UNITED NATIONS CONFERENCE ON TRADE AND DEVELOPMENT

REVIEW OF MARITIME TRANSPORT

2023

Towards a green and just transition

United Nations

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ABBREVIATIONS

AER	Annual Efficiency Ratio
AfCFTA	African Continental Free Trade Area
AI	Artificial Intelligence
AIS	automatic identification system
ASYCUDA	Automated System for Customs Data
BCTI	Baltic Clean Tanker Index
BDI	Baltic Dry Index
BDTI	Baltic Dirty Tanker Index
BIMCO	Baltic and International Maritime Council
BSI	Black Sea Initiative
CBAM	Carbon Border Adjustments Mechanism
CIF	cost, insurance freight
CII	Carbon Intensity Indicator
CLC	International Convention on Civil Liability for Oil Pollution Damage
CO_2	carbon dioxide
CPPI	Container Port Performance Index
CTU Code	Code of Practice for Packing of Cargo Transport Units
DCS	IMO Data Collection System
dwt	dead weight tons
EAC	East African Community
EBIT	earnings before interest and taxes
EBITDA	earnings before interest, taxes, depreciation and amortization
ECA	Economic Commission for Africa
EEDI	Energy Efficiency Design Index
EEXI	Energy Efficiency Existing Ship Index
EPL	engine power limitation
EPZs	Export Processing Zones
ESCAP	United Nations Economic Commission for Asia and the Pacific
EST	Energy Saving Technology
ETS	Emission Trading System
EU	European Union
FAL Convention	Convention on Facilitation of International Maritime Traffic
FCL	Full Container Load

FEU	40-foot-equivalent unit
FOB	free on board
GDP	gross domestic product
GHG	greenhouse gas
GISIS	IMO Global Integrated Shipping Information System
GT	gross tonnage
HFO	heavy fuel oil
IAPH	International Association of Ports and Harbors
ICT	inland container terminals
IEEC	International Energy Efficiency Certificate
ILO	International Labour Organization
IMF	International Monetary Fund
IMO	International Maritime Organization
IMLI	IMO International Maritime Law Institute
IOPC-FUNDS	International Oil Pollution Compensation Funds
ITF	International Transport Workers' Federation
LDC	least developed country
LLDC	landlocked developing country
LLMC	Convention on Limitation of Liability for Maritime Claims
LNG	liquified natural gas
LPG	liquified petroleum gas
LPI	Logistics Performance Index
LSCI	Liner Shipping Connectivity Index
LSFO	low sulphur fuel oil
MARPOL Convention	International Convention for the Prevention of Pollution from Ships
MASS	maritime autonomous surface ship
MEPC	IMO Marine Environment Protection Committee
MLC 2006	Maritime Labour Convention 2006
MLETR	UNCITRAL Model Law on Electronic Transferable Records
MSC-LEG-FAL	IMO Maritime Safety, Legal and Facilitation Committees
MSWs	Maritime Single Windows
NTFCs	National Trade Facilitation Committees
OECD	Organisation for Economic Co-operation and Development

OOCL	Overseas Orient Container Line
OOIL	Orient Overseas International
OPEC	Organization of the Petroleum Exporting Countries
OSBPs	One-Stop Border Posts
PAV	Port Authority of Valencia
PCS	Port Community System
PDM	Port Data Management
PIDA	Programme for Infrastructure Development in Africa
PPS	Port Performance Scorecard
RECTS	Regional Electronic Cargo Tracking System
RORO	roll-on roll-off
SAATM	Single African Air Transport Market
SCFI	Shanghai Containerized Freight Index
SDG	Sustainable Development Goal
SEEMP	Ship Energy Efficiency Management Plan
ShaPoLi	shaft power limitation
SIDS	small island developing states
SIGMAT	Interconnected System for the Management of Transit Goods
SOLAS 1974	International Convention for the Safety of Life at Sea 1974
SOx-ECA	Emission Control Area for Sulphur Oxides
STCW 1978	Standards of Training, Certification and Watchkeeping for Seafarers 1978
STRs	Special Trade Regimes
TAH	Trans-African Highway
TEU	20-foot equivalent unit
UN	United Nations
UNCITRAL	United Nations Commission on International Trade Law
UNCTAD	United Nations Conference on Trade and Development
UNECE	United Nations Economic Commission for Europe
UNFCCC	United Nations Framework Convention on Climate Change
VLCC	very large crude carrier
VLSFO	very low sulphur fuel oil
WMU	World Maritime University
WTO	World Trade Organization

NOTE

The *Review of Maritime Transport* is a recurrent publication prepared by the UNCTAD secretariat since 1968 with the aim of fostering the transparency of maritime markets and analysing relevant developments. Any factual or editorial corrections that may prove necessary, based on comments made by Governments, will be reflected in a corrigendum to be issued subsequently.

This edition of the *Review* covers data and events from January 2022 until July 2023. Where possible, every effort has been made to reflect more recent developments.

All references to dollars ($) are to United States dollars, unless otherwise stated.

"Ton" means metric ton (1,000 kg) and "mile" means nautical mile, unless otherwise stated.

Because of rounding, details and percentages presented in tables do not necessarily add up to the totals.

Two dots (..) in a statistical table indicate that data are not available or are not reported separately.

The terms "countries" and "economies" refer to countries, territories or areas.

Since 2014, the *Review of Maritime Transport* does not include printed statistical annexes. UNCTAD maritime statistics are accessible via the following links:

All datasets: https://stats.unctad.org/maritime

Merchant fleet by flag of registration: https://stats.unctad.org/fleet

Share of the world merchant fleet value by flag of registration: https://stats.unctad.org/vesselvalue_registration

Merchant fleet by country of ownership: https://unctadstat.unctad.org/wds/TableViewer/tableView.aspx?ReportId=80100

Share of the world merchant fleet value by country of beneficial ownership: https://stats.unctad.org/vesselvalue_ownership

Ship recycling by country: https://stats.unctad.org/shiprecycling

Shipbuilding by country in which built: https://stats.unctad.org/shipbuilding

Seafarer supply: https://stats.unctad.org/seafarersupply

Liner shipping connectivity index: https://stats.unctad.org/lsci

Liner shipping bilateral connectivity index: https://stats.unctad.org/lsbci

Container port throughput: https://stats.unctad.org/teu

Port liner shipping connectivity index: https://unctadstat.unctad.org/wds/TableViewer/tableView.aspx?ReportId=96618

Port call performance (Time spent in ports, vessel age and size), annual: https://stats.unctad.org/portcalls_detail_a

Port call performance (Time spent in ports, vessel age & size), semi-annual: https://stats.unctad.org/portcalls_detail_sa

Number of port calls, annual: https://stats.unctad.org/portcalls_number_a

Number of port calls, semi-annual: https://stats.unctad.org/portcalls_number_sa

Seaborne trade: https://stats.unctad.org/seabornetrade

National maritime country profiles: https://unctadstat.unctad.org/CountryProfile/en-GB/index.html

Vessel groupings used in the *Review of Maritime Transport*

Group	Constituent ship types
Oil tankers	Oil tankers
Bulk carriers	Bulk carriers, combination carriers
General cargo ships	Multi-purpose and project vessels, roll-on roll-off (ro-ro) cargo, general cargo
Container ships	Fully cellular container ships
Other ships	Liquefied petroleum gas carriers, liquefied natural gas carriers, parcel (chemical) tankers, specialized tankers, reefers, offshore supply vessels, tugboats, dredgers, cruise, ferries, other non-cargo ships
Total all ships	Includes all the above-mentioned vessel types
Approximate vessel-size groups according to commonly used shipping terminology	
Crude oil tankers	
Ultra large crude carrier	320,000 dead weight tons (dwt) and above
Very large crude carrier	200,000-319,999 dwt
Suezmax crude tanker	125,000-199,999 dwt
Aframax/Long Range 2 crude tanker	85,000-124,999 dwt
Panamax/Long Range 1 crude tanker	55,000-84,999 dwt
Medium Range tankers	40,000-54,999 dwt
Short Range/Handy tankers	25,000-39,000 dwt
Dry bulk and ore carriers	
Capesize bulk carrier	100,000 dwt and above
Panamax bulk carrier	65,000–99,999 dwt
Handymax bulk carrier	40,000–64,999 dwt
Handysize bulk carrier	10,000–39,999 dwt
Container ships	
Neo Panamax*	Ships that can transit the expanded locks of the Panama Canal with up to a maximum 49 m beam and 366 m length overall.
Panamax	Container ships above 3,000 20-foot equivalent units (TEUs) with a beam below 33.2 m, i.e. the largest size vessels that can transit the old locks of the Panama Canal.
Post Panamax	Fleets with a capacity greater than 15,000 TEUs include some ships that are able to transit the expanded locks.

* 12-14,999 TEU 'Neo-Panamax' fleet includes some ships which are too large to transit the expanded locks of the Panama Canal based on current official dimension restrictions; 15,000+ TEU 'Post-Panamax' fleet includes some ships which are able to transit the expanded locks.

Source: Clarksons Research.

Note: Unless otherwise indicated, the ships mentioned in the *Review of Maritime Transport* include all propelled seagoing merchant vessels of 100 gross tons and above, excluding inland waterway vessels, fishing vessels, military vessels, yachts, and fixed and mobile offshore platforms and barges (with the exception of floating production storage and offloading units and drill-ships).

FOREWORD

In a world rife with cascading crises – geoeconomic fragmentation, retreating development, and climate change – maritime trade serves as a stabilizing anchor, holding fast against the turbulent currents of disruption. Over four fifths of all trade in the world flows through the high seas. This includes the crucial trade of food, energy, and other essential goods. As recent trade disruptions, and most notably that of Black Sea food exports due to the war in Ukraine have shown, in our interconnected world, billions of people need open ports and steady ships to eat, keep their lights on, and have their hospitals well-stocked.

In a context of rising trade disputes, it is therefore more imperative than ever to correctly gauge the health and prospects of maritime trade. Declining seaborne transport volumes could spell trouble to many developing countries, especially small island developing States which rely almost exclusive on this trade. This, alongside the need to monitor the challenges of the maritime transport industry in its quest for innovation and decarbonization, are the raisons d'être of the UNCTAD *Review of Maritime Transport*, whose first edition was published 55 years ago.

This 2023 edition of the *Review of Maritime Transport* paints a complex, mixed picture. On the one hand, we estimate that maritime trade volumes will continue to grow for the foreseeable future – 2.4 per cent in 2023, and 2. 1 per cent over the next five years. While this represents a slowdown from the average annual rate of maritime trade volume growth of around 3 per cent over the past four decades, it does show the limits of the notion of geoeconomic fragmentation – at least in the short- to medium-term, and in terms of volume. Our *Review* does however suggest that shipping patterns and trading routes are indeed shifting, perhaps because of growing commercial tensions and a new geography of transport and trade. A clear result of this dynamic is that the average distance travelled for several commodities is increasing. Shipments of oil cargo and grain, for example, travelled longer distances in 2023 than any other year on record.

On the other hand, we describe a maritime transport industry at a crossroads, with many forces at play reshaping the sector's roles and operating landscape. For one, maritime transport needs to decarbonize as soon as possible. In 2023, carbon emissions from international shipping were 20 per cent higher than ten years earlier. As the maritime industry embarks on this complex transformative journey towards decarbonization, it must do so while sustaining economic growth. At the same time, world shipping fleet growth is slowing down, and the average age of the world fleet is increasing. Alternative fuels are not yet available at scale and are more costly, and the ships that can use them are also more costly than traditional ships. Furthermore, developing regions, including small island developing States and least developed countries, may face higher domestic inflationary pressures due to a limited capacity to mitigate the passthrough effects of energy transition costs in shipping and the associated increase in maritime logistics costs.

Another driver of change facing the sector is digitalization. Maritime logistics is increasingly dependent on more efficient ports and digitalized processes. While the COVID-19 pandemic deeply disrupted global supply chains and logistics, it also led to an increase in innovation in the industry, with an important growth in investment for paperless digital solutions. Customs modernization, port reform, trade facilitation, and the promotion of the use of electronic trade documents will all help to achieve faster transactions, lower costs, and reduce delays. All of this will lead to more efficiency, less waste, and better results for countries and the planet.

The International Maritime Organization is discussing economic measures that could generate funds to deal with these complex questions in a holistic manner. Such measures would enable shipping decarbonization and help close the price gap between traditional and alternative fuels, while supporting the scale up of decarbonization efforts and providing support to developing countries. UNCTAD proposes that an important share of generated funds could be channelled to promote port investment in small island developing States and the least developed countries, including investment in climate change adaptation, trade and transport reforms, as well as transport and digital connectivity. Such financial and technical support can pave the way to a just and equitable energy transition in maritime transport, and UNCTAD stands ready to support countries in this mission. These and other pressing matters will be the subject of the upcoming Global Supply Chain Forum, co-hosted between UNCTAD and the Government of Barbados, which will take place between 21 and 24 May of next year in Bridgetown. We hope to see you there.

