

OVERVIEW

REVIEW OF MARITIME TRANSPORT

2023

Towards a
green and just
transition



United
Nations

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Nations**

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Seaborne trade declined by 0.4 per cent in 2022, growth resumes in 2023

Shipping continues to navigate COVID-19 post-pandemic trends, the legacies of the 2021–2022 crunch in global supply chains, a softening in the container shipping market and shifts in shipping and trading patterns arising from the war in Ukraine.

Global shipping continues to confront multiple challenges, including heightened trade policy and geopolitical tensions and is dealing with changes in globalization patterns. Additionally, shipping must transition to a more sustainable future, decarbonize and embrace digitalization. Being at the intersection of these forces will influence how the sector adapts to the evolving operational and regulatory landscape while continuing to effectively service global trade.

Maritime trade volume contracted marginally by 0.4 per cent in 2022, but UNCTAD projects it will grow by 2.4 per cent in 2023. Indeed, the industry remains resilient and UNCTAD expects continued but moderated growth in maritime trade volume (table 1) for the medium term (2024–2028).

Global shipping is also facing concurrent forces that make balancing supply and demand a challenging task for carriers. During 2022, containerized trade, measured in metric tons, declined by 3.7 per cent. UNCTAD projects it will increase by 1.2 per cent in 2023 and expand by over 3 per cent during the 2024–2028 period, although this rate is below the long-term growth of about 7 per cent over the previous three decades. On the supply side, container shipping may have entered an overcapacity phase, meaning that carriers will aim at managing capacity using tools such as slippage, idling of vessels or demolition.

Table 1 Seaborne trade forecast, 2024–2028
(Annual percentage change)

Year	Total seaborne trade	Containerized trade
2024	2.1	3.2
2025	2.2	3.2
2026	2.2	3.2
2027	2.1	3.0
2028	2.1	2.9

Source: UNCTAD secretariat calculations, July 2023.

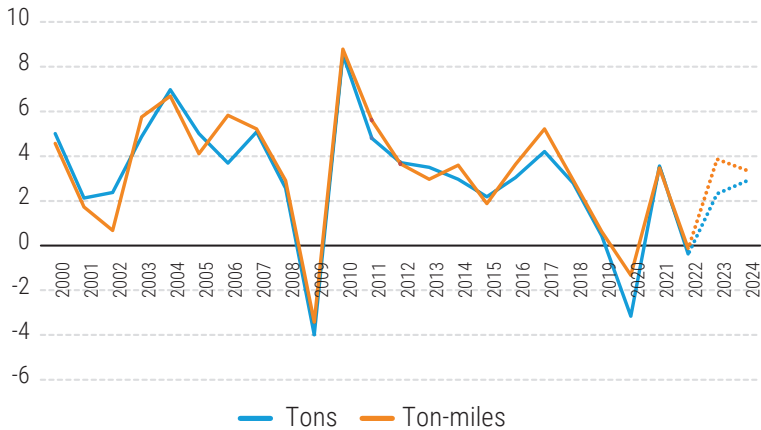
Note: UNCTAD projections are based on the estimated elasticities of maritime trade with respect to gross domestic product (GDP), export volumes, investment share in GDP as well as monthly seaborne trade data published by Clarksons Research. They also build on the GDP forecast published in the International Monetary Fund, *World Economic Outlook*, July 2023.

Undoubtedly, the key challenge for the sector is that the maritime industry must embark on a transformative journey towards decarbonization while sustaining economic growth. Balancing environmental sustainability, regulatory compliance and economic demands is vital for a prosperous, equitable and resilient maritime transport future.

Despite uncertainties surrounding future decarbonization measures, including their impact on logistics costs and trade, the sector should remain committed to fleet modernization, renewal of ageing vessel capacity and adopting low-carbon pathways. Amidst regulatory, commercial and sustainability pressures, meeting carbon emission targets is a formidable yet positive challenge. Developing regions, including small island developing States (SIDS) and least developed countries (LDCs), may face higher impacts due to a limited capacity to mitigate higher logistics costs.

Starting in early 2022, seaborne trade, in particular dry bulk and tanker shipments, has been impacted by the war in Ukraine. The war led to changes in shipping patterns and increased the distances travelled for commodities, especially oil and grain. Growth in ton-miles exceeds growth in tons in 2022, 2023 and for 2024 projections (figure 1).

Figure 1 Seaborne trade growth, tons and ton-miles, 2000 – 2024
(Annual percentage change)



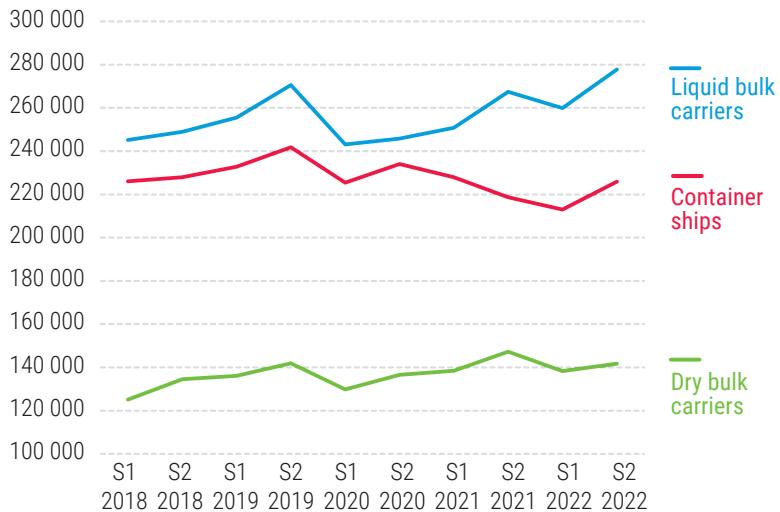
Source: UNCTAD secretariat, based on Clarksons Research, Shipping Intelligence Network timeseries (as of July 2023).

Note: 2023 data are estimated and 2024 are forecasts.

In 2022, oil and gas trade volumes witnessed robust annual growth rates, of 6 per cent and 4.6 per cent, respectively. The increase can be attributed to heightened demand for fuel as the pandemic eased and related restrictions were lifted. As spending on energy-intensive services like transport and travel gradually recovered, a return to normalcy contributed to the surge in oil demand. In contrast, containerized and dry bulk shipments declined in 2022. Weakened containerized trade reflects the slowdown in global economic growth, high inflation and normalizing of demand after the unusual surge during the COVID-19 pandemic.

