

Ports could also benefit from their position as nodes bringing together different transport modes, all of which are expected to decarbonise. Ports could reinvent themselves as places where not only ships recharge or refuel, but also trucks. The challenge for port operators will be to develop refuelling or recharging structures that have multiple uses.

Despite the potential for ports to facilitate the decarbonisation of coastal shipping, a great deal of uncertainty exists regarding the business and funding models. For example, it remains unclear which alternative fuel or energy source will become predominant in the future. Faced with this uncertainty, ports will be reluctant to install refuelling infrastructure for fuels that might not be used. Some port operators have dealt with this uncertainty by developing flexible structures, such as refuelling barges, instead of permanent structures that would incur higher fixed costs.

There is also uncertainty about who will pay for the investments in refuelling and recharging infrastructure. An appropriate funding principle to apply would be "user-pays", which happens when shipping companies equip their terminals with the relevant infrastructure and equipment. Another application of the "user-pays" principle would be for ports or other authorities to recover their investments via user fees. At the same time, actors such as the EU and national governments already support many refuelling and recharging infrastructure initiatives. One prominent example is the massive roll-out of battery recharging infrastructure in Norwegian ports, which has been financed by public authorities (ITF, 2020).

The role of governments in decarbonising coastal shipping

Despite their regional or local character, relatively few governments have defined decarbonisation policies for coastal shipping. Only 19 of the 194 Nationally Determined Contributions (NDC) made as part of the Paris Agreement process mention maritime transport or define concrete measures to decarbonise maritime transport (ITF, n.d.). According to the ITF's Transport NDC Tracker, most of the countries that mention maritime transport in their NDCs are in Asia, the Pacific and sub-Saharan Africa (ITF, n.d.).

The IMO's Initial GHG Strategy lists developing national action plans (NAP) to deal with the decarbonisation of international shipping as a short-term candidate measure. Seven countries have now submitted a national action plan to the IMO: Finland, India, Japan, Marshall Islands, Norway, Singapore, and the United Kingdom (IMO, 2020).

From 2024, EU-related maritime transport will be covered by the EU Emissions Trading System (EU ETS). This ensures that the EU economy-wide cap on emissions is met, and that reduction efforts are allocated most efficiently across all the sectors covered under the ETS. Revenues generated by maritime transport under the EU ETS will be redirected to support investments in the decarbonisation of the sector via the Innovation Fund.

In practice, a considerable part of coastal shipping will be exempted from the EU ETS, considering that it applies to ships with a gross tonnage (GT) of 5 000 GT, whereas a substantial number of of coastal ships have smaller cargo carrying capacity. Moreover, the EU ETS regulation makes it possible to exempt island shipping.

In addition to the EU ETS, a new initiative, the FuelEU Maritime Regulation (which becomes applicable in 2025) aims to establish a gradual increase in demand for clean fuels for maritime transport by setting gradually increasing targets for reducing the GHG intensity of the energy used onboard ships.

These two initiatives are complementary. While the ETS targets energy efficiency, FuelEU will ensure the uptake of cleaner fuels and energy. The supply and distribution infrastructure of low-carbon renewable fuels is covered by other elements of the Fit for 55 package – namely, the Renewable Energy Directive and the Alternative Fuels Infrastructure Regulation. The EU also supports the decarbonisation of maritime transport through research and innovation programmes, notably with the objective to develop and demonstrate deployable zero-emission solutions for all main ship types and services by 2030 (ITF, 2022c).

National governments could be more pro-active in developing policies to decarbonise coastal shipping. These policies could take different forms. For example, governments could shape the demand for zero-emission coastal shipping via procurement, public service obligations, subsidies and taxation. Several countries already provide subsidies for coastal shipping services or grant specific companies the right to operate certain coastal shipping services. The transition towards zero-emission shipping could form part of the conditions for such subsidies or licences to operate these routes.

Zero-emission coastal shipping could also be stimulated via tax reform. Most countries have tax arrangements that explicitly or implicitly subsidise the use of fossil fuels (OECD, n.d.). Terminating these tax exemptions would help stimulate coastal shipping. In cases where policy makers consider ending fuel exemptions unfeasible, they could consider starting by tackling disincentives for using cleaner solutions. For example, ship fuel is exempt from taxation almost everywhere, whereas onshore power is taxed, meaning that ship operators often have financial incentives to keep using ship fuels when at berth, instead of shore power.