Rebeca Grynspan
Secretary-General of UNCTAD

OVERVIEW

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.

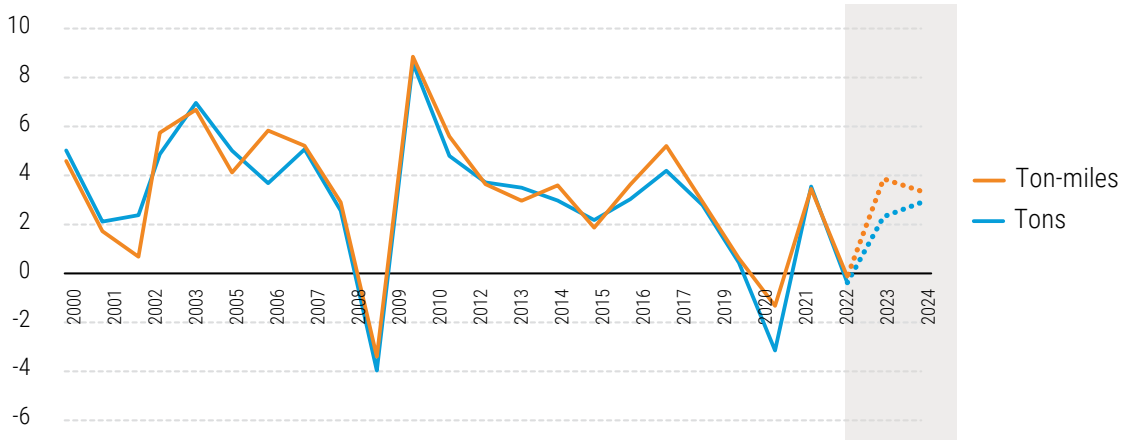
Note: UNCTAD projections are based on the estimated elasticities of maritime trade with respect to gross domestic product (GDP), export volumes, investment share in GDP as well as monthly seaborne trade data published by Clarksons Research. They also build on the GDP forecast published in the International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

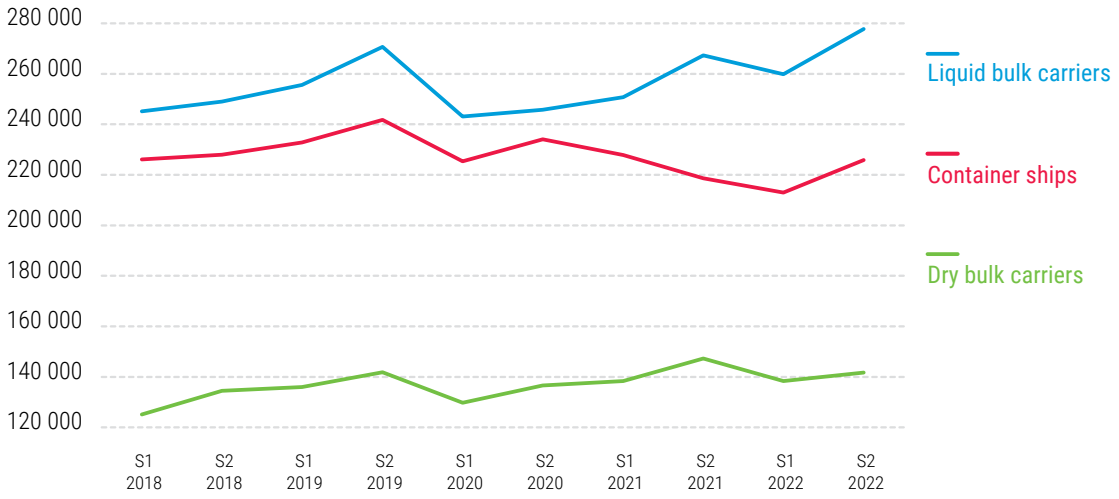


Source: UNCTAD secretariat, based on Clarksons Research, Shipping Intelligence Network timeseries (as of July 2023).
Note: 2023 data are estimated and 2024 are forecasts.

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.

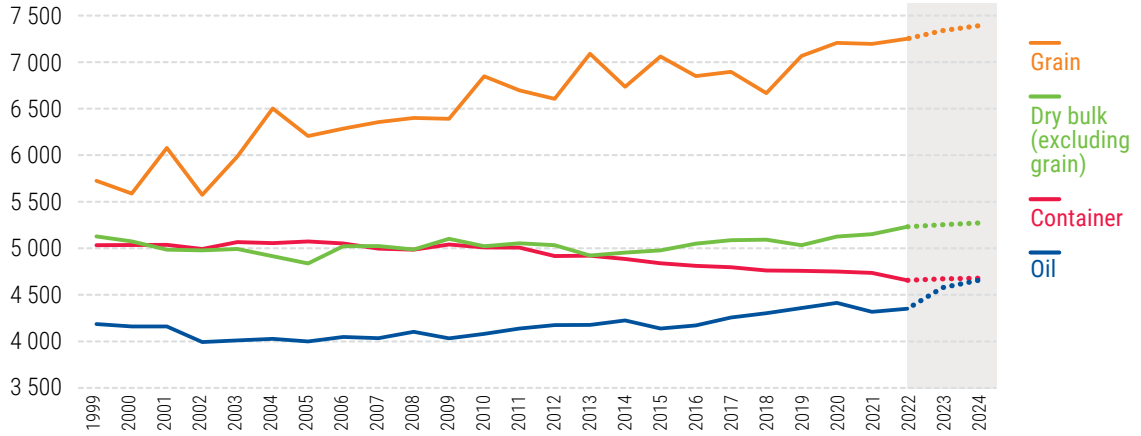
Expanding distances for oil and grain cargo

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. 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. 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).

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.

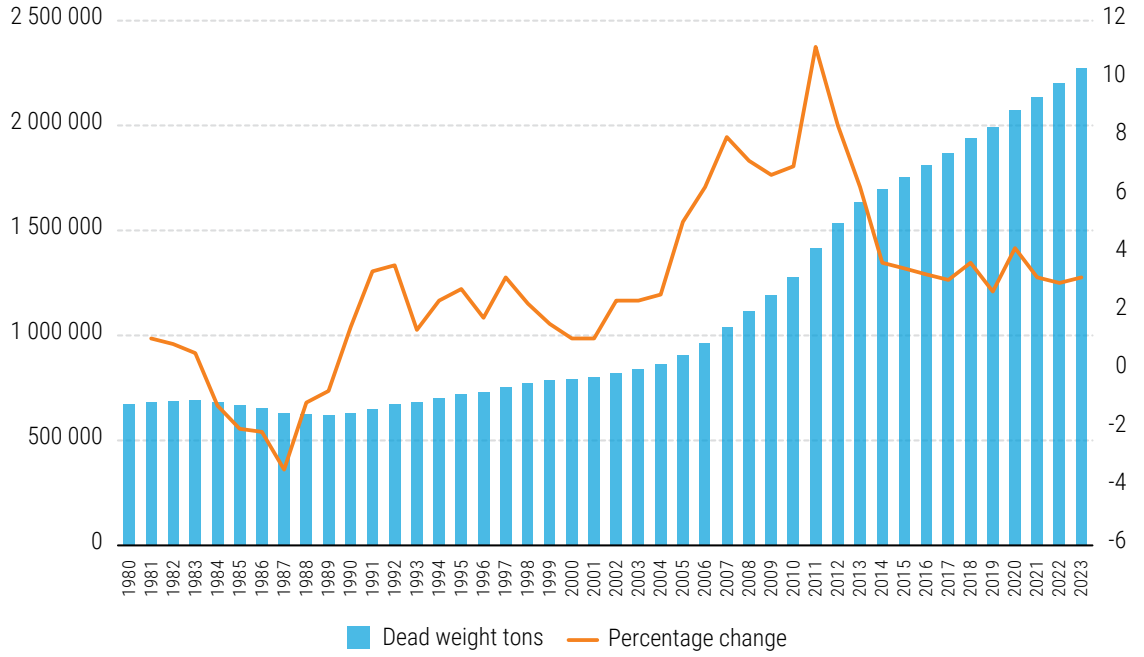
SIDS showed initial signs of recovery in their LSCI but have not yet returned to pre-pandemic levels. During the pandemic, SIDS in the Indian Ocean, Africa and the Caribbean experienced a decline in LSCI. This was attributed to ships being redeployed to more lucrative European and North American import 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 dead weight tons (figure 4).

Figure 4 **The world fleet, 1980–2023**
(Thousand dead weight tons 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. Dead weight 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 dead weight tonns was robust, at 7.1 per cent. However, reflecting 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.

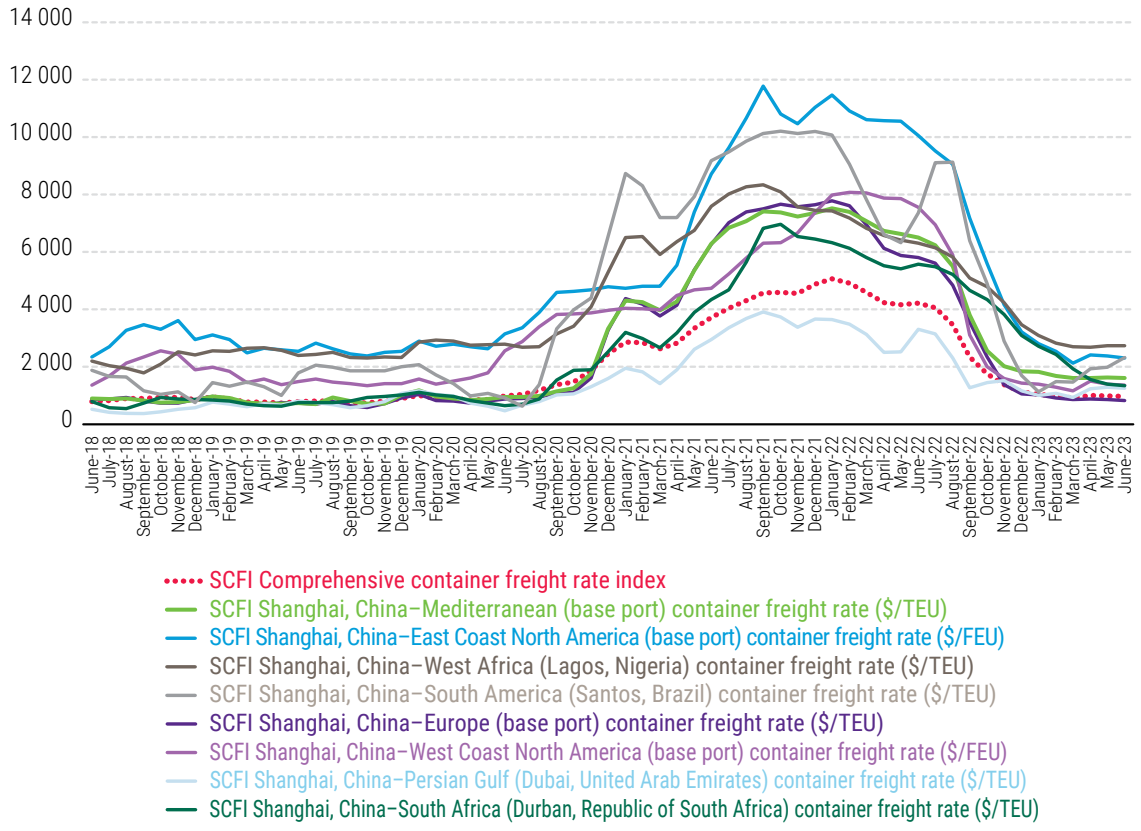
In tandem with spot freight rates, charter rates also experienced a significant decrease in 2022, albeit remaining higher than pre-pandemic levels.