Port calls follow these trends in trade, dropping significantly at the start of the COVID-19 pandemic (figure 2). Following a year-to-year drop in the first half of 2022, vessel port calls increased in the second half of 2022. Port calls by tankers reached historical highs while calls by bulk carriers returned to their pre-COVID-19 levels; port calls by container ships are yet to return to their 2019 level.

Figure 2 Number of port calls per half year, world total, 2018–2022



Source: UNCTAD, based on data provided by MarineTraffic, 2023.

Notes: Ships of 1,000 gross tons (GT) and above. S1 and S2 refer to first and second semesters.

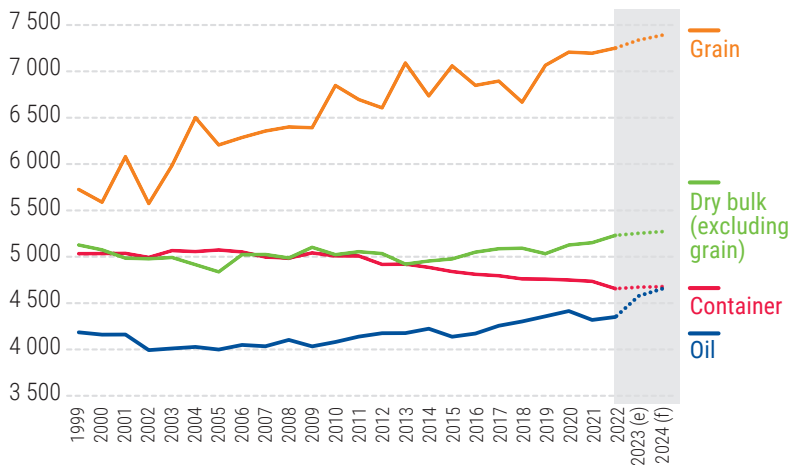
Expanding distances for oil and grain cargo

In 2023, oil cargo distances reached long-term highs (figure 3), driven by disruptions from the war in Ukraine. Crude oil and refined products travelled longer distances, as the Russian Federation sought new export markets for its cargo and Europe looked for alternative energy suppliers.

Shipments of grains travelled longer distances in 2023 than any other year on record (figure 3). Although grain shipments from Ukraine resumed in 2022 thanks to the Black Sea Initiative, several grain-importing countries had to rely on alternative grain exporters. They are instead buying from the United States of America, or Brazil, which requires longer hauls.

Containerized trade distances have tumbled since 2020 but increased marginally in 2023 (figure 3). Intra-Asian containerized trade, which accounts for the majority of intraregional trade, saw its share increase over the years. As intra-Asian trade is carried over shorter distances, the average distances travelled per ton of container cargo of global containerized trade are relatively low. The predominance of intra-Asian containerized trade flows reflects global manufacturing patterns with China continuing to serve as the leader in global manufacturing, supported by neighbouring East Asian countries. It also reflects the growing participation of several East Asian countries in regional and global value chains.

Figure 3 Average distance travelled, grain, other dry bulk, container and oil cargo, 1999–2024
(Nautical miles)



Source: UNCTAD secretariat calculations, based on Clarksons Research, Shipping Intelligence Network timeseries (as of 8 June 2023).

Abbreviations: (e) estimated, (f) forecast.

Container shipping connectivity remains below pre-COVID-19 levels in small island developing States

In the second quarter of 2023, the most-connected economies as measured by the Liner Shipping Connectivity Index (LSCI) were China, followed by the Republic of Korea, Singapore, Malaysia and the United States. In Europe, Spain, the Kingdom of the Netherlands and Belgium, saw their LSCI increase over this period, while the United Kingdom of Great Britain and Northern Ireland saw its LSCI decline slightly.

Most regions recovered in terms of COVID-19 pandemic disruptions and shipping connectivity. By the second quarter of 2023, regional averages for the LSCI in Asia, Latin America and the Caribbean and Oceania reached record highs. Meanwhile, the average LSCI for Africa also increased, but remained below its pre-pandemic values. North America and Europe both saw their average LSCI drop in 2022, only recording a recovery in the second quarter of 2023.

Regional variations reflect the demand and supply dynamics during and after the pandemic. Asia increased its container trade activity, including intraregional traffic. Europe and North America initially experienced a surge in demand and fleet deployment which subsided as the market stabilized. In contrast, Africa found itself in a middle ground, without a post-COVID-19 boom nor a subsequent weakening.

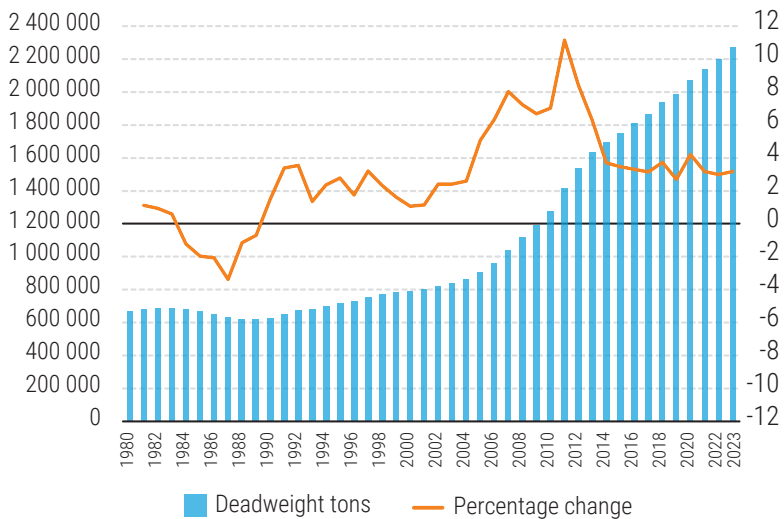
SIDS showed initial signs of recovery in their LSCI but have not yet returned to pre-pandemic levels. During the pandemic, SIDS in the Indian Ocean, Africa and the Caribbean experienced a decline in LSCI. This was attributed to ships being redeployed to more lucrative European and North American import markets, as well as reduced demand in tourism-dependent island economies.

In 2023, SIDS serving as regional trans-shipment centres, such as Jamaica and the Dominican Republic, resumed their long-term growth trajectory in connectivity, building on their trans-shipment business. However, other SIDS serving as regional hubs, notably Bahamas and Mauritius, have yet to fully recover from the impact of the pandemic.

A slow growing fleet, ageing ships and the challenges ahead

As of January 2023, the world fleet consisted of 105,493 vessels of 100 gross tons and above. In 2022, capacity expanded at an annual rate of 3.2 per cent with overall tonnage hitting 2.27 billion deadweight tons (figure 4).