Even in countries where shore power is exempted from taxation, there might be complications. Sometimes, electricity at berth is exempted from taxation, but electricity for propulsion is fully taxed. This is complicated because operators cannot always split electricity use for both purposes.

The declining relevance of mode-shift policies

Many countries have either deployed explicit mode-shift policies or developed measures to stimulate specific freight transport modes, such as coastal shipping, at the expense of other modes, particularly road freight transport. Such policies often have multiple goals. This policy is designed to address other external costs arising from road freight transportation (e.g. noise, congestion, traffic accidents, well-to-tank emissions, and loss of habitat) in addition to those strictly connected with GHGs and air pollution.

However, mode-shift policies have limited impact on GHG-emission reductions. Specific technology scenarios might render mode-shift policies to reduce GHG emissions ineffective. A scenario in which road-freight transport will have transitioned towards zero-emissions before sea transport is likely, considering the much lower average lifespan of trucks compared to ships. In such a scenario, generic modal shift policies are no longer effective instruments for achieving emission reductions, as they could lead to a shift away from the mode that performs best in reducing emissions (ITF, 2022a).

For example, a recent study on mode choice in freight transport in Sweden modelled possible GHG emissions and air pollution from modal shift policies in the future and concluded that, by 2040, modal shift policies might result in net increases in GHG emissions, rather than the intended decreases (Johansson, Vierth and Holmgren, 2021).

Coastal shipping and regional development

Coastal shipping caters to a wide variety of regions. In hub-port regions, for instance, coastal shipping provides maritime links with the spokes of the hub-and-spoke network. As such, maritime links via coastal shipping can offer hub port regions the maritime connectivity that makes the port region a central node. In more peripheral coastal regions, coastal shipping often provides links to global networks, and, as such, the possibility of being connected to global trade. In the case of islands, coastal shipping is indispensable for access to global markets and the local goods, services and amenities that the mainland provides. This is particularly relevant for remote islands that are not large enough to be self-sufficient. As such, the impacts of coastal shipping differ hugely between regions, with varying degrees of dependence on coastal shipping and different ramifications according to port size.

The potential role of coastal shipping in regional development

Shipping activity in ports can be a driver of regional economic development. Ports with good maritime connections can help regional firms develop their imports and exports. The presence of various cargo types in ports also lead port regions to specialise in certain economic activities. Coastal shipping – like trans-oceanic shipping – can be a driver of such economic development opportunities.

Maritime transport can drive three types of economic activities in port regions:

1. **Maritime services**, including cargo handling and logistics, but also ship finance, marine insurance, consultancy and engineering. Maritime service clusters are generally based in places with a rich maritime heritage, but do not necessarily require much shipping activity. Economic activities related to coastal shipping, including management, fuelling and provisioning services, are part of such maritime clusters.
2. **Heavy industries**, including petro-chemical industries. Heavy industries are usually driven by bulk cargo traffic transported by oil tankers, chemical tankers and coal carriers. In many cases, this maritime transport is coastal shipping, for example between offshore exploration sites and refining and production facilities in coastal regions.
3. **Waterfront-based leisure activities**, which are often based in former port areas that have been redeveloped (OECD, 2014). Coastal shipping activities, such as ferry services, often form part of regional waterfront economic activities.

Grasping the regional development potential of shipping is often dependent on the alignment of strategies and planning carried out by ports, regions and other relevant stakeholders. Ports can create the circumstances for attracting certain cargo flows necessary for economic activity, for example by ensuring that dedicated space and equipment is available and that the relevant land-based stakeholders have smooth access to the appropriate port areas. Regional and local governments can facilitate port-driven economic development by applying zoning and land-use planning in the area around the port, creating networks of relevant stakeholders and enabling pilots and experiments.

The concentration of shipping networks has put a focus on large hub ports. These ports receive the majority of global operator investment. They are considered a priority in most government policies, and also receive the most attention in the academic literature. In shipping sectors with increasing hub-and-spoke tendencies, such as container shipping, the performance of whole transport chains has become more dependent on the performance of these large hub ports. When challenges such as congestion or delays arise, these spill over to the entire transport chain, potentially resulting in a slowing of global supply chains (ITF, 2022c).