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 389 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



Source: UNCTAD secretariat, based on data from Clarksons Shipping Intelligence Network, 2023.
Abbreviations: 40-foot-equivalent unit (FEU), 20-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

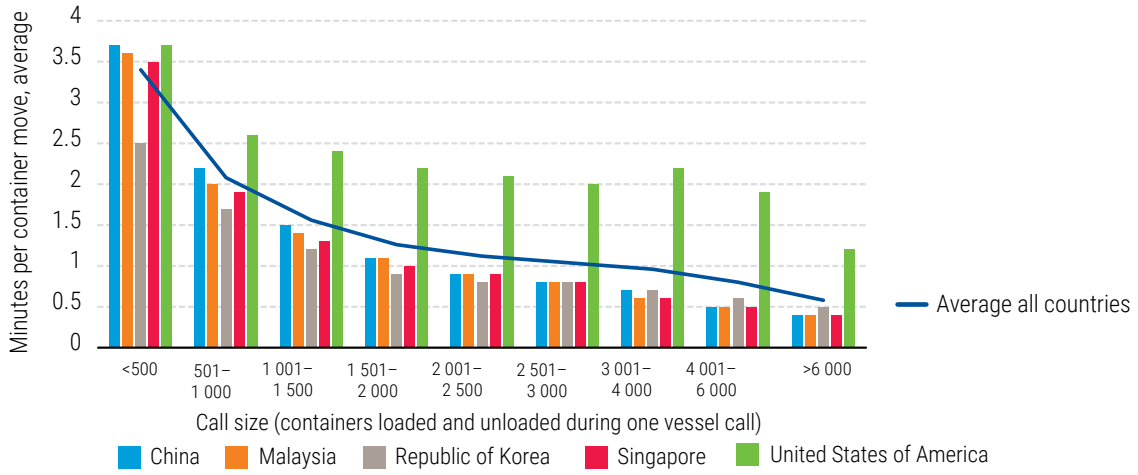
The tanker market witnessed a remarkable recovery in 2022, with both the Baltic Dirty Tanker Index and Baltic Clean Tanker Index reaching peak annual values. The war in Ukraine has contributed to sustained rates and has reshaped oil trade patterns. Oil and gas exports from the Russian Federation shifted 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



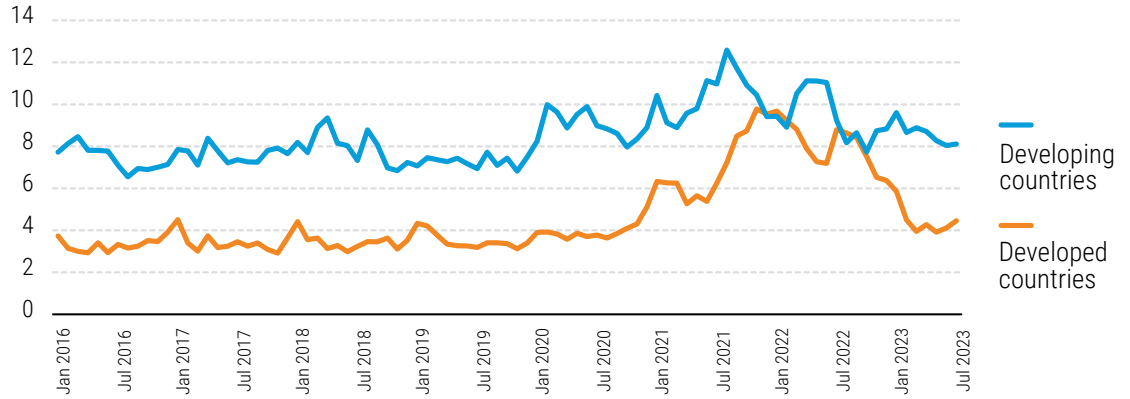
Source: UNCTAD, based on data provided by S&P Global Port Performance Program, 2023.

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).

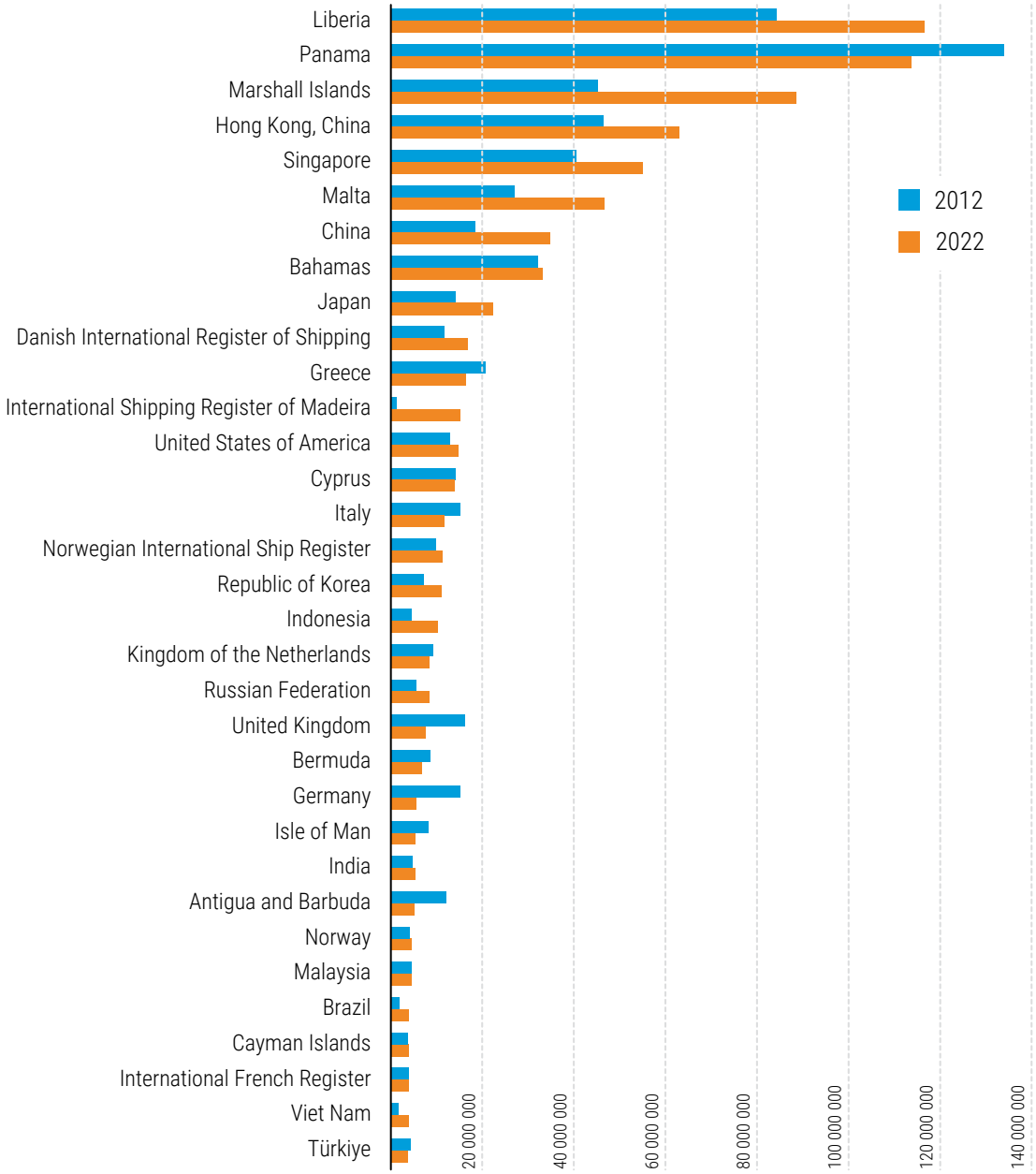
A key development took place in July 2023 as the IMO Marine Environment Protection Committee at its eightieth session adopted the Revised GHG Reduction Strategy and the GHG reduction plans moved closer to finalization. Before these are implemented, a comprehensive impact assessment of the proposed measures 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.

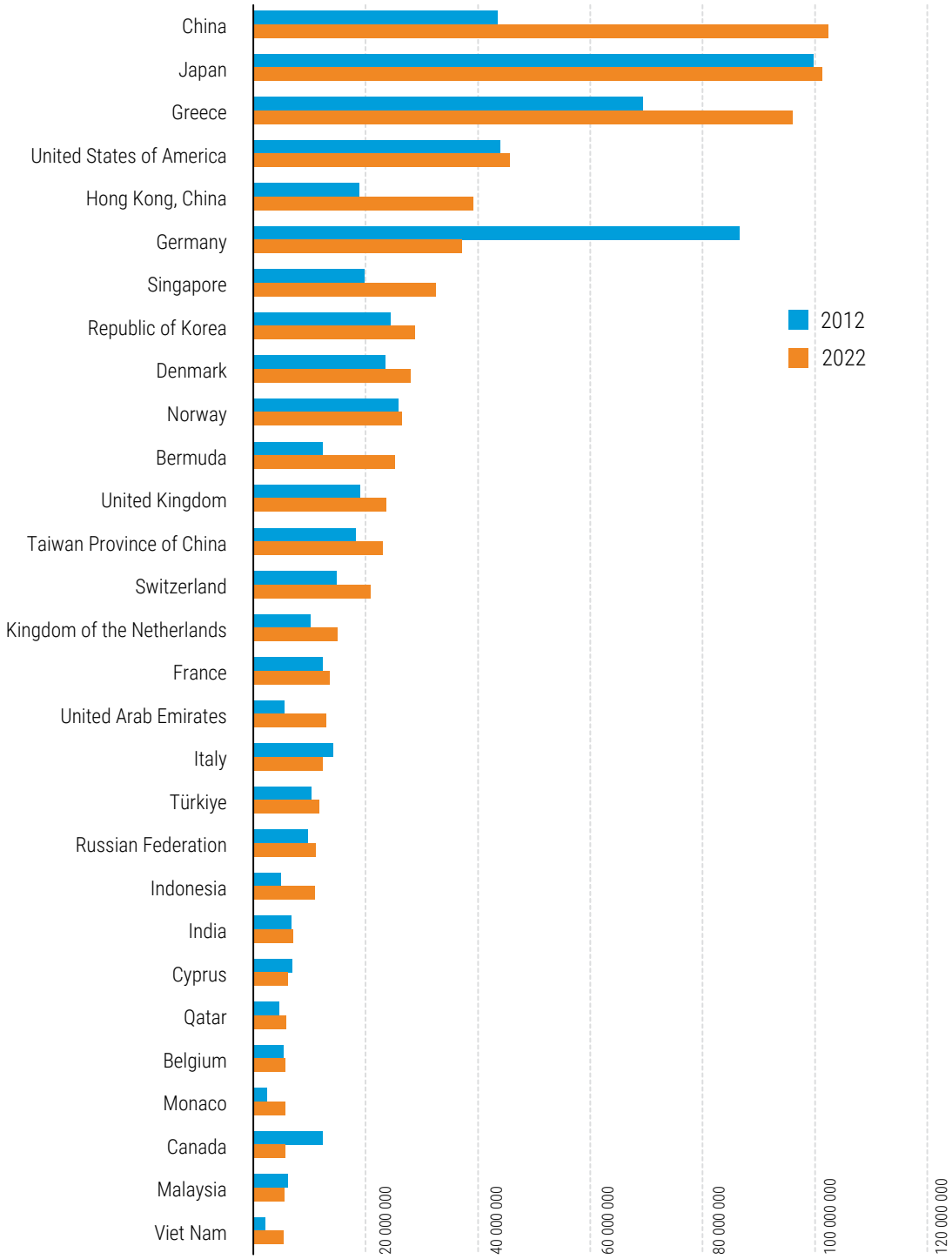
Figure 8 Carbon dioxide emissions, tons, by main flags of registration, 2012 and 2022



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 shipowning economies, namely 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 ship owning economies to intensify their efforts in improving the carbon emission performance of the global fleet.

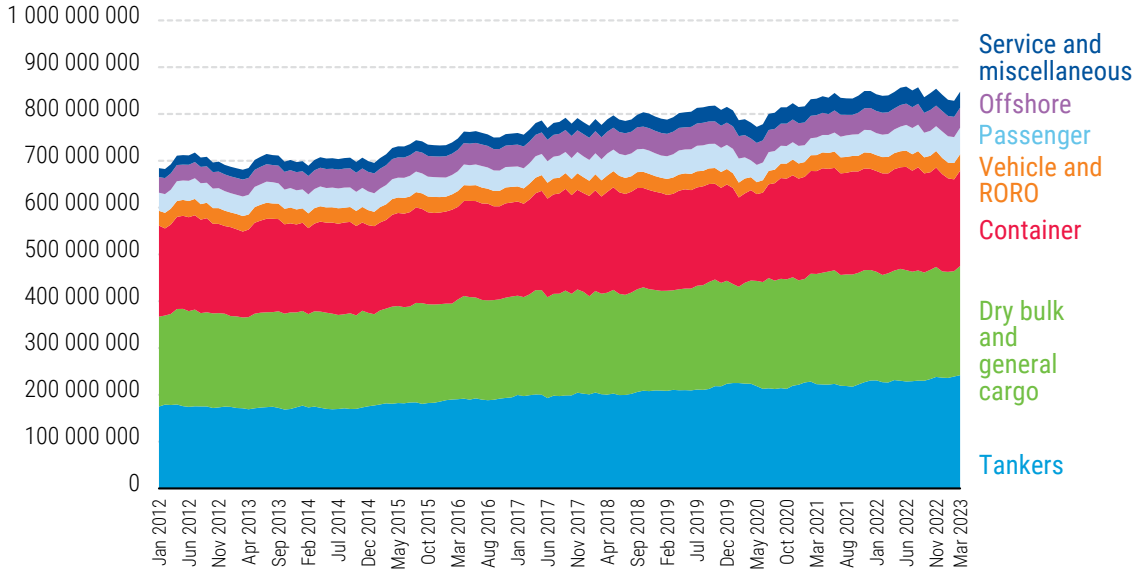
Shipowners face a conundrum

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.