Figure 4 The world fleet, 1980–2023
(Thousand deadweight tonnage and annual percentage change)



Source: UNCTAD calculations, based on data from Clarksons Research, 2023.

Notes: Propelled seagoing merchant vessels of 100 GT and above, as of 1 January 2023. Deadweight tons for some individual vessels have been estimated.

The container fleet capacity saw an increase of 3.9 per cent, followed by oil tanker fleet growth (3.4 per cent). Meanwhile, bulk carrier capacity grew at a moderated rate of 2.8 per cent and gas carriers experienced the highest growth, at 5 per cent.

In terms of tonnage delivered in 2022, dry bulk carriers took the lead, followed by oil tankers and container vessels. China, the Republic of Korea and Japan were the top shipbuilding countries, accounting for a significant 93 per cent of total tonnage delivered.

Over the years, global fleet capacity expansion has seen its ups and downs, reflecting business cycles and trends in shipping, shipbuilding and financing. Between 2005 and 2010, the average annual growth of global deadweight tonnage was robust, at 7.1 per cent. However, since the 2007–2008 financial crisis, growth has slowed to an average of 4.9 per cent between 2011 and 2023 due, among other factors, to consolidation in shipbuilding and downsizing of the ship financing market. Since the pandemic, fleet growth has further slowed, averaging 3.1 per cent per year.

The global fleet is also ageing. At the start of 2023, commercial ships had an average age of 22.2 years, slightly higher than the previous year. Compared to a decade ago, the global fleet has aged by an average of two years, with over half of the fleet now exceeding 15 years of age.

Container freight rates returning to pre-pandemic levels

Container freight rates were a tale of two halves in 2022. Spot container freight rates soared to record levels by early 2022, reflecting the pandemic-related rebound and global supply chain crisis. Rates declined in the second half of 2022 across most major trade lanes and stabilized in early 2023. The Shanghai Containerized Freight Index, a measure for spot container freight rates from China, plunged by more than 80 per cent to 967 points in June 2023, down from its peak of 5,067 points in January 2022 which was five times higher than its level before COVID-19 in January 2019 (figure 5). Container carriers achieved unprecedented

profits estimated at almost \$300 billion in earnings before interest and taxes (EBIT) in 2022.

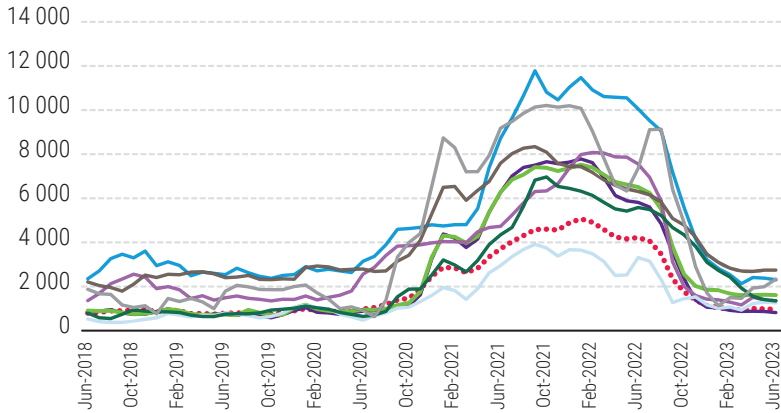
In tandem with spot freight rates, charter rates also experienced a significant decrease in 2022, albeit remaining higher than pre-pandemic levels.

Contracted freight rates increased in 2022, in line with trends shaping the spot rates and reflecting factors including the mismatch in supply and demand of ship capacity, disruptions in the supply chain, port congestion, cost pressure and trade imbalances. Compared with 2019, the highest increase in contract rates was seen on routes originating from Asia. Contract freight rates on the Asia–South America trade lane surged by 386 per cent in 2022 compared with 2019. Trade imbalances continue to have a large influence on contracted freight rates. Substantially increased transport costs caused inflationary pressures on the broader economy.

As container shipping transitioned from the historical boom of 2021, the sector entered a difficult phase. The market normalized and capacity levels shifted with an influx of new container ship capacity in 2023. Capacity is expected to shift further as more container vessels are expected to hit the water in 2024 and 2025. Liner operators are adopting different strategies to tackle overcapacity, including rerouting, blank sailing, reducing speed and idling ships.

Carriers are pursuing different strategies to build resilience and adapt to the evolving operating environment. Some, such as Maersk, have favoured an integrated approach, offering end-to-end service delivery. Others, such as MSC, have shown an appetite for ship ordering and capacity expansion.

Figure 5 Shanghai Containerized Freight Index, monthly spot rates, June 2018 – June 2023, selected routes



- SCFI Comprehensive container freight rate index
- SCFI Shanghai, China–Mediterranean (base port) container freight rate (\$/TEU)
- SCFI Shanghai, China–East Coast North America (base port) container freight rate (\$/FEU)
- SCFI Shanghai, China–West Africa (Lagos, Nigeria) container freight rate (\$/TEU)
- SCFI Shanghai, China–South America (Santos, Brazil) container freight rate (\$/TEU)
- SCFI Shanghai, China–Europe (base port) container freight rate (\$/TEU)
- SCFI Shanghai, China–West Coast North America (base port) container freight rate (\$/FEU)
- SCFI Shanghai, China–Persian Gulf (Dubai, United Arab Emirates) container freight rate (\$/TEU)
- SCFI Shanghai, China–South Africa (Durban, Republic of South Africa) container freight rate (\$/TEU)

Source: UNCTAD secretariat, based on data from Clarksons Shipping Intelligence Network, 2023.

Abbreviations: Forty foot Equivalent Unit (FEU), Twenty foot Equivalent Unit (TEU).

Meanwhile, as the container shipping markets weakened, some of the newer entrants who had been drawn by the soaring freight rates of 2021–2022, now exited the markets. Some had to suspend operations or exit the market altogether. Others persevered and seized opportunities to increase their market share in liner operations and capacity deployment.

A volatile landscape for dry bulk freight rates

Dry bulk freight rates were highly volatile in 2022 and 2023 due to shifts in demand, port congestion (namely in the first half of 2022), heightened geopolitical tensions, weather-induced disruptions and macroeconomic headwinds, including in China.

The war in Ukraine reshaped maritime trade flows, increasing cargo distances and ton-miles. The Baltic Dry Index, which measures shipping prices, fluctuated significantly, with rates peaking in May 2022. Rates fell to pre-pandemic levels by December 2022. In early 2023, freight rates declined further due to a seasonal slowdown and adverse weather conditions disrupting commodity production. A surge in demand for dry bulk cargo in the second quarter of 2023, triggered by post-pandemic industrial growth in China, led to a rebound in freight rates by mid-year.