As, such, the concentration of shipping networks can be associated with decreased resilience of transport chains. This is also the case because many coastal regions with smaller ports have become more subordinate in hub-and-spoke-networks, for example becoming dependent on feeder services from hub ports. This subordinate position has regional economic impacts: as most shippers prefer direct maritime connections – to minimise risks of delays or other supply-chain disruptions – the decline of a port's direct maritime connectivity takes away one of the advantages for shippers located in the port region. Consequently, many port-cities and port-regions have witnessed an outflow of companies commonly associated with maritime logistics (OECD, 2014).

However, paradoxically, increased concentration may also increase the regional development potential of smaller ports. This is a potential area that deserves more attention from policy makers. The largest ports often carry out economic functions that exceed local boundaries; although they can have economic effects on the coastal regions in which they are located, their impacts spill over to many other contexts, including land-locked regions (OECD, 2014). By contrast, smaller ports often have more economic links within the coastal region itself (Merk, Manshanden and Dröes, 2013). Moreover, unlike the largest ports – which generally contain terminals operated by global operators – smaller ports are often run by public authorities (sometimes operating the terminals) controlled by central, regional or local governments (ITF, 2017). As such, local and regional governments have – in theory – more leverage over these smaller ports, even if governments – in practice – do not necessarily apply their generic policy goals to the ports they control (ITF, 2021).

Decarbonisation as a regional economic opportunity

Decarbonisation will change the demand for maritime transport. The transport of fossil fuels currently accounts for around one-third of maritime transport volumes: 11% is coal transport, 16% is crude oil, and 5% is gas (UNCTAD, 2021). A considerable part of this transport of fossil fuels is carried out by coastal shipping operators. However, ongoing decarbonisation in a wide array of sectors will drastically decrease the demand for maritime transport of fossil fuels. At the same time, more demand for renewable energy sources might generate new demand for maritime transport that could replace the demand for transport of fossil fuels.

Decarbonisation will also lead to a global reconfiguration of energy flows. It will reduce the exploration, production and transport of fossil fuels and stimulate the production of renewable energy sources. Production of renewable energy will likely not take place in the same regions as fossil-fuel production. The number of places where renewable energy production could take place might be larger than the number of production sites of fossil fuels, resulting in more regionalised energy systems. This will have consequences for the intensity of maritime flows and the configuration of maritime routes.

These changes will be huge but are difficult to predict. Moreover, consumer behaviour could become increasingly dominated by a desire to decarbonise, which could result in a decline in consumption, a shift towards more regionalised consumption patterns or economic models such as the circular economy, based on recycling and re-use of local residual products.

In this context, green energy production for alternative shipping fuels could be an opportunity. Demand for shipping fuels could complement local energy demand that could drive investments in renewable energy production. In addition, alternative fuel refuelling facilities could attract shipping activity that could drive export activity, including in renewable energy trades. This could also present opportunities for coastal shipping operations. For example, Egypt has formulated a green hydrogen production strategy as well as an alternative ship-fuel bunkering strategy for the main ports along the Suez Canal, aiming at complementarities between both policy objectives (SCZone, 2022).

Development paths are likely going to be highly different according to region. Currently, much uncertainty exists regarding the future shape of the global energy system and the possible role of shipping and ports in such a system. Different models seem to be taking shape at the same time. Despite uncertainty about the most likely shipping fuels in the future, some ports, such as Rotterdam, are positioning themselves as future nodes for alternative ship fuels. These alternative fuels (e.g. hydrogen, ammonia or methanol) will only be "green" if they are produced with renewable energy sources. This is why regions with a high potential for renewable energy production are expected to be leading players in the development of alternative ship-fuel bunkering facilities (World Bank, 2021).

Maritime cabotage reforms

Maritime cabotage – maritime transport between two ports in the same country – is one of the core segments of coastal shipping. Given the long coastlines of many countries, maritime cabotage can represent an important part of coastal shipping activity. As maritime cabotage activities often take place in territorial waters, they are among the most heavily regulated. Maritime cabotage regulations often provide very specific provisions constraining parts of coastal shipping markets. This section explores how various countries have regulated their cabotage markets and the extent to which these regulations are sustainable in the transition towards a zero-carbon future.