1

INTERNATIONAL MARITIME TRADE

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 for the medium term (2024–2028).

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.

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.

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.

In 2023, oil cargo distances reached long-term highs, 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. 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. 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.

A. INTERNATIONAL MARITIME TRADE FLOWS

1. Maritime trade volume contracted in 2022 and is expected to grow at a slow pace

International seaborne trade volume contracted by 0.4 per cent in 2022, reaching 12,027 million tons, down from 12,072 million tons in 2021. This drop in performance comes after a strong rebound in 2021 but is dwarfed by the sharp decline observed in 2020 at the onset of the COVID-19 pandemic. The 2022 performance reflects the normalization that followed the extraordinary market surge in 2021.

Several factors influenced the weak growth in maritime trade flows in 2022 (see box 1.1). Weaker global economic growth, high inflation impacting consumer spending, the disruption caused by the war in Ukraine, and strict COVID-19 containment measures affecting the economic and trade performance of China had a particular impact (Clarksons Research, 2023a and ICC, 2023). 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.

Box 1.1 Persistent challenges impeding global economic growth and trade in 2022 and 2023

In 2022, global domestic product increased by 3.2 per cent, half the rate of the 6.1 per cent recorded in 2021(a). The war in Ukraine and other interconnected shocks impacted global economic performance, leading to a cost-of-living crisis. Growing poverty, hunger and debt distress reversed progress on several Sustainable Development Goals, midway to their 2030 deadline.

Global inflation reached a multi-decade high of about 8 per cent in 2022 and early 2023. Inflation rates vary by country groupings, with developing countries expected to reach 7.3 per cent and advanced economies 3.3 per cent in 2023 (IMF). The Middle East and Africa recorded the highest consumer price increases, particularly during the first quarter of 2023 (UNCTAD, 2023b).

Energy prices, particularly gas and coal prices, reached unprecedented highs in 2022, boosting import bills in 2022 and impacting the most vulnerable households. Prices also affected food security; between January 2020 and May 2023, the FAO food price index rose by 21 per cent, although global food prices have displayed a downward trend since mid-2022. This was due to several reasons, including trade-enabling conditions provided by the Black Sea Initiative (see section B.3).

To combat inflation, central banks around the world raised interest rates from the end of 2021. The tightening of monetary policy has increased existing debt costs and made new financing more expensive for many developing countries. It has also constrained industrial production and demand growth.

There is significant uncertainty about growth prospects, with downside factors such as geopolitical risks associated with the war in Ukraine and trade tensions, inflation and financial vulnerability negatively impacting the outlook. Global growth projections remain modest for 2023 (3.2 per cent) and 2024 (2.9 per cent) (a), supported by the reopening of the Chinese economy. Asia, particularly India, South Asia and Central Asia are projected to record the highest growth, whereas other regions will mostly see very low growth.

Global inflation is projected to remain persistently elevated in 2023, with high food and energy prices potentially deepening the cost-of-living crisis. It is expected to remain above central bank targets in 2023 and above the 2000–2019 average and to gradually decline, reaching pre-pandemic levels, towards the end of 2024 (a).

Box 1.1 Persistent challenges impeding global economic growth and trade in 2022 and 2023 *(cont.)*

Merchandise trade growth has also been slowing down. In 2022, volumes increased modestly by 2.7 per cent, representing a sharp decline from the 9.4 per cent rebound witnessed in 2021 (c). During the first quarter of 2023, trade grew by 1.9 per cent, driven by the revival of economic activity in China, and by an increase in the trade of road vehicles and pharmaceuticals (UNCTAD, 2023c). During the last two years, trade grew more in value terms than in volume terms, driven mainly by rising commodity prices and inflation. The outlook for global trade for 2023 is pessimistic, with an expected annual growth rate of 1.7 per cent (c) and -0.6 per cent for the second quarter of 2023 (b). Trade growth is projected to improve to 3.2 per cent in 2024 (c).

Sources: IMF (2023) World Economic Outlook 2023 Update. Gloomy and More Uncertain, July 2023; OECD (2023) Economic Outlook, Volume 2023 Issue 1, June 2023; UNCTAD (2023a) Nowcast; UNCTAD (2023b) Pulse of the Global Crisis; UNCTAD (2023c) Global Trade Update, June 2023: Global trade growth returns but outlook is poor); United Nations (2023) World Economic Situation and Prospects, Mid-year update, May 2023 and WTO (2023) Global Trade Outlook and Statistics, 5 April 2023.

Notes: (a) reflects projections by IMF – July 2023; (b) by UNCTAD – Nowcast, last accessed on 28 July 2023 and (c) by WTO - April 2023.

Bearing in mind the ongoing uncertainty and downside risks surrounding the economic prospects, UNCTAD projects total seaborne trade to grow by 2.4 per cent in 2023, an improvement over the contraction of 2022. UNCTAD forecasts[1] maritime trade to expand at an average annual growth rate of 2.1 per cent during the period 2024–2028 (table 1.1). This is below the 3 per cent historical average growth rate of the past three decades.

Table 1.1 International maritime trade development 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 and forecasts published by Clarksons Research (July 2023).

Note: UNCTAD projections are based on the estimated elasticities of maritime trade concerning 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, July 2023 World Economic Output.

2. Above-average growth in energy trade carried in tankers and moderate growth for dry bulk trade projected for 2023

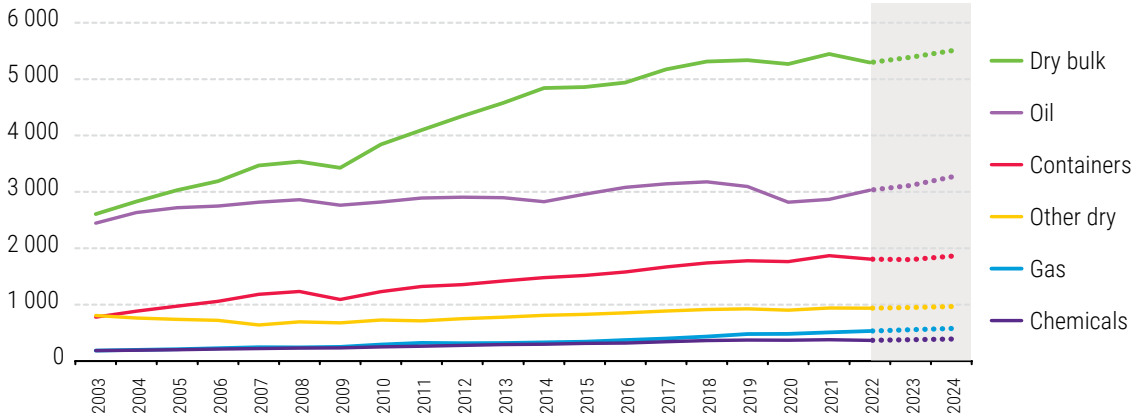
In 2022, seaborne trade volumes continued to be dominated mainly by dry bulk and oil shipments, followed by containerized trade (figure 1.1).

Oil[2] and gas[3] trade volumes witnessed the highest annual growth rates among cargo types in 2022, at 6 per cent and 4.6 per cent respectively. In the case of oil, this growth rate, as well as the rates projected for 2023 and 2024, significantly exceeds the 10-year average compound rates of the periods 1992–2002, 2002–2012 and 2012–2022 (Clarksons, 2023e).

This reflects greater demand for fuels with the easing of the pandemic and the return to normality leading to spending on energy-intensive services such as transport and travel, marking a recovery from the lows of 2020–2021. In addition, factors such as energy security and geopolitics have also contributed to this growth. These factors are expected to persist in 2023, leading to further growth in the energy trade and the gas trade in particular (Clarksons, 2023g). This is primarily driven by the need for enhanced energy security and a growing environmental agenda.

In contrast, containerized and dry bulk shipments declined by -3.7 and -2.9 per cent respectively in 2022. The performance of containerized trade in the second half of 2022 and the first half of 2023 largely reflects

Figure 1.1 International maritime trade, 2003–2024
(Million tons loaded)



Source: UNCTAD secretariat, based on Clarksons Research, Shipping Intelligence Network time series (July 2023).

Notes: 2023 and 2024 are forecast. "Dry bulk" includes major bulks (iron ore, coal and grain) and minor bulks (metals, minerals, agribulks and softs); "Oil" encompasses crude oil and refined oil products; "Other dry" is an estimation of all other dry trade that is not included in major/minor bulks, for instance, cars and other vehicles, roro and project cargoes, as well as reefer cargoes that don't go in containers and breakbulk cargoes that are not in the minor bulk category; "gas" includes LPG, LNG and ammonia.

the less favourable macroeconomic trends and a return to normal after the unusual post-COVID-19 surge in container trade demand, which expanded at a solid 6.2 per cent over 2020.

For 2023, UNCTAD forecasts containerized trade volumes to increase by 1.2 per cent. The outlook for containerized trade remains weak in 2023 given the overall macroeconomic and operating landscape. A potential improvement in global economic conditions and the recovery of China from the disruption caused by the COVID-19 pandemic and consequent economic slowdown could support sector performance during the second semester of 2023 (Clarksons, 2023f). However, UNCTAD forecasts a growth rebound starting in 2024 of around 3 per cent p.a. (table 1.1). These growth rates remain well below the average rates witnessed during the periods 1992–2002 (8.7 per cent) and 2002–2012 (7.2 per cent) (Clarksons, 2023e).

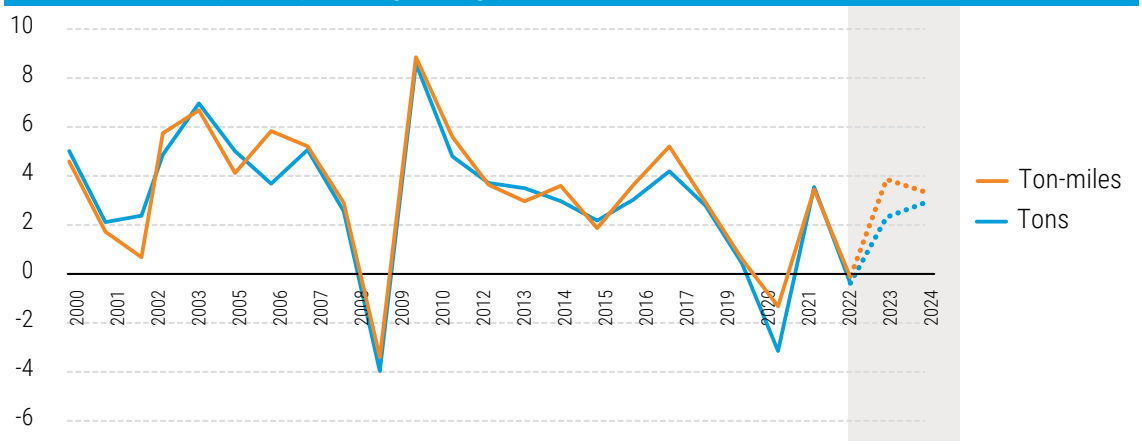
In 2022, dry bulk shipments declined due to the disrupted Ukrainian exports, high energy prices (which affected various energy-intensive industries that use dry bulk commodities as an input) and trends in the Chinese economy, including the sharp decline in investment in the Chinese real estate sector (Clarksons, 2023b and Danish Ship Finance, 2022). Demand for major dry bulks improved in 2023 driven by subsequent economic recovery in China. Grain and minor bulk shipments totalled 535 and 2,117 million tons respectively, representing a 3.8 and a 1.9 per cent growth rate compared to 2022 (Clarksons, 2023e). Bulk demand is projected to grow modestly within the 1.5–2.5 per cent range in 2023 (BIMCO, 2023). Improvements in bulk trade could materialize in 2024, depending on the easing of the global macroeconomic situation, increased coal consumption and production in China and India, the pace of the energy transition, and the war in Ukraine.

3. Distance travelled by sea of refined oil products, crude oil and grain reaches record highs

Seaborne trade, both in tons and in ton-miles declined in 2022. In 2023 and 2024 ton-miles are projected to grow more than tons, reflecting growth in distances travelled, with the gap between the two reducing in 2024 (figure 1.2). Closely monitoring trends in ton-miles, as discussed in sections B.1 and B.2, is essential to understand if a long-term shift in the geography of shipping and trade is at play. This assessment also involves examining key factors such as the impact of the war in Ukraine on trading and shipping patterns, the pursuit of energy security, and the adoption of low-carbon energy sources. These elements are significantly influencing trade flows and the demand for shipping services.