Tanker freight rates see a strong revival

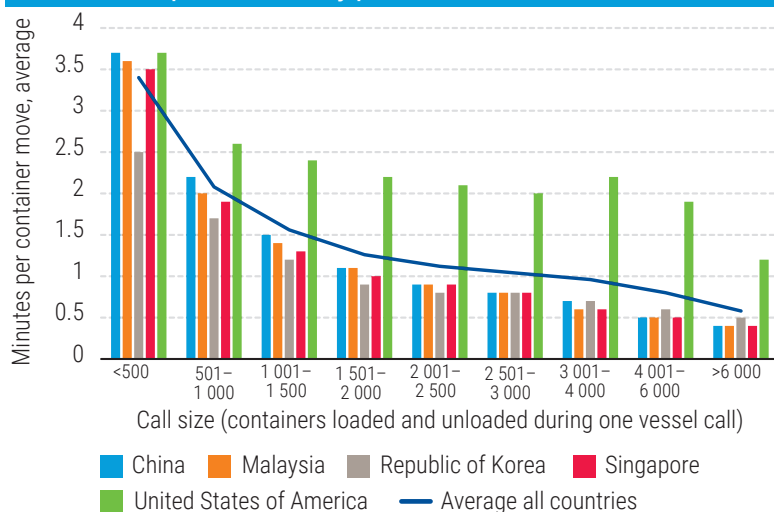
The tanker market witnessed a remarkable recovery in 2022, with both the Baltic Dirty Tanker Index and Baltic Clean Tanker Index reaching peak annual values. The war in Ukraine has contributed to sustained rates and has reshaped oil trade patterns. Oil and gas exports from the Russian Federation shifted towards Asia as the Russian Federation looked for alternative markets and European countries sought new suppliers to replace energy imports from the Russian Federation.

In early 2023, the tanker market continued to show strong earnings due to ongoing geopolitical factors and increased ton-miles. However, uncertainties related to the energy transition and compliance with new International Maritime Organization (IMO) requirements, namely the Energy Efficiency Existing Ship Index (EEXI) and the Carbon Intensity Indicator (CII), may limit effective future tanker carrying capacity.

Port cargo handling performance improves after worsening during the pandemic

Over the years, there have been gradual improvements to the length of time ships spend in port. However, any progress made was lost during the COVID-19 pandemic, as all vessels spent more time in port. In 2022, the median port time of container ships and liquid cargo carriers remained stable compared to 2021. In contrast, dry breakbulk carriers recorded a 3 per cent decrease while dry bulk carriers experienced a 3.4 per cent increase. As pandemic-related disruptions eased in the second half of 2022, ship turnaround times improved in most markets.

Figure 6 Minutes per container move, by range of call size, top 5 countries by port calls



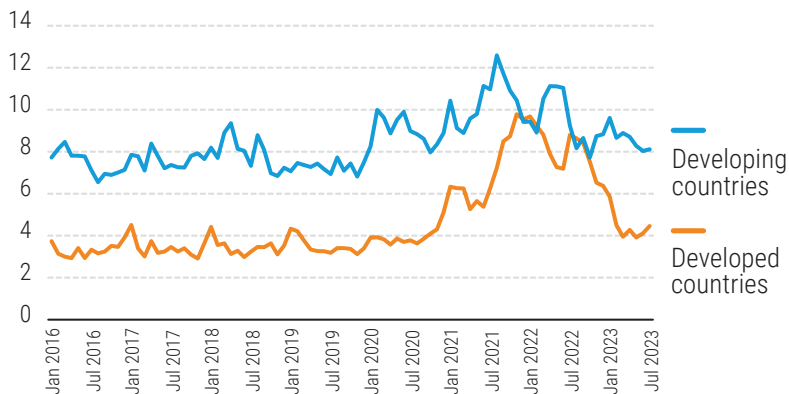
Source: UNCTAD, based on data provided by S&P Global Port Performance Program, 2023.

Combining time in port with container moves, figure 6 presents port performance as measured by minutes per container move at the country level. Among the top five countries by container ship port calls, Republic of Korea was the fastest for five call size categories whilst the United States recorded the slowest loading and unloading rates. Differences in port performances reflect levels of port automation and the type of traffic handled; larger ports tend to use more automation across cranes and yards. In the United States, most traffic is from import containers, while the other top four countries handle more trans-shipment and export containers.

Disruptions had negative impacts on congestion, port volumes and revenue

Container ships tend to spend more time in ports of developing countries than of developed countries (figure 7). These averages can be explained by a combination of faster clearance times, better infrastructure and higher labour productivity. During the COVID-19 pandemic, however, waiting times surged more in developed countries, even exceeding those of developing countries in early 2022. As demand for containerized goods went up, especially during periods of lockdowns combined with economic stimulus packages, ports could not cope with the surge in volumes and experienced congestion, especially in North American and some European ports.

Figure 7 Average waiting times of container ships at port in hours, monthly, January 2016 – July 2023



Source: UNCTAD, based on data provided by Clarksons Research, 2023.

Note: The waiting time is estimated based on the time between when a vessel first enters an anchorage associated with a port group (or a port, if an anchorage shape has not been detected) and when it first enters a berth within the port.

Data from ports participating in the UNCTAD TrainForTrade port management programme confirms the impact of disruptions on port volumes and revenue growth rates. Growth rates declined in 2019 and 2020 but experienced a strong recovery in 2021 before falling again in 2022. Payroll as a proportion of total revenue declined, an indicator of limited wage increases and cautious recruitment. Training expenditure as a percentage of payroll also remained low (ranging from 0.3 per cent to 1.1 per cent from 2016 to 2022), with the lowest value recorded in 2022. While some training shifted online, the overall level of investment appears insufficient given the transformative trends in the industry.

Facilitating maritime trade enhances port performance and hinterland connectivity

Port delays often indicate port inefficiencies. These are commonly attributed to administrative and institutional challenges around clearing goods. Investing in digitalization and technology can help improve predictability and reliability, creating efficiencies and reducing delays.

When it comes to efficient ports, smooth sailing depends on well-oiled regulatory processes. Certain trade facilitation measures can unlock smoother operations. When correlating the distributions of the World Bank's Container Port Performance Index by country according to their implementation status for relevant articles of the Agreement on Trade Facilitation of the World Trade Organization, there are positive correlations for certain measures such as Risk Management (article 7.4), Authorized Operators (article 7.7), Border Agency Cooperation (article 8) and Single Window (article 10.4), which may hold the key to better port performance.