Understanding maritime cabotage systems

There are different ways to determine the openness of markets for maritime cabotage. Cabotage systems are often presented as existing along a continuum from "very closed" to "very open", or "very protectionist" to "fully liberalised" (Paixão, Casaca and Lyridis, 2018). This report applies a categorisation of maritime cabotage systems along the lines of the OECD Services Trade Restrictiveness Index (STRI), an index covering a wide variety of services, including maritime freight transport services, in 44 different countries (OECD, n.d.).

The STRI Databases include up-to-date information on maritime cabotage regulation which makes it possible to categorise cabotage systems by the extent to which foreign-flagged vessels are excluded from maritime cabotage? Full exclusion means that foreign-flagged vessels are in principle not allowed to carry out maritime cabotage, other than in highly exceptional circumstances. No exclusion means that foreign-flagged vessels can be engaged in maritime cabotage under the same conditions as vessels flying the national flag. As shown in Table 1, the largest group of countries has a partial exclusion (see Table 1), which means that foreign-flagged vessels are allowed to carry out cabotage activities, but only under certain conditions or in certain situations.

Table 1. Countries that exclude foreign-flagged vessels from maritime cabotage

Extent of exclusion of foreign-flagged vessels	Country
Fully excluded	Belgium, China, Colombia, Estonia, Greece, Indonesia, Lithuania, Slovenia, Türkiye, United States
Partly excluded	Australia, Brazil, Canada, Chile, Costa Rica, Finland, France, Germany, Israel, Italy, Japan, Kazakhstan, Korea, Malaysia, Mexico, New Zealand, Peru, Poland, Portugal, Russia, South Africa, Spain, Sweden, Thailand, Viet Nam
Not excluded	Denmark, Iceland, India, Ireland, Latvia, Netherlands, Norway, Singapore, United Kingdom

Source: OECD (n.d.).

The cabotage regime in the European Economic Area (EEA) is often considered (e.g. in Akpan, 2019) as liberalised because it allows vessels with a flag from the EEA to carry out cabotage. However, the EEA regime essentially excludes all foreign-flagged vessels except for vessels flying the flag of an EEA state.

Countries frequently allow cabotage activities by foreign vessels only on the condition that no nationally flagged vessel is available to carry out these activities. In some countries, foreign-flagged vessels must then be chartered by national shipping companies. Some other countries allow cabotage for certain activities, such as repositioning empty containers, super-sized cargo and activities related to the oil industry (see Table 2).

Table 2. Conditions for allowing foreign-flagged vessels to conduct maritime cabotage

Country	Condition
Australia	Need a license
Brazil	Only if Brazilian-flagged vessel is unavailable. Need to be chartered by Brazilian company
Canada	Need a license. Only if Canadian-flagged vessel is unavailable
Chile	Need contract awarded by public tender. Only if Chilean-flagged vessel is unavailable
Costa Rica	Moving equipment (e.g. empty containers) is allowed. Needs permission from customs office
Finland	Only if EEA-flagged vessel is unavailable. Or based on bilateral agreement
France	Only if EEA-flagged vessel is unavailable. Needs a waiver
Germany	Only if EEA-flagged vessel is unavailable. Needs a license
Israel	Needs a permit, generally for 30 days
Italy	Meet the requirements of the Italian Navigation Code
Japan	Needs permission by the Minister
Kazakhstan	Possible for activities for subsoil use, hydraulic structures and rescue operations.
Korea	Possible for empty containers, feedering and temporary cargo transport.
Malaysia	Possible for connections between certain specified ports
Mexico	Only if Mexican-flagged vessel is unavailable. Need permit. Empty containers allowed
New Zealand	When chartered by New Zealand company. When carriage of coastal cargo is incidental in relation to the carriage of the international cargo.
Peru	Only if Peruvian-flagged vessel is unavailable. Need to be chartered by Peruvian company
Portugal	Only if EEA-flagged vessel is unavailable
Russia	Only if Russian-flagged vessel is unavailable
South Africa	Repositioning of empty containers and feedering allowed
Spain	Only if EEA-flagged vessel is unavailable. Need to be chartered by Spanish company
Sweden	Based on bilateral agreements
Thailand	Only if Thai-flagged vessel is unavailable
Viet Nam	Super-sized freight, cruise, mitigation of disasters

Source: OECD (n.d.)