Over the past decade, the average distance travelled by seaborne trade increased for oil and dry bulk commodities but fell in the case of containerized trade (UNCTAD, 2022a). The average distance travelled by one ton of grain was 5,574 nautical miles in 2002 and increased to 7,251 in 2022. For oil commodities (including crude oil and refined oil products) this measure was 3,993 nautical miles in 2002, increasing to 4,350 in 2022. The average distance travelled by one ton of dry bulk commodities (excluding grains) was

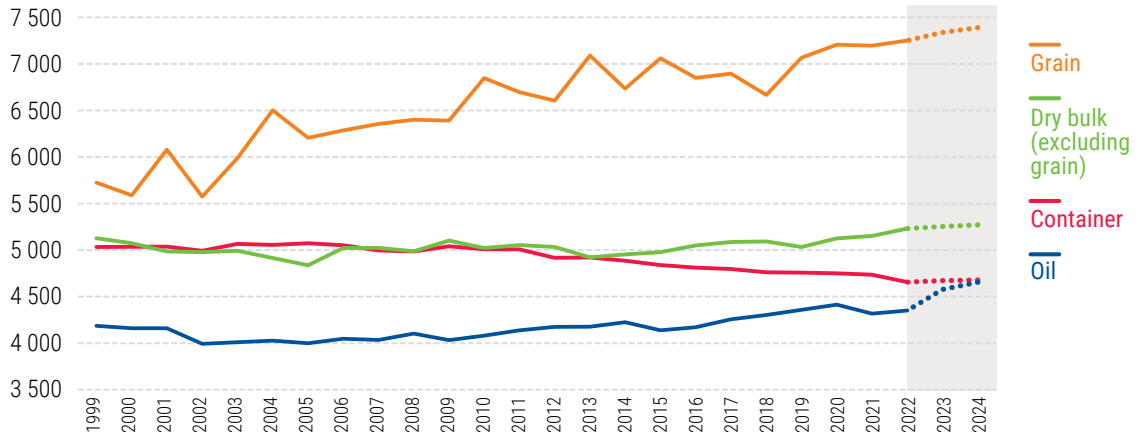
Figure 1.2 Seaborne trade growth, tons and ton-miles, 2000–2024
(Annual percentage change)



Source: UNCTAD secretariat, based on Clarksons Research, Shipping Intelligence Network time series (July 2023).
Note: 2023 and 2024 are forecast.

4,978 nautical miles in 2002 and increased to 5,231 in 2022. These cargo types are expected to reach long-time records in 2023, namely 7,338 nautical miles for grain, 5,253 nautical miles for other dry bulk commodities, and 4,578 nautical miles for oil cargo (figure 1.3).

Figure 1.3 Distance travelled per ton of maritime cargo, 1999–2024
(Nautical miles)



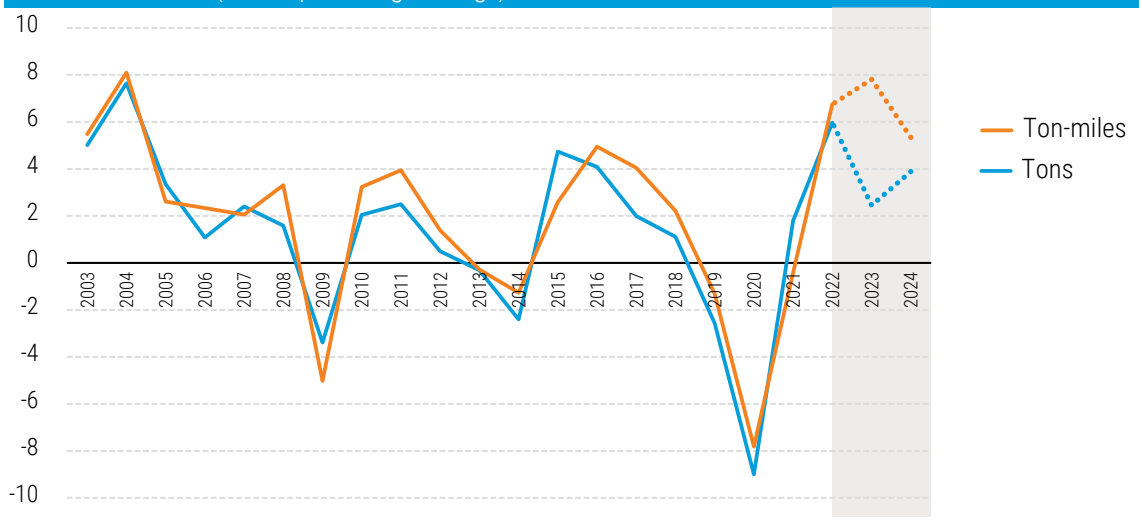
Source: UNCTAD secretariat, based on Clarksons Research, Shipping Intelligence Network time-series (July 2023).
Notes: 2023 and 2024 are forecast. "Oil" includes crude oil and refined oil products.

Growth in distances travelled of oil cargo reflects structural shifts in the energy production and distribution sectors and imbalances in supply and demand. The shale revolution in the United States, coupled with the lifting of the crude oil export ban in 2015, led to an increase in oil cargo shipments from the United States to Asia.

At the same time, the growing refining capacity in Asia has increased demand for crude oil shipments from the Atlantic basin. Meanwhile, demand for refined oil products in Asia, especially China, and exports of refined oil products from Asia have also changed the direction of flows and distances travelled. As for dry bulk shipments, large consumption in China of iron ore, coal and grains and minor bulks used in steel production have been a major driver in dry bulk trade shipments and distances travelled with many of these commodities being sourced from the Argentina, Brazil and United States.

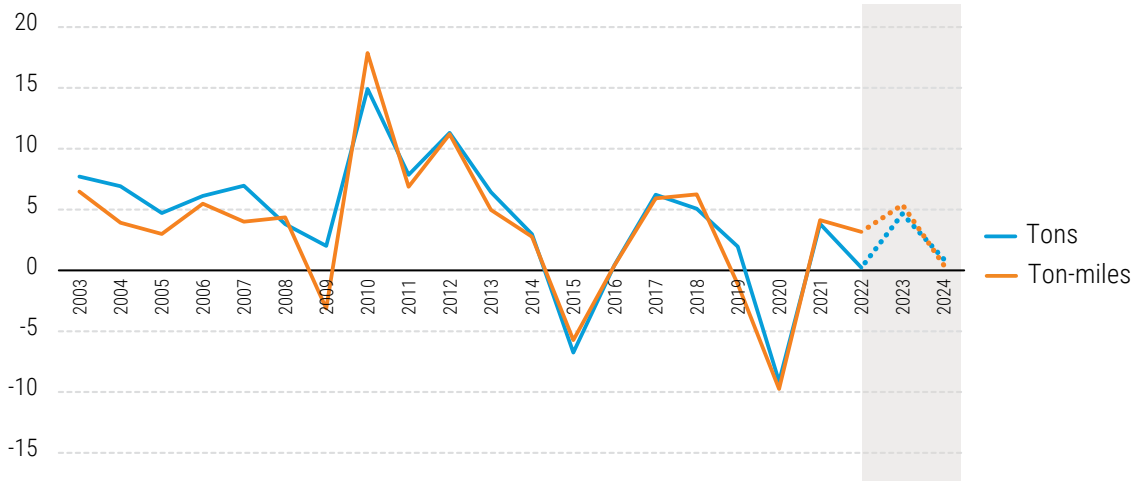
Since 2022, a gap is observed between ton and ton-mile growth in the case of oil and oil products, and coal (figure 1.4 and figure 1.5). Growth in ton-miles seems to have been heightened by the war in Ukraine in the case of these three products. In 2023, refined oil products, liquefied petroleum gas (LPG) and crude oil trade are expected to witness the largest increases in ton-miles that exceed growth in trade volumes (Clarksons, 2023e).

Figure 1.4 Crude oil and refined oil products seaborne trade growth, tons and ton-miles, 2003–2024
(Annual percentage change)



Source: UNCTAD secretariat, based on Clarksons Research, Shipping Intelligence Network time series (July 2023).
Notes: 2023 and 2024 are forecast.

Figure 1.5 Coal seaborne trade growth, tons and ton-miles, 2003–2024
(Annual percentage change)



Source: UNCTAD secretariat, based on Clarksons Research, Shipping Intelligence Network time series (July 2023).
Note: 2023 and 2024 are forecast.

If sustained and inclusive, this development could lead to trade diversification opportunities and shifts in the geography of trade that may enable new players to emerge as importers and exporters. However, for the end user or the consumer, alternative cargo sourced from further away may entail greater shipping costs and result in higher import prices. For shipping companies, increasing ton-miles implies a larger demand for shipping capacity that may require investment in more ships and support better fleet utilization and earnings.

However, this gap is expected to reduce in 2023 and 2024. In the case of oil and oil products specifically, starting in 2024, growth in tons is expected to increase while growth in ton-miles is expected to slow down. This reflects lower growth in distances travelled (5.3 per cent in 2024) compared with 2023 (about 7.8 per cent) (Clarksons, 2023e). This suggests that growth in ton-miles exceeding volumes induced by the war in Ukraine was a cyclical change in the usual patterns, as opposed to a structural shift.

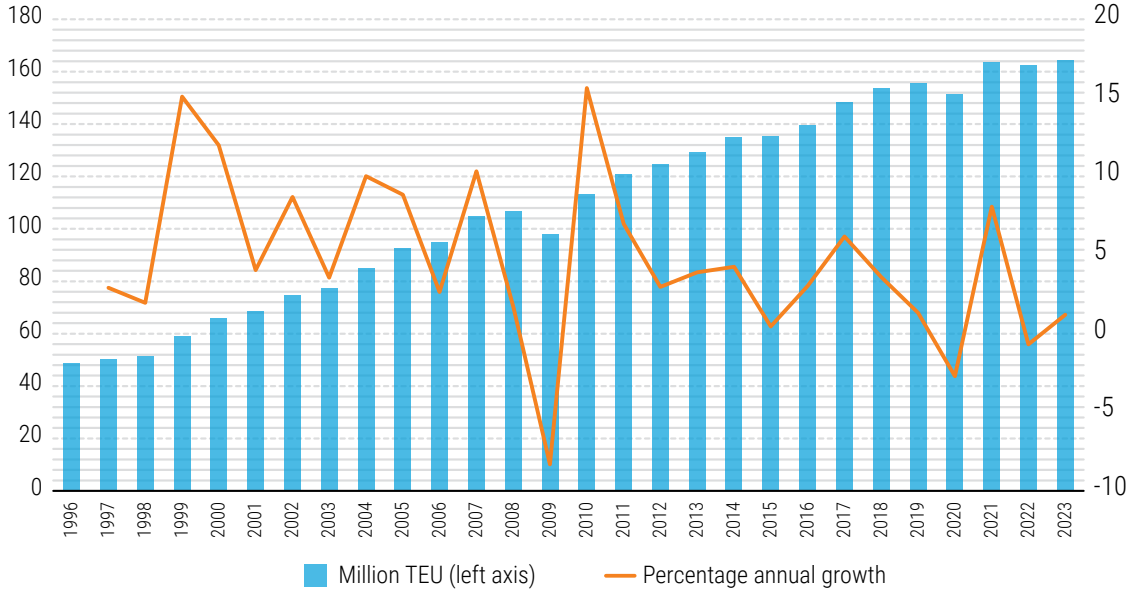
4. Modest recovery in containerized trade in 2023

In 2022, global containerized trade volumes declined marginally by -0.7 per cent, reaching 163 million 20-foot equivalent units (TEUs), down from 164 million TEUs in 2021 and in sharp contrast to the surge in volumes recorded in 2021 (8.1 per cent), as illustrated in figure 1.6. UNCTAD forecasts that containerized

seaborne trade will grow by 1.2 per cent in 2023 and will grow modestly, as macroeconomic challenges ease, with around 3 per cent per year for containerized trade starting in 2024 (see table 1.1 and annex).

Global containerized trade has been on a roller coaster ride since the COVID-19 pandemic. While the market boomed in 2021 and during much of the first half of 2022, the situation changed dramatically by the second half of the year and returned to normal pre-COVID-19 levels. Significant differences were observed across regions in terms of annual changes in containerized trade (box 1.2).

Figure 1.6 Global containerized trade, 1996–2023
(Million 20-foot equivalent units and percentage annual change)



Source: UNCTAD secretariat, based on data from MDS Transmodal (MDST), World Cargo Database, 1 June 2023.

Box 1.2 Seaborne containerized trade performs differently across sub-regions

Since 2020, containerized trade has faced an unprecedented rise in shipping rates, difficulties of trade logistic systems to adapt effectively to supply and demand abrupt changes, less frequent port calls, port congestion and labour-related issues. As a result, disruptions in maritime supply chains have been widespread at a global level, prompting a substantial drop in seaborne containerized cargo volumes.

However, impacts differed across regions, as shown in the table below. Effects were more marked in Latin America than in other regions, with a reduction of almost six percentage points in container volumes in 2020 compared to the previous year. By the end of 2022, although the gap had narrowed, the total ended below the levels of 2019.