In 2024, IMO will introduce a significant development in port infrastructure with the mandatory implementation of Maritime Electronic Single Windows. This mandate will have far-reaching implications, requiring enhanced interoperability and seamless coordination among port agencies. The Maritime Electronic Single Window aims to establish a robust digital framework to optimize port operations. This calls for strong support and focus from all IMO members, especially developing countries and LDCs, which lag behind in implementing similar WTO measures under the Agreement on Trade Facilitation.

The digital transformation of ports involves connecting platforms and establishing a unified electronic data submission point. Interconnecting foreign trade and customs platforms using standard data formats streamlines processes and reduces trade costs. ASYCUDA is a notable example, modernizing customs operations and facilitating international trade. Through its digital platforms, ASYCUDA enables seamless data exchange and integrates processes among regulatory agencies, customs

and government bodies. The ASYCUDA Single Window empowers traders to submit import and export documents electronically, using a single interface. This simplifies procedures, enhances port performance and promotes transparency for both traders and customs officials.

New environmental requirements could mean additional red tape and additional controls when importing goods. The Carbon Border Adjustment Mechanism (CBAM) is an instrument within the European Green Deal which mobilizes funding for sectors related to climate change. Starting on 1 October 2023, importers will have to pay an import tariff on carbon-intensive goods entering the European Union.

Border agencies will have to report carbon emissions for products using CBAM certificates, which represent one ton of carbon dioxide. The administrative workload associated with CBAM certification will occur before the border crossing. These new carbon mechanisms could change the trade facilitation process and increase compliance procedures prior to customs clearance.

Regulation to facilitate acceptance and use of electronic bills of lading

In a major recent development, in July 2023, legislation was adopted in the United Kingdom, to ensure that electronic trade documents, including electronic equivalents to negotiable bills of lading, enjoy the same legal recognition as paper-based documents. With international contracts often subject to English law, by agreement of the parties, the new Electronic Trade Documents Act, 2023, is expected to boost the use of electronic bills of lading and reduce delays across global trading networks. In some other jurisdictions, relevant laws have been passed based on the UNCITRAL Model Law on Electronic Transferable Records and national policymakers are encouraged to consider similar adjustments to national legislation.

At the same time, managing the growing cyber risks inherent in electronic transactions is likely to demand greater attention by policymakers and

industry stakeholders alike, given the increasingly rapid pace at which technology is evolving.

Work is also under way under the auspices of UNCITRAL Working Group VI to prepare a new legal instrument on Negotiable Multimodal Transport Documents. This addresses the growing need for financing in international trade and will establish the legal recognition of negotiable multimodal transport documents (including electronic records) as documents of title, similar to negotiable bills of lading.

From the perspective of small traders, particularly in developing countries, it will be important to ensure that a shipper or final consignee in any cargo claim against a multimodal transport operator would be protected by mandatory minimum standards of carrier liability, as is already the case for claims under negotiable bills of lading that are covered by mandatory cargo liability conventions. However, at present, it is not envisaged that liability issues will be addressed as part of the instrument. All stakeholders are encouraged to take an active interest in the work to ensure the legal instrument currently being developed will be fit for purpose and commercially acceptable.

MARPOL – the International Convention for the Prevention of Pollution from Ships

MARPOL is among the most important legal instruments relating to international shipping. Developed under the auspices of IMO, MARPOL Technical Annex VI includes key regulatory measures for decarbonizing the shipping industry and reducing greenhouse gas (GHG) emissions from ships.

With international shipping responsible for around 3 per cent of global GHG emissions, decarbonization continues to be an urgent priority. Regulation can play a key role in driving energy efficiency in the shipping sector. Short-term decarbonization measures include the Energy Efficiency Existing Ship Index (EEXI) and the Carbon Intensity Indicator (CII) under Annex VI of MARPOL. These need to be implemented from

2023 onwards and are expected to add to the impact of earlier rules, namely the Energy Efficiency Design Index (EEDI) and the Ship Energy Efficiency Management Plan (SEEMP).

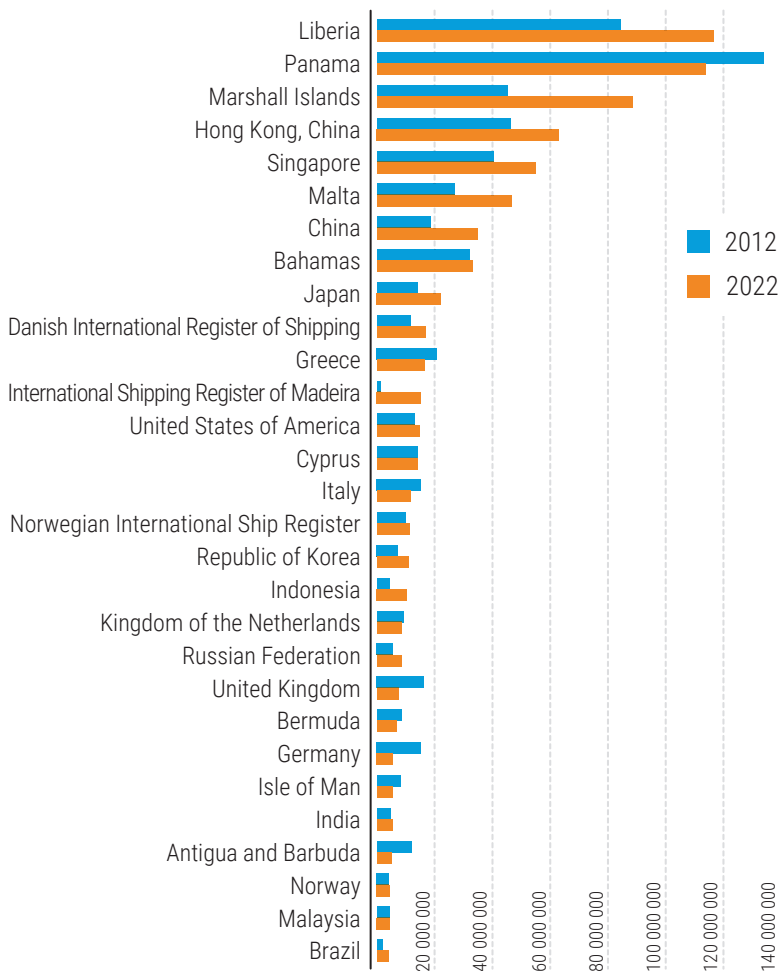
A key development took place in July 2023 as the IMO Marine Environment Protection Committee at its eightieth session adopted the Revised GHG Reduction Strategy and the GHG reduction plans moved closer to finalization. Before these are implemented, a comprehensive impact assessment of the proposed measures will need to be conducted, in accordance with the workplan and the revised procedure for assessing impacts on States.