Foreign-flagged vessels often need a licence, permit or public authorisation in a different form to carry out cabotage. There is wide variation in the duration of these licenses and permits. In Israel, the duration of the permit is generally 30 days. In Mexico, the temporary permit is initially for three months, but with the possibility to extend it six more times. Under the Australian Coastal Trading Act 2012 (Australian Government, 2012), the cabotage regime is based on a three-tier licensing system, comprising:

1. General licences, granting unrestricted coastal trade for a period of five years and available to ships registered in the Australian General Shipping Register.
2. Temporary licences, available to foreign-flagged ships and ships registered in the Australian International Shipping Register, and valid for a limited number of voyages in a 12-month period.
3. Emergency licences, open to foreign-flagged ships, valid for no more than 30 days and issued to respond to national emergencies.

The requirement to fly a national flag often means that companies must comply with what are generally referred to as the “manning requirements” associated with that flag. This typically means that all or a certain percentage of the ship’s crew or officers must be nationals of the country whose flag the ship flies. Many countries also have international shipping registries with much looser manning requirements.

Other requirements associated with certain cabotage regulations, notably in the US Jones Act, are that ships active in cabotage trades should be constructed within the country. In addition, many countries impose informal market barriers, technical barriers or operational barriers that make it difficult for foreign-flagged shipping companies to carry out cabotage trades, even if the legal framework would allow it.

Justifications for maritime cabotage restrictions

Maritime cabotage regulations are often the remnants of much more ambitious past efforts to restrict foreign shipping operations, such as the Navigation Acts in the United Kingdom. Whereas most of the market restrictions related to foreign shipping have disappeared over time, restrictions related to cabotage continue. The main motivations for such restrictions include ensuring the commercial viability of routes to remote areas, supporting national shipping companies and shipbuilding, and national security (Paixão Casaca and Lyridis, 2021).

The main argument for liberalising maritime cabotage is efficiency: opening up markets would provide for more competition, resulting in a possible reduction of maritime transport costs (see e.g. Agostini et al., 2022) and potential increases in coastal shipping activity. In several countries, cabotage traffic is marginal because no shipping operators can provide adequate services.

Maritime cabotage regimes tend to be stable over time. Actors with a stake in the current system - including national shipping companies, trucking companies and in some cases the domestic shipbuilding industry – strongly defend the status quo. However, despite the political sensitivities, several countries including Brazil, Mexico, and Peru have recently reformed their cabotage regulations.

Maritime cabotage reform and decarbonisation

In recent decades, many international organisations have recommended that countries liberalise their maritime cabotage regulations. The assumption is generally that more competition in maritime cabotage will provide more efficiency, decrease maritime transport costs and enhance external trade opportunities. UNCTAD (2017) provided a relatively recent example of such reasoning, recommending that countries, including small developing countries, liberalise their maritime cabotage markets to reduce maritime trade costs and improve maritime connectivity.

Maritime cabotage takes place in an environment of increased global concentration in shipping. Global carriers now dominate regional coastal shipping markets, and the liberalisation of maritime transport has generally benefitted large global shipping operators that are often also the largest proponents of maritime cabotage reform. Global economic regulation of the shipping sector does not exist and there is limited co-ordination between competition authorities regarding shipping (as discussed in ITF, 2022c). This context has made liberalisation of maritime cabotage regulation less feasible. Even if some of these regulations could stifle competition, innovation and service quality, many countries are cautious about liberalising them.

Stronger monitoring of competition in shipping – and evidence that countries can enforce service requirements related to global shipping operators – could encourage countries to reconsider liberalising maritime cabotage. However, for the moment it is likely that most countries will keep maritime cabotage regulations in place.

While the maintenance of the status quo in maritime cabotage may not always foster competition, it also presents an opportunity. Countries could leverage their maritime cabotage regulations to implement ambitious economic development strategies. Perhaps more importantly, they could also use existing regulations to accelerate the decarbonisation of coastal shipping. For example, exemptions from cabotage restrictions could be granted only to zero-emission ships, or other measures could be considered that use maritime cabotage regulation to decarbonise shipping fleets.

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Decarbonisation, Coastal Shipping and Multimodal Transport

This report outlines the most pressing challenges the coastal shipping sector currently faces and provides governments and policy makers with concrete actions to help address them. Coastal shipping – maritime transport that takes place between ports on the same continent – represents around half of the global shipping market. It is also crucial to the connectivity of island regions and regional development. Decarbonising coastal shipping presents both challenges and opportunities, as does the growing concentration of ownership in the maritime transport sector.

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