Annual changes in containerized international seaborne trade (Sum of exports and imports) by sub-region, 2019 = 100

	2019	2020	2021	2022
Sub-Saharan Africa	100	96.4	98.2	98.1
North America	100	100.5	109.4	101.6
Latin America	100	94.3	101.9	96.5
Australasia and Oceania	100	100.6	101.9	97.4
Europe	100	97.0	101.9	94.5
Asia	100	99.9	106.3	104.0
Indian Subcontinent and Middle East	100	96.9	98.0	101.6
Global	100	98.7	104.5	100.9

Source: Barleta and Saade (2023), based on Container Trade Statistics (CTS), 2019–2022.

Box 1.2 Seaborne containerized trade performs differently across sub-regions (*cont.*)

Performances diverged among and within regions and across the type of trades. Some of the main ports in the region such as Panama, show that the Caribbean coast of Panama recovered more quickly and showed better results in exports (+15 per cent exports vs. -15 per cent imports) in 2022 compared with 2019 whereas the Panamanian Pacific coast experienced a 14 per cent increase in imports against a -11 per cent decline in exports.

As the world appears to be returning to previous levels and normalizing after the volatility of recent years, many questions remain about the future of seaborne trade in the Latin American and Caribbean region. A more resilient future will require mechanisms that consider global variations, route changes, industry concentration and regional inequalities. It will also require addressing the historic and substantial infrastructure gap related to connectivity between ports and the region's economic hinterland. This infrastructure gap poses a significant obstacle to development in countries from this region, making it a crucial aspect to address in building resilience. The considerable investment needed at a time when countries and Governments are under severe economic pressure and lack resources constitutes a major hurdle.

Tighter and more efficient resource planning is needed, together with more creative financing mechanisms. Extensive planning, financing and regulatory efforts are required to ensure an integrated Latin American and Caribbean region that can navigate future disruptions and leverage seaborne trade opportunities more effectively.

Source: UN-ECLAC, based on Eliana Barleta y Miryam Saade Hazin: "Challenges for the maritime sector: after the storm, comes the calm?" Economic Commission for Latin America and the Caribbean, Santiago, 2023; and Economic Commission for Latin America and the Caribbean: "International Trade Outlook for Latin America and the Caribbean 2022", LC/PUB.2022/23-P, Santiago, 2023.

By the third quarter of 2022, normalization in market conditions started to show, reflecting the fading away of the boost generated by various COVID-19-related drivers. Demand moderated and volumes weakened, reflecting the end of the stimulus spending effect, especially in the United States; the impact of inflation, including on global consumer demand; more destocking and inventory draws, as well as a recovery of services trade.

By late 2022, containerized trade had tempered the bullish market conditions seen in 2021 and early 2022, when freight rates had soared, the orderbook surged, and port congestion reached record highs. The average container capacity held up in ports increased from about 31 per cent in 2019 to 35 per cent in 2021 and 2022 (Clarksons, 2023h). A softening in container shipping demand has helped to ease the global logjam in the maritime supply chain, with the average number of vessels waiting in ports now back to their pre-pandemic levels (see also chapter 4, and Danish Ship Finance, 2023).

5. Containerized trade flows on the main East-West routes contract, while intraregional trade grows

Table 1.2 shows the bidirectional flows of containerized trade over the main East-West trade routes. The transpacific route, involving trade between East Asia and more specifically China and the United States, continued to dominate global containerized trade flows in 2022. However overall volumes transported on this route contracted by -6.5 per cent, reducing volumes from 30 million TEUs in 2021 to 28 million TEUs in 2022. Volumes on the Asia-Europe route also declined by -4.9 per cent in 2022, whereas flows from Europe heading to the North American East Coast increased by nearly 2 per cent. These developments reflect a weakening in the container shipping market in the second half of 2022.

In 2023, after a sluggish start to the year, ocean carriers shifted capacity from transatlantic routes (more resilient in 2022, encompassing non-consumer goods, whose imports were less affected by the slowdown in demand) back to transpacific routes where spot rates were projected to increase, albeit remaining lower than pre-pandemic levels (Knowler, 2023; and Tirschwell, 2023).

Despite the drop in volumes observed in 2022, table 1.3 underscores the continued predominance of the main East—West routes (37.5 per cent). However, the importance of intraregional routes, whose share amounted to 27.6 per cent in 2022, remains significant. It reflects dynamic intra-Asian container shipping activity and the manufacturing supply chain specific to East Asian countries. Other routes involving the participation of developing countries include the non-mainline routes (e.g., Indian Sub-Continent to Europe) with a 13.2 per cent share, followed by South—South trades (e.g. Africa—Latin America and the Caribbean) which contributed 12.5 per cent to global containerized trade in 2022.

Table 1.2 Containerized trade on major East—West trade routes, 2014–2022
(Million 20-foot equivalent units and percentage annual change)

	Trans-Pacific			Asia–Europe			Transatlantic		
	Eastbound	Westbound		Eastbound	Westbound		Eastbound	Westbound	
	East Asia-North America	North America-East Asia	Total Trans-Pacific	Northern Europe and Mediterranean to East Asia	East Asia to Northern Europe and Mediterranean	Total Asia-Europe	North America to Northern Europe and Mediterranean	Northern Europe and Mediterranean to North America	Total Transatlantic
2014	16.2	8.2	**24.4**	7.3	14.7	**22.0**	2.9	4.1	**6.9**
2015	17.4	8.1	**25.5**	7.4	14.3	**21.7**	2.8	4.3	**7.1**
2016	17.3	7.9	**25.2**	7.8	14.8	**22.6**	2.8	4.4	**7.1**
2017	18.5	7.8	**26.3**	8.1	15.7	**23.9**	3.0	4.7	**7.7**
2018	19.8	7.9	**27.7**	8.3	16.7	**25.0**	3.1	4.9	**8.1**
2019	19.1	7.4	**26.4**	8.6	16.9	**25.5**	3.0	5.1	**8.1**
2020	20.0	7.3	**27.3**	8.5	15.8	**24.3**	2.6	5.0	**7.6**
2021	23.8	6.4	**30.2**	8.2	17.3	**25.5**	2.7	5.6	**8.3**
2022	22.4	5.8	**28.2**	7.0	17.2	**24.2**	2.6	5.8	**8.5**
Percentage annual change									
2014–2015	7.5	-2.2	**4.2**	0.5	**-2.8**	-1.7	-3.0	5.3	**1.9**
2015–2016	-0.8	-2.1	**-1.2**	6.0	**3.2**	4.2	0.4	1.4	**1.0**
2016–2017	7.0	-0.7	**4.6**	4.3	**6.6**	5.8	7.1	7.6	**7.4**
2017–2018	7.1	1.0	**5.3**	2.2	**5.8**	4.6	4.4	5.5	**5.1**
2018–2019	-3.7	-7.0	**-4.7**	2.9	**1.4**	1.9	-2.4	3.4	**1.2**
2019–2020	4.8	-0.7	**3.3**	-1.2	**-6.5**	-4.7	-12.8	-2.5	**-6.3**
2020–2021	19.2	-12.8	**10.6**	-3.4	**9.6**	5.0	1.5	12.6	**8.8**
2021–2022	-5.9	-8.5	**-6.5**	-14.4	**-0.4**	-4.9	-1.4	3.5	**1.9**

Source: UNCTAD secretariat, based on MDS Transmodal (MDST), World Cargo Database, 1 June 2023.

Table 1.3 Global containerized trade by route, 2020–2022
(Market shares in percentages)

	2020	2021	2022
Main East West	39.1	39.1	37.5
Intraregional	26.9	26.5	27.6
Non-mainlane East West	12.7	12.8	13.2
South—South	12.2	12.3	12.5
North—South	9.1	9.3	9.1
	100.0	100.0	100.0

Source: UNCTAD secretariat, based on data from MDS Transmodal (MDST), World Cargo Database, 1 June 2022.

Notes: Non-mainlane East—West: Trade involving Western Asia and the Indian Sub-continent, Europe, North America, and East Asia. North—South: Trade involving Oceania, Sub-Saharan Africa, Latin America, Europe, and North America. South—South: Trade involving Oceania, Western Asia, East Asia, Sub-Saharan Africa, and Latin America.

As noted above, weaker global demand, elevated inflation, large inventories and destocking, and the continued COVID-19 logistical legacies, especially in China, all contributed to the negative performance on the main East—West Asian trades. Accordingly, table 1.4 shows that trade flows on the main East—West trade lanes involving East Asia, Europe and North America declined by nearly 5 per cent. In contrast, trade on the non-mainlane routes (i.e. routes other than the main transpacific, Asia—Europe and transatlantic lanes) recorded a volume increase of nearly 2 per cent in 2022, and intraregional trade, reflecting to a large extent the intra-Asian shipments, increased by over 3 per cent in 2022 compared with 2021.

Table 1.4 Containerized trade on main East—West and other containerized trade routes, 2015–2022
(20-foot equivalent units and percentage annual change)

	2015	2016	2017	2018	2019	2020	2021	2022
					TEU			
Main East—West routes	**54 196 409**	**54 867 319**	**57 869 249**	**60 743 741**	**60 011 073**	**59 172 534**	**63 966 110**	**60 925 992**
Other routes	**81 280 939**	**84 710 760**	**90 339 411**	**92 821 282**	**95 588 032**	**92 209 405**	**99 653 295**	**101 589 452**
Of which								
Non-mainlane East West	*18 149 559*	*18 853 201*	*20 051 005*	*19 961 618*	*20 694 108*	*19 275 390*	*21 004 670*	*21 518 388*
North—South	*13 197 138*	*13 458 901*	*14 156 828*	*14 475 542*	*14 537 104*	*13 808 441*	*15 137 204*	*14 842 761*
South—South	*15 270 831*	*16 123 617*	*17 644 339*	*18 220 186*	*19 074 587*	*18 451 584*	*20 118 813*	*20 387 978*
Intraregional	*34 663 410*	*36 275 041*	*38 487 239*	*40 163 936*	*41 282 233*	*40 673 989*	*43 392 607*	*44 840 326*
World total	**135 477 348**	**139 578 080**	**148 208 660**	**153 565 023**	**155 599 105**	**151 381 939**	**163 619 405**	**162 515 444**
					Percentage change			
		2016	2017	2018	2019	2020	2021	2022
Main East—West routes		**1.2**	**5.5**	**5.0**	**-1.2**	**-1.4**	**8.1**	**-4.8**
Other routes (Non-main lanes)		**4.2**	**6.6**	**2.7**	**3.0**	**-3.5**	**8.1**	**1.9**
Of which								
Non-mainlane East West		*3.9*	*6.4*	*-0.4*	*3.7*	*-6.9*	*9.0*	*2.4*
North—South		*2.0*	*5.2*	*2.3*	*0.4*	*-5.0*	*9.6*	*-1.9*
South—South		*5.6*	*9.4*	*3.3*	*4.7*	*-3.3*	*9.0*	*1.3*
Intraregional		*4.6*	*6.1*	*4.4*	*2.8*	*-1.5*	*6.7*	*3.3*

Source: UNCTAD secretariat, based on data from MDS Transmodal (MDST), World Cargo Database, 1 June 2023.

Notes: Non-mainlane East West: Trade involving Western Asia and the Indian Sub-continent, Europe, North America, and East Asia.
North—South: Trade involving Oceania, Sub-Saharan Africa, Latin America, Europe, and North America.
South—South: Trade involving Oceania, Western Asia, East Asia, Sub-Saharan Africa, and Latin America.