Charting a course towards shipping decarbonization

Shipping is under pressure to decarbonize as soon as possible, with momentum arising from the confluence of regulatory and commercial drivers and growing demands for sustainability, as well as scrutiny from customers, partners and the public. However, meeting the targets set out in IMO Revised Strategy on Reduction of GHG Emissions from Ships remains a challenge. The shipping industry faces uncertainty in determining the most effective way to reduce carbon emissions and transition to lower or zero-carbon fuels. Carriers need to modernize and renew their ageing fleets and switch to low carbon whilst being unclear about the best alternative fuels and green technologies. Complicating matters, ships have long lifespans with some vessels being too old to retrofit and too young to scrap.

Figures 8 and 9 show trends in carbon emissions based on flag of registration and economy of ownership. Registries have different ship types, sizes and ages registered under their flags, including highly efficient and less efficient vessels, which can impact their overall emissions profile.

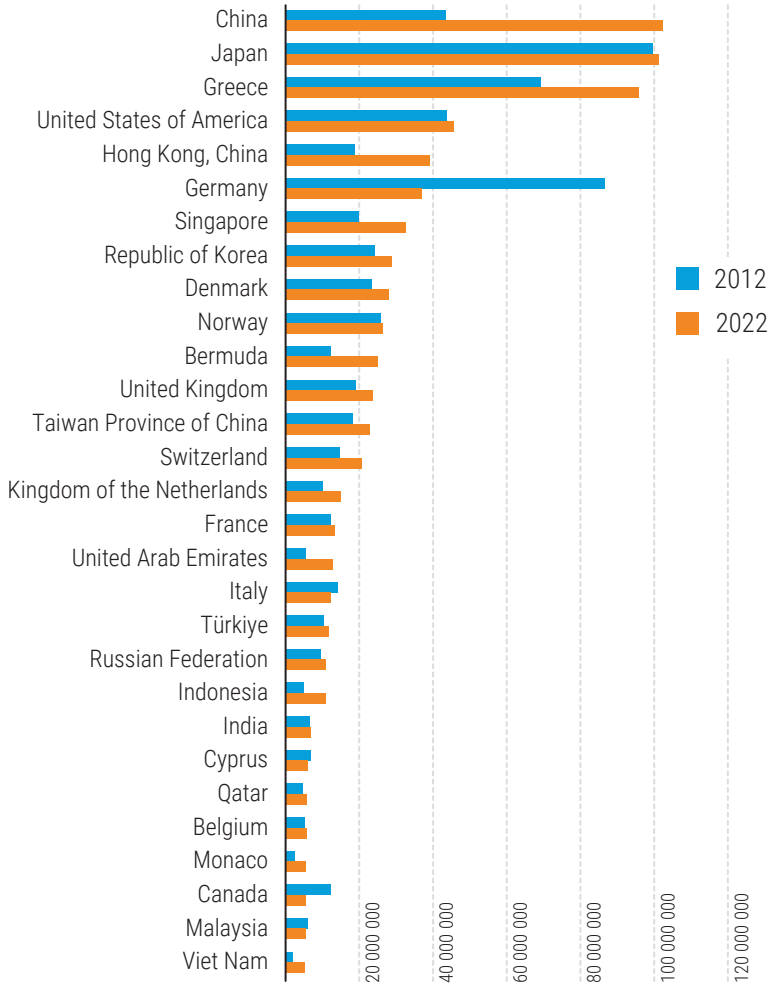
Figure 8 Carbon dioxide emissions, tons, by main flags of registration, 2012 and 2022



Source: UNCTAD, based on data provided by Marine Benchmark, June 2023.

Note: Carbon dioxide emissions from vessels' main and auxiliary engines calculated bunker fuel from AIS (Automatic Identification System).

Figure 9 Carbon dioxide emissions, tons, by main economies of ownership, 2012 and 2022



Source: UNCTAD, based on data provided by Marine Benchmark, June 2023.

Note: Carbon dioxide emissions from vessels' main and auxiliary engines, calculated bunker fuel from AIS.

Panama, Liberia and the Marshall Islands, the world's three leading flags of registration, collectively account for over one third of global carbon dioxide emissions, reflecting their market share in tonnage. Emissions assigned to flags of registration can provide an indication of how emissions are distributed across the global fleet and highlight the oversight that may be required. While flag states must ensure compliance, it is the shipowners that need to invest in the future fleet, fuels and onboard green technology. Decisions made by shipowners will also shape the emissions profile of the global fleet and its ability to meet the IMO GHG emission targets. Between 2012 and 2022, the share of carbon dioxide emissions of the top three ship-owning countries—China, Japan and Greece—increased.

It will be important to assess the carbon footprint of the global fleet while considering the roles of the country of the flag and the country of ownership and the implications of their decisions regarding carbon emissions monitoring, reporting and action. It is crucial for both flag States and shipowning economies to intensify their efforts in improving the carbon emission performance of the global fleet.

Shipowners face a conundrum

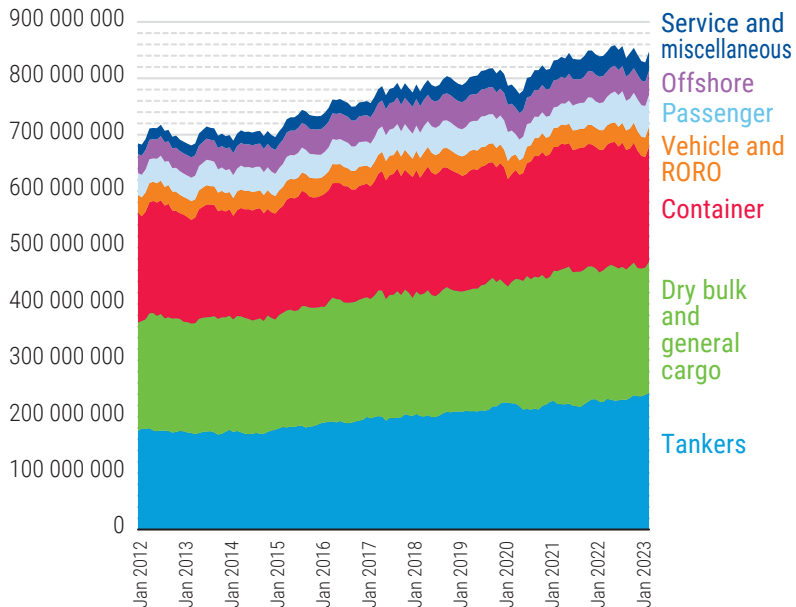
Shipowners must decide whether to renew the fleet now while still lacking clarity about alternative fuel, green technology options and the regulatory regime. Uncertainty about the fleet renewal timelines and constraints caused by shipbuilding yard capacity and higher building prices are also complicating investment decisions. Ports and terminals face similar challenges when considering investing in equipment or terminals.