B. CONTINUED DISRUPTIONS TO SHIPPING AND PORTS THREATEN ENERGY AND FOOD SECURITY

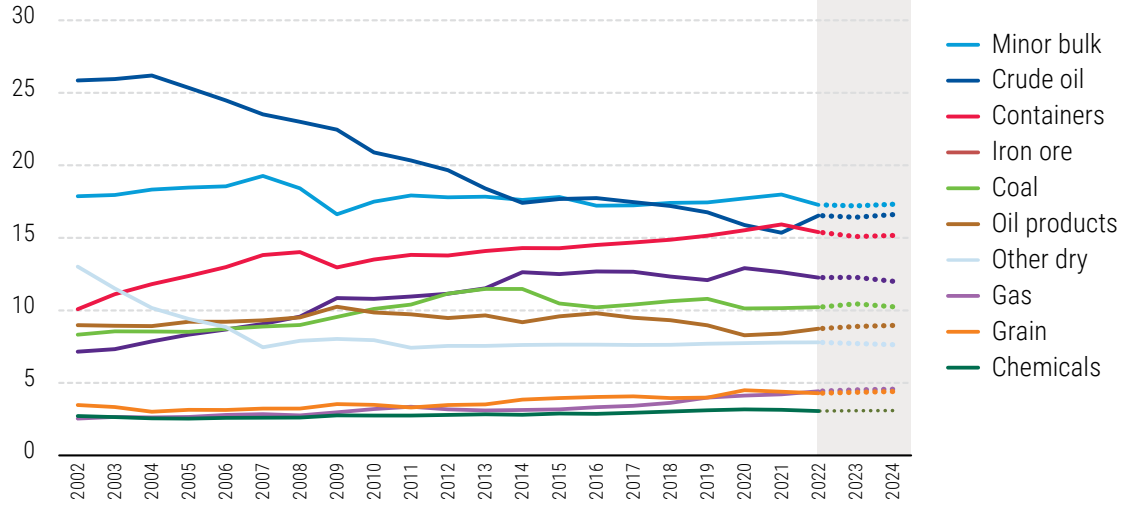
1. Changing energy trade patterns amid rising energy security requirements

Since the COVID-19 pandemic, disruption to global logistics, in particular shipping and ports has been reshaping trade flows and supply chains. The ongoing war in Ukraine continues to affect maritime transport and trade. It has disrupted fossil fuel markets, as the Russian Federation is the leading exporter of natural gas and the second-largest exporter of oil. This disruption exacerbated the challenges experienced during the pandemic, when demand was reduced and supply contracted in the first phase, to be followed by surging demand that outpaced supply, resulting in extremely high and volatile prices. After the war erupted, natural gas prices reached record highs, causing electricity prices to surge in some markets, and oil prices to soar to their highest levels since 2008 (IEA, 2023a). For example, immediately after the war in Ukraine started, energy prices reached a 20 per cent increase for five months straight, with WTI crude oil price jumping 15.3 per cent, from $92.77 per barrel (24 February 2022) and averaging $106.96 from 28 February to 3 August (Open Access Government, 2023).

Although energy prices have eased compared with the 2022 high peaks, prices could spike again in the event of new disruptions, such as insufficient supplies of natural gas in case of a colder 2023 winter season in Europe, potentially affecting companies and households. Total energy costs (direct and indirect) for households are estimated to have increased by at least 63 per cent and possibly as much as 113 per cent during the year following the beginning of the war in Ukraine (*The Conversation*, 2023). In this context, energy security has become a key policy concern.

As global economic activity rebounded from the COVID-19 pandemic and global energy demand revived, the flow of oil trade, including crude and refined petroleum also recovered (as mentioned in section A.2). As a result, energy commodities, particularly crude oil and oil products increased their share in total seaborne trade in 2022, notwithstanding a general persistent long-term trend of declining shares of oil and refined products in total seaborne trade volumes and a long-term trend away from coal (figure 1.7). This long-term trend is consistent with the peak in demand for coal and oil due to the energy transition, which is projected to reduce the growth of the seaborne trade of these products by more than two-thirds and one-third respectively by 2030 (DNV, 2022), suggesting that volumes and distances traded for those commodities will decrease in the future.

Figure 1.7 Percentage share of different cargo types in total seaborne trade, 2002–2024
(Metric tons)



Source: UNCTAD secretariat, based on Clarksons Research, Shipping Intelligence Network time series (as of 28 July 2023).
Notes: 2023 and 2024 are forecast.

In the context of the war in Ukraine, the United Kingdom, the United States and the European Union, have applied restrictive economic measures to the trade of Russian crude oil, refined petroleum products and gas, such as import bans, pipeline transport restrictions and a cap on the price of the oil barrel,

impacting underwriting for insurance-related processes. These measures have induced changes in the trading patterns of these products.

For instance, the share of the Russian Federation in EU imports of petroleum products and coal declined by 9.2 and 13 percentage points respectively between the average of the second and third quarters of the period 2017–2021 and the second and third quarters of 2022. In contrast, oil imports from the Iraq, Kazakhstan, Libya, Nigeria, Norway, Saudi Arabia, the United Kingdom and the United States increased (Yanatma, 2023). On the other hand, exports of oil and oil products from the Russian Federation to alternative destinations further away (including China, the Middle East, India, Türkiye, Africa and Latin America) increased (Clarksons, 2023d).

The war in Ukraine also led European countries to import more gas from other suppliers, including the Algeria, Norway, Qatar and the United States to compensate for the loss of shipments from the Russian Federation. The latter represented 40 per cent of the European supply in 2021. Seaborne liquefied natural gas (LNG) flows have replaced pipeline natural gas, as illustrated in table 1.5 through the significant increase in import shares of European countries in 2022.

Table 1.5 Major seaborne exporters and importers of oil, oil products, coal and liquefied natural gas, top ranking in terms of share of global trade volumes and of annual percentage changes

	Importing countries/regions					Exporting countries/regions			
	Top importers 2022		Percentage share(1)	Top percentage changes 2021–2022		Top exporters 2022	Percentage share(1)	Top percentage changes 2021–2022	
Crude oil	1	Total Asia	58.1	Latin America and the Caribbean	22.2	Middle East/Gulf	47.4	North America	21.5
	2	Total Europe	25.9	India	10.4	Latin America and the Caribbean	10.0	Black Sea	14.9
	3	China	22.8	Baltic	10.2	North America	9.7	Middle East/Gulf	14.6
	4	India	11.7	United Kingdom / Continental Europe	10.1	West Africa	8.2	Baltic	5.5
	5	United Kingdom / Continental Europe	11.5	Other Asia	10.0	Mediterranean	6.1	Latin America and the Caribbean	3.7
Oil products	1	Total Asia	31.4	Middle East/Gulf	21.7	Total Europe	34.1	Latin America	24.1
	2	Total Americas	20.1	Latin America	14.0	Middle East/Gulf	18.4	Total Americas	12.8
	3	South East Asia	16.9	Indian Subcontinent	11.9	Total Americas	16.0	United States	11.3
	4	United Kingdom/ Continental Europe	16.9	Africa (inc. Mediterranean)	8.3	United Kingdom/ Continental Europe	14.4	East Asia (inc. Russian Federation)	9.8
	5	Latin America	11.6	United Kingdom / Continental Europe	2.3	East Asia (inc. Russian Federation)	13.9	Middle East/Gulf	9.0
Coal	1	Total Asia	82.2	European Union + United Kingdom	34.4	Indonesia	38.2	Canada	12.9
	2	India	19.8	India	19.1	Australia	27.6	South Africa	9.2
	3	China	19.0	Japan	1.1	Russian Federation	12.9	Indonesia	7.8
	4	European Union + United Kingdom	9.8	Republic of Korea	0.8	Total North America	8.7	North America	2.9
	5	Republic of Korea	9.8			United States	5.9		
LNG	1	Total Asia	64.1	United Kingdom	71.8	Total Atlantic	39.2	United States	11.7
	2	Total Europe	31.0	France	71.6	Total Asia Pacific	36.9	Russian Federation (Arctic)	9.7
	3	Japan	18.5	Total Europe	54.5	Total Middle East	24.0	Total Atlantic	9.0
	4	China	16.2	Spain	48.0	Australia	20.1	Malaysia	7.1
	5	Republic of Korea	11.7	Republic of Korea	14.5	Qatar	19.7	Total Asia Pacific	2.4

Sources: UNCTAD Secretariat, based on data from Clarksons Research, Seaborne Trade Monitor, July 2023.

Note: (1) Percentage shares of the total seaborne trade of specific commodities, totals can encompass countries mentioned subsequently.

Contrary to trading patterns of other energy products, gas grew more in volumes than in ton-miles in 2022 (figure 1.8). This was due to shifting trade patterns such as increased United States exports heading to Europe rather than on longer voyages to Asia (Clarksons, 2022). Volumes increased in 2022 for both LNG and LPG although the opposite trend is projected for 2023 (Clarksons, 2023e).

Coal trade volumes marginally increased in 2022, because of tight energy markets resulting from the war in Ukraine. Coal trade benefitted from firm European imports, which drove ton-mile growth (figure 1.5 and Clarksons, 2023c). In 2023, following policy reforms aimed at securing coal supply to cope with El Nino impacts, coal imports to China increased significantly, particularly from the Russian Federation (Drewry, 2023a and Chen, 2023). Continued strong growth of coal imports in Asian economies is expected to lead to record demand in 2023.

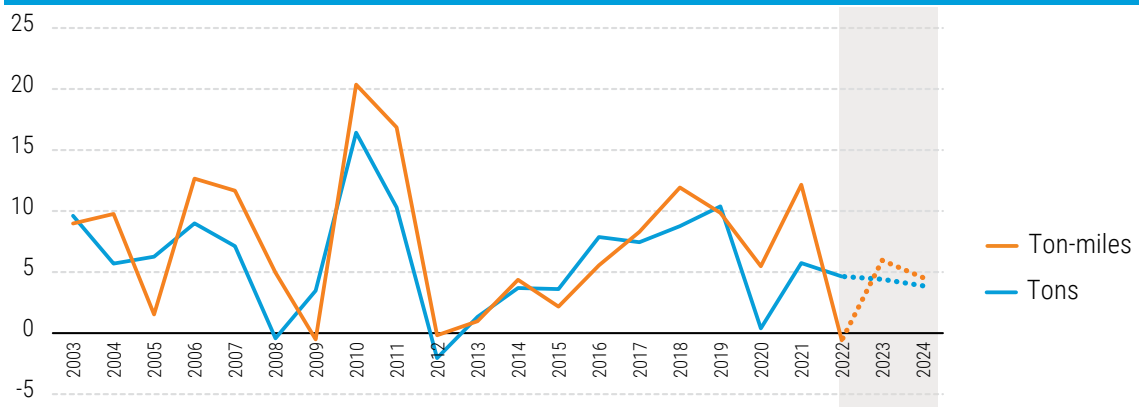
2. Energy security needs intersect with global environmental sustainability goals

With energy security staying high on the agenda, maritime trade of energy commodities is expected to grow more than non-energy commodities in 2023. Supply and demand factors suggest a positive outlook for the next two years. Seaborne crude oil trade volumes are expected to grow (limited to some extent by OPEC cuts) by 1.6 per cent in 2023 and by a strong 7 per cent in ton-miles (Clarksons, 2023e), with exports growing from the United States, Brazil, Norway and the Russian Federation, and increased Chinese and Indian demand. Figure 1.8 shows that global seaborne LNG demand is expected to remain strong, with United States exports continuing to drive LNG export growth and China and India driving import growth.

Increased maritime shipments of fossil fuels such as oil, gas and coal and an increase in distances travelled could lead to more carbon dioxide (CO_2) emissions. This raises the question of the impact of shifts in energy trade patterns vis a vis the need to reduce greenhouse gas (GHG) emissions. Similarly, increases in oil and gas prices could shift investment back into extractive industries and fossil fuel-based energy generation, running the risk of reversing the trend towards renewable energy documented over the past five years (IRENA, 2023). Latest disruptions have prompted interest in building energy supply capacity to benefit from emerging trading opportunities. For instance, India increased its crude oil imports, due to increased production of refined oil products, and its refined oil products exports to the European Union. The United States has increased investment in new liquefaction infrastructure for significant additional LNG capacity.

Despite this, clean-energy investment witnessed a rapid acceleration in 2022, with a record $2.8 trillion invested globally into the energy sector, of which more than $1.7 trillion went to clean energy sources (IEA, 2022b). Current geopolitical tensions and challenging economic conditions have provided momentum to build long-term energy security while simultaneously tackling the threat of climate change. In other words, many countries have engaged in policies aimed at reducing dependence on volatile energy markets and developing capacity in homegrown renewable energy to ensure domestic price stability.

Figure 1.8 Gas seaborne trade growth, tons and ton-miles
(Percentage annual change)



Source: UNCTAD secretariat, based on Clarksons Research, Shipping Intelligence Network time series (July 2023).

Notes: "Gas" includes LNG and LPG.
2023 and 2024 are forecast.

Examples of policies aimed at boosting clean energy supply include the Clean Energy Plan and Inflation Reduction Act (United States); the REPowerEU plan (European Union) and the GX Green Transformation Programme (Japan). In developing countries, China, India, and Indonesia have launched initiatives encompassing solar and biofuels. As a result of these initiatives, renewable power capacity is expected to expand as much in the next five years as it did in the past 20 years (IEA, 2023a and IEA, 2022b).

3. Changing grain trade patterns and implications for food security

The Russian Federation and Ukraine are global players in the grain and agrifood markets and, before the war, were important sources of wheat, corn, barley, rapeseed, sunflower oil and seeds for many net food-importing developing countries, including many lower-income countries. For example, in 2018–2020, 32 per cent of the total of African wheat imports came from the Russian Federation and 12 per cent of total African wheat imports came from Ukraine. For least developed countries, imports of wheat from the Russian Federation and Ukraine were 29 per cent and 10 per cent, respectively. As many as 25 African countries imported more than one-third of their wheat from the two countries, and 15 of them imported more than half (UNCTAD, 2022b).

In this context, the disruption to Black Sea shipping and ports caused by the war in Ukraine has generated a gap in volumes of grain shipped from Ukrainian ports, contributing to a 2.6 per cent contraction in global grain trade volumes in 2022.