Although total emissions have continued to climb during the last decade (figure 10), the 2023 IMO Revised GHG Strategy includes an enhanced common ambition to, inter alia, reduce the total annual GHG emissions from international shipping by at least 20 per cent, striving for 30 per cent by 2030, compared to 2008.

To achieve this new goal, effective supply of ship carrying capacity remains uncertain. It depends on whether operators delay or cancel newbuildings and on the potential impact on vessel speeds under the new IMO rules. Compliance with IMO measures (EEXI, CII) is expected to usher in lower

sailing speeds and alter the effective capacity supplied. To achieve a good Carbon Intensity Indicator score, (A, B and C ratings, which indicate a low carbon intensity), ships will need to operate more efficiently, notably by optimizing routes, fuels and speed. In 2022, two thirds of the world fleet performed within the A to C rating, which indicates compliance. However, by 2026, this share would drop to 49 per cent if no measures are taken to make improvements and reduce carbon intensity.

Figure 10 Carbon dioxide emissions by main vessel types, tons, January 2012 – March 2023



Source: UNCTAD based on data provided by Marine Benchmark, June 2023.

Notes: Carbon dioxide emissions from vessels’ main and auxiliary engines calculated bunker fuel from AIS.

Abbreviation: Roll on roll off (RORO).

Collaboration is key to decarbonization

While logistics, digitalization, hydrodynamics and measures such as carbon capture and storage have the potential to curb a share of GHG emissions from shipping, the greatest potential to make a significant difference lies in switching to low or zero-carbon fuels. Shipping needs to replace fossil fuels with alternatives that emit little or no GHGs across their entire life cycle (well-to-wake). While the energy transition in shipping is still in its infancy, some progress is under way, with one third of the tonnage on order in 2022 capable of using alternative fuels.

Implementing alternative fuels on a large scale requires significantly transforming fuel production and distribution value chains. It also involves multiple stakeholders across the shipping, port, energy and finance sectors. Swift intervention at the policy and regulatory level is needed to stimulate demand for alternative fuels, green technologies and fleets, and encourage industry to invest.

Decarbonizing shipping by 2050 will require large investments, with some estimates suggesting an additional \$8 billion to \$28 billion annually, to enable ships to decarbonize by this date. Fuel infrastructure investments are expected to surpass onboard investments. Scaling up fuel production, distribution and bunkering infrastructure to supply 100 per cent carbon-neutral fuels by 2050 will require annual investments of around \$28 billion to \$90 billion. Estimates suggest that full decarbonization could raise annual fuel costs by 70 to 100 per cent compared to current levels.

Shipping cannot decarbonize on its own. Decarbonization efforts should bring together the broader industry, including carriers, ports, manufacturers, shippers, investors, energy producers and distributors. As an example, the COP26 Clydebank Declaration, which commits to establishing green shipping corridors sought to leverage collaboration.

Green corridors are collaborative routes involving multiple stakeholders operating between two ports. The objective is threefold: to provide bunkering options for vessels using low or zero-carbon fuels, facilitate testing of various solutions and support pioneering green initiatives. Since the signing of the Clydebank Declaration, 21 green shipping corridor initiatives have emerged. Experiences with green shipping corridors will

vary by region and will entail both challenges and opportunities. Going forward, it will be important to ensure inclusive green shipping corridors that also benefit developing countries, particularly SIDS and LDCs.

Monitoring the impact of decarbonization costs

Some of the factors hindering a more rapid pace of decarbonization in shipping include the availability and cost of alternative fuels, the maturity of available technology, technical feasibility, safety, bunkering infrastructure, on-board storage, crew skills and ship and engine design. The cost implications, in particular the cost of alternative fuels, need to be monitored and assessed to improve understanding of their impact and ways to mitigate their negative effects and ensure a smooth transition.

Fuel costs already account for a significant portion of overall ship voyage and operating costs. Transitioning to cleaner fuels will further add to expenses. Depending on vessel size, efficiency and distance, fuel can account for up to two thirds of overall expenses. The price of alternative fuels is still high compared to conventional fuels.

Small island developing States and least developed countries impacted by cost of decarbonization

One potential consequence of decarbonization is the impact on maritime logistics costs and the ripple effect on trade and economic output, especially in developing regions. Increased investment in ship capacity, alternative fuels and green technologies, as well as lower sailing speeds, are all expected to result in increased maritime logistics costs. The shift to cleaner fuels will impact the cost structure of shipping operations.

Impacts are likely to be stronger for many SIDS and LDCs, who already pay more for transport in international trade and have little capacity to mitigate higher maritime logistics costs. In 2021, UNCTAD conducted a Comprehensive Impact Assessment of the proposed IMO short-term GHG reduction measures, namely EEXI and CII. UNCTAD estimated an increase in maritime logistics costs of 2.7 per cent under the median scenario, with an increase of time at sea of 2.8 per cent and an increase in average maritime shipping costs of 1.5 per cent in 2030. Developing

coastal countries, including SIDS and LDCs, are shown to experience a bigger decline in their gross domestic product (GDP) and in their import and export flows, when compared with developed coastal countries.

A more recent UNCTAD assessment suggests that increases in global maritime logistics costs would alter trade flows. Hypothetical rises of 10, 30 and 50 per cent in maritime logistics costs produced negative changes in trade (0.11, 0.32 and 0.60 per cent median reduction) and in GDP (0.01, 0.04 and 0.08 per cent median reduction, respectively). Based on the global GDP of US\$104 trillion in 2022, a reduction of 0.08 per cent would be equivalent to a reduction of global GDP of about US\$80 billion.

Monitoring the evolution of freight rates and costs of the energy transition is crucial. The formulas used to calculate freight rates and surcharges, including fuel surcharges, are generally an issue of concern for shippers, who argue that the setting of freight rates and surcharges requires more clarity. As the energy transition in shipping accelerates, pricing and charging mechanisms for alternative fuels will require careful consideration as they affect the costs faced by carriers, shippers and trade.

Understanding how freight rates and new, low or zero-carbon bunker fuel prices will be determined and incorporated into final costs is important. A mechanism that ensures transparent, fair and sustainable freight rate and surcharge price setting practices will be required.

Towards a just transition

The nationality of most ships (their flag) is different from the nationality of their owners while international trade involves two or more countries. All ships that trade internationally must comply with the same multilateral GHG emission-reduction rules. Fragmented solutions and exemptions in international shipping can lead to suboptimal outcomes. A universal regulatory framework for decarbonization that applies to all ships, irrespective of their flags of registration, country of ownership and area of operation is critical to avoid a two-speed decarbonization process and ensure a level playing field.

For developing countries, a multilateral solution adopted under the auspices of IMO, which considers the special needs for assistance of

the most vulnerable economies, will provide a workable outcome and avoid fragmented unilateral approaches. To protect the special needs of vulnerable economies and mitigate the effects of climate change on these States, the “Common but Differentiated Responsibilities and Respective Capabilities” principle will need to be borne in mind.

IMO is currently considering a range of midterm GHG mitigation measures that encompass both technical and economic aspects. Technical aspects, such as fuel standards, establish parameters for specific energy efficiencies. Economic elements such as a levy or contribution paid in relation to GHG emissions from fuels may incentivize action, promote the competitiveness of alternative fuels and narrow the cost gap with conventional heavy fuels.

The economic component of the proposed IMO midterm measures could also generate funds to scale up decarbonization efforts and provide support to developing countries grappling with higher maritime logistics costs. An important share of generated funds could be channelled to support investment for SIDS and LDCs in ports, including investment in climate change adaptation, trade and transport reforms, as well as transport and digital connectivity.

These investments would enable vulnerable economies to alleviate the costs of transitioning to low or zero-carbon shipping, including increased maritime logistics costs. The funds could also be used to tap into emerging business opportunities arising from alternative fuel production, storage, bunkering and distribution. Economic measures can help achieve the twin objectives of decarbonizing shipping while ensuring a just and equitable energy transition.

Policy recommendations

1. Ensure food and energy security

- Grain and fertilizer exports need to be ensured, such as through the Black Sea Initiative and the Memorandum of Understanding on trade facilitation of food and fertilizers from the Russian Federation.
- The international community should support investments in transport infrastructure for developing countries to ensure sustainable and resilient food and energy security.

2. Support investment in the renewal of the global ageing fleet

- To encourage investment in ship carrying capacity, national and international regulations must minimize uncertainty that prevents shipowners' timely investment in new and modern vessels.
- Monitor trends in ship finance for both fleet renewal and green investment, and scale up financing and investment levels. Monitor developments in shipbuilding yard capacity.
- Share information, allow access to relevant data and conduct research to improve understanding of fleet renewal and capacity expansion challenges.
- Upgrade skill sets and ensure that crew receive adequate training in connection with the latest technologies and the use of alternative fuels and related shipboard systems.

3. Facilitate the fuel transition and an equitable decarbonization process

- Clear targets for low and zero-carbon fuels in shipping are vital to attract private sector investment and address climate change, as set out in the Paris Agreement. A strong regulatory framework aligned with the 2030 Agenda for Sustainable Development is crucial for protecting the environment.

- International regulations should enable a level playing field and promote measures to lower the cost or the price gap between alternative and conventional marine fuels. Economic measures such as a levy or a carbon / GHG price can support the energy transition and incentivize investment in alternative fuels and green technologies for ships.
- The regulatory framework must ensure a just and equitable transition. Economic measures such as a carbon levy can generate funds to help developing countries reduce maritime logistics costs, enhance their climate resilience and seize energy-related business opportunities.
- Industry and multilateral institutions should invest in sustainable port facilities, clean energy marine hubs and green shipping corridors. Close collaboration among stakeholders can also ensure a sufficient supply of low-carbon alternative fuels.

4. *Assess readiness, maturity and safety of alternative fuels and impacts of policy measures on developing countries*

- The readiness and availability of alternative fuels and vessel designs must be assessed, along with their regulatory and safety maturity levels.
- Continue and regularly update the assessments of the impacts of the decarbonization of international shipping on the most vulnerable economies, which often face higher freight rates and heavily rely on maritime transport for trade and economic development.

5. *Improve understanding of alternative fuel costs, monitor their implications for freight costs and surcharges and set up a mechanism to guide the setting of these costs*

- Given the volatility of freight markets and uncertain demand and supply associated with the energy transition in shipping, industry and policymakers need to invest in improving research and analysis for better understanding of freight market trends associated with the fuel transition in shipping.

- Monitor trends in alternative fuel prices and surcharges and improve understanding of issues at stake. Insights gained will inform the setting of freight rates and surcharges and help ensure transparent and competitive freight markets.

6. Reform and invest in port efficiency and performance

- Ports can boost efficiency through digitalization, trade facilitation and sustainable infrastructure. Stakeholder collaboration strengthens port performance and resilience.
- Port performance metrics inform decision-making and foster transparency. Governments should encourage public–private collaboration in policy reforms to enhance port infrastructure, operations and facilitate exports, imports and transit at ports. Simplifying customs processes is proven to increase sector efficiency.

7. Promote the use of electronic trade documents and related regulatory reform

- Promoting the use of electronic trade documents, including electronic bills of lading, will lead to faster transactions, lower costs and reduce costly delays. A suitable legal framework needs to be in place to make it easier to use electronic alternatives to traditional paper documentation, in particular to the negotiable bill of lading.
- Policymakers should take note of recent regulatory developments such as those in the United Kingdom and elsewhere to ensure the full legal recognition of electronic bills of lading as equivalent to traditional paper documents and, where necessary, develop relevant national legislation.
- With greater electronic interactions there are potentially growing cyber risks, which need to be effectively managed.
- UNCITRAL Working Group VI is developing a legal instrument for negotiable multimodal transport documents. All stakeholders are encouraged to actively participate in this work so the instrument will be both fit for purpose and commercially acceptable, including from the perspective of small traders in developing countries.

UNCTAD will continue to support efforts aimed at implementing sustainable and resilient freight transportation and trade logistics. Insights, knowledge products, tools and guidance developed under UNCTAD three pillars of work spanning research, technical assistance and capacity building and intergovernmental negotiations will continue to be leveraged. As an example, countries can tap into the UNCTAD technical assistance toolbox (<https://unctad.org/projects/TOOLBOX>) including the programmes on Sustainable and Resilient Transport and Logistics Services, the Automated System for Customs Data ASYCUDA, Trade Facilitation and Strengthening Knowledge and Skills for Sustainable Economic Development TrainForTrade.

Review of Maritime Transport 2023:

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