To help stabilize rising global food prices and deteriorating food security amid already high price levels due to the pandemic, the United Nations brokered two initiatives. One of these, the Black Sea Initiative (BSI), aimed at allowing the safe export of grain and other foodstuffs from Ukrainian ports on the Black Sea (box 1.3). It was signed on 22 July 2022 and discontinued on 17 July 2023.

Box 1.3 The Black Sea Initiative contribution to grain trade amid the war in Ukraine and its discontinuation

The Black Sea Initiative involved the Russian Federation, Türkiye and Ukraine and concerned the export of grain and fertilizer from three Ukrainian ports on the Black Sea. It consisted of Ukrainian vessels guiding cargo ships to international waters on the Black Sea, avoiding mined areas and vessels, then safely proceeding along an agreed corridor through the Black Sea. Ships were inspected by a team including representatives from the Russian Federation, Türkiye, Ukraine and the United Nations. The Initiative was discontinued on 17 July 2023, with the withdrawal of the Russian Federation from the deal.

Since its signature and up until 20 July 2023, the Black Sea Initiative facilitated exports of 32.9 million metric tons of various food commodities encompassing corn, wheat, sunflower products, barley, soya and rapeseed and 725,000 metric tons of humanitarian food assistance exports to regions facing acute food insecurity. Around 57 percent of shipments went to developing countries. Considering World Bank income categories, 20 per cent of exports went to low-income and lower-middle income groups.

The initiative enabled a gradual rise in ship departures and shipped volumes of grain from Ukrainian ports, contributing to bringing down the cost of food, stabilizing global markets and keeping them open. The food price index decreased from its peak in March 2022 by over 23 per cent in June 2023.

The discontinuation of grain trade flows through this passage is likely to reduce shipping demand in the region and impact bulk shipping performance. Alternative routes could include transiting the Black Sea via territorial waters in Romania and through the Constanta Port in Romania, shipments by the river Danube and railway connections via the Republic of Moldova. These alternative options could lead to rising logistics costs via the Black Sea and the Bosporus, making trade in the region less competitive and supporting continued shifts in grain trading patterns.

Sources: United Nations Black Sea Grain Initiative Joint Coordination Centre Dashboard, accessed 20 July 2023; UNCTAD: A double burden: the effects of food price increases and currency depreciations on food import bills, Geneva, 16 December 2022; UNCTAD: A trade hope: the role of the Black Sea Grain Initiative in bringing Ukrainian grain to the world, Geneva, October 2022; UNCTAD: Maritime trade disrupted: the war in Ukraine and its effects on maritime trade logistics, Geneva, 28 June 2022 and Sharma, T. (2023) End of the Black Sea Initiative: For Bad or Worse? 19 July 2023.

In response to potential food shortages caused by reduced grain exports resulting from the war in Ukraine, several countries implemented trade policy measures such as export bans, export restrictions and export taxes to limit the export of food to ensure sufficient domestic food supplies. Between June 2022 and April 2023, the share of traded food products restricted due to these measures has been estimated to range between 7 and 10 per cent (IFPRI, 2023).

While global food prices had decreased by March 2023, they remain high compared to pre-war and pre-pandemic levels (UNCTAD, 2023e). The use of trade policy measures restricting food exports could send prices soaring again (World Bank, 2023). This underscores the importance of restraining such measures and of continued support for the Black Sea Initiative. Additionally, ongoing geopolitical and climate change factors pose additional risks that could undermine the stability of global food prices.

A further impact of the war in Ukraine has been the substitution of import origins and, in some cases, commodity substitution (WTO, 2023b). This underscores the importance of alternative sources of supply and an open trading system that allows for shifting the source of imports. During 2022, reduced grain exports from Ukraine were partly offset by increased shipments from other existing suppliers such as Australia, Brazil and Canada, as reflected in table 1.6.

Table 1.6 Major grain seaborne exporters and importers 2022 and 2023, top ranking in terms of share of global trade volumes and of annual percentage changes

	Top importers 2022	Percentage share(1)	Top percentage changes *2021–2022*		Top importers 2023(2)	Percentage share(1)	Top percentage changes *2022–2023*	
1	Total Asia	48.4	Morocco	25.0	Total Asia	48.3	Argentina	78.8
2	China	26.5	Iran (Islamic Republic of)	10.4	China	26.6	Thailand	11.3
3	Total Africa	12.1	Philippines	7.0	Total Africa	11.9	Morocco	11.1
4	Total Europe	11.6	Colombia	6.8	Total Europe	11.4	Saudi Arabia	8.6
5	Total America	10.8	Mexico	6.2	Total America	10.5	Viet Nam	5.3
6	Total Middle East	10.2	Taiwan Province of China	6.0	Total Middle East	9.9	China	2.8
7	European Union + United Kingdom	7.7	Türkiye	5.6	European Union + United Kingdom	7.6	Total Asia	2.1
8	Japan	5.0	Japan	2.0	Japan	4.9	Mexico	1.5
9	Egypt	5.0	Republic of Korea	0.6	Egypt	4.7	Japan	1.2
	Top exporters 2022	**Percentage share(1)**	**Top percentage changes 2021–2022**		**Top exporters 2023(2)**	**Percentage share(1)**	**Top percentage changes 2022–2023**	
1	Total South America	38.4	Canada	114.4	Total South America	38.6	Russian Federation	26.9
2	Total North America	28.1	Brazil	16.1	Total North America	28.6	Canada	18.4
3	Brazil	24.2	Total Asia/Pacific	11.4	Brazil	27.1	Brazil	14.6
4	United States	23.2	Total South America	8.8	United States	22.6	Total Europe	6.3
5	Total Europe	21.7	Australia	7.0	Total Europe	22.5	European Union + United Kingdom	5.4
6	Argentina	11.7	Russian Federation	1.4	Canada	10.4	Total North America	4.1

Sources: UNCTAD Secretariat, based on data from Clarksons Research, Dry Bulk Trade Outlook, July 2023.

Notes: (1) Percentage shares of total seaborne trade of specific commodities, totals can encompass countries mentioned subsequently. (2) forecast figures (June 2023).

Shifting grain trade patterns are well illustrated in the case of Africa. Grain imports from Ukraine, crucial to the food security of many African economies, declined by 14.9 per cent in 2022, forcing these economies to adapt their trading patterns (WTO, 2023b). Egypt for instance, coped with an 81 per cent fall in wheat imports from Ukraine during the first eight months of the war by replacing the source of imports with the Russian Federation, the United States and the European Union (WTO, 2023b). Ethiopia replaced the loss of wheat supply from the Russian Federation and Ukraine with shipments from the United States and Argentina.

Overall grain trade volumes have remained relatively stable, despite higher prices due to commodities being brought in from further away and from the ripple effects of the cost-of-living crisis (Clarksons, 2023c; UNCTAD, 2022f). This is because demand for food is often very inelastic to price changes, unlike demand for many consumer products and some energy sources. Reducing food intake is more difficult than reducing the consumption of non-essential consumer goods or services.

C. SHIFTS IN THE GEOGRAPHY OF MARITIME TRADE

In recent years, there has been an increasing emphasis on de-risking supply chains and expanding goals to diversify suppliers and markets. Heightened trade policy tensions, the COVID-19 disruption, the war in Ukraine and the consequent drive for greater resilience building and self-sufficiency have moved supply chain configuration to the forefront of the agenda for policymakers and industry.

Over the past decade, supply chain reconfiguration trends have been unfolding. These are most visible in Asia and China, as the world's largest market and key player in global value chains and containerized trade flows. China as the global manufacturing powerhouse, is historically associated with the rise of globalized production processes and supply chains structured around intra-industry trading patterns.

Since 2010, distances per ton of containerized trade travelled started to decline (table 1.4), largely due to an increase in intraregional maritime trade which supports manufacturing activity in China and its neighbouring countries. UNCTAD data reveals that intra-Asian routes serving intraregional supply chains record the highest growth rates. This reflects global manufacturing patterns, where China serves as the global manufacturing centre, supported by neighbouring East Asian countries supplying parts and components. At the same time, China is increasingly reliant on domestic production of parts and components, thereby reducing imports of many containerized goods from distant locations. China has also been moving up the value chain with some lower-skilled manufacturing moving to its neighbouring countries.

More recently, a growing geopolitical divide is causing shifts in supply chains. The introduction of tariffs in the United States and China since 2018 has imposed additional costs on their bilateral trade and caused a trade diversion, with some winners and losers emerging (Fajgelbaum et al., 2023). Tariffs imposed by the United States affected around 18 per cent of its imports, equivalent to 2.6 per cent of its GDP, while retaliation by China impacted 11 per cent of its imports, equivalent to 3.6 per cent of its GDP. These tariffs impacted industries in both countries and increased costs for about two-thirds of dutiable products in the United States (Fajgelbaum et al., 2023). Countries that have benefited from the trade diversion include Canada, Mexico, India, Viet Nam and the European Union, among others (UNCTAD, 2019). While some shifts in trade patterns were triggered by the United States and China tariffs, changes were also accelerated by the COVID-19 pandemic, the 2021–2022 global logjam in logistics and the war in Ukraine.

In an increasingly complex operating environment, traders and supply chain managers are embracing various strategies to increase their agility to respond to new challenges. These include pursuing new efficiencies (such as reducing transport costs to increase profitability), finding new markets, and reconfiguring supply chains to reduce the risk of disruptions in the event of shortages of key inputs in their supply networks (Economist Impact, 2023). Supply chain reconfiguration involves various strategies and approaches including offshoring production across a wider range of locations and a variety of trading partners; bringing manufacturing back home (reshoring); relocating manufacturing to neighbouring countries closer to the home market (nearshoring) or prioritizing trade with highly trusted countries that share common values and strategies.

An important strategy adopted by companies for diversifying supply sources and reducing overdependence on China without entirely decoupling from the country is the "China Plus One" strategy which encourages companies to diversify their operations by expanding outside of China while still maintaining a presence in the country. These strategies have implications for containerized shipping demand and supply patterns as well as shipping costs and rates. Apart from the need to de-risk supply chains, a relative increase in production costs in China has also encouraged moving some manufacturing to other countries. As an example, several multinational companies, such as Apple, Samsung, Sony and Adidas, shifted some manufacturing activities from China to South-East Asia, due to labour costs and risk management considerations (Ho-him, 2023).

The share in United States imports from Taiwan Province of China, Mexico, Viet Nam and the European Union in various sectors including vehicles, computers, electronic devices, transport equipment and machinery, and electrical equipment and machinery (Bekkers et al, 2020 and Nicita, 2019) has been growing. In 2022 the share of United States container imports from Viet Nam increased to 8 per cent, up from 4 per cent in 2017. The share in India, about 3 per cent in 2017, amounted to about 5 per cent in 2022. In contrast and while still dominating the global manufacturing space, the share in China of United States container imports fell from 40 per cent in 2017 to about 31 per cent in 2022 (Danish Ship Finance, 2023).

China continues to be a key player and a leading world exporter of containerized cargo, and importer of energy and commodities. Chinese companies are seeking to improve their resilience by diversifying their

input and commodity sources. They are increasingly sourcing inputs from within China and investing in manufacturing and commodities in third countries.

UNCTAD analysis of containerized maritime trade during 2022 and the first quarter of 2023 suggests that the geographical proximity of manufactured trade remained relatively stable, suggesting a lack of significant nearshoring trends, at least on average. However, there has been a notable increase in the political proximity of trade since the latter part of 2022. This indicates a reorientation of bilateral trade flows prioritizing partners with similar values (UNCTAD, 2023f). This phenomenon is likely to intensify in the coming years, given efforts by Western economies to limit their dependency on China in strategic and promising trading sectors related to technology and the energy transition.

Examples of such efforts include the United States Inflation Reduction Act, aimed at promoting investments in domestic manufacturing capacity and encouraging procurement of key raw materials and components for the green-energy transition domestically or from specific trade partners (Mc Kinsey and Company, 2022 and Sueur, 2023). Similarly, the CHIPS and Science Act aims to reshore production of high-tech equipment, such as semiconductors (United States, White House, 2023). The European Union is considering similar initiatives, with some countries already providing support to encourage local production of similar components (O'Carroll, 2023 and Vidalon, 2023). These initiatives could potentially lead to shifts in future seaborne trade flows. However, this may also result in additional costs for companies and consumers, shifting production away from the most cost-effective producers, impacting welfare and trade, and potentially hindering the diffusion of ideas, innovation and technology spill overs (Goes and Bekkers, 2022).

Given the uncertainties associated with global political frictions, energy transition and shipping decarbonization, as well as higher transport cost volatility in the foreseeable future, intraregional trade appears as an area where reinvigorated policy action could yield positive resilience-building outcomes (Nicita and Saygili, 2021).

While Western economies are taking steps to reduce their dependence on China and prioritize sourcing from countries with similar values, it is important to consider the implications for other regions. Strong regional value chains have been pointed out as a possible strategy for economic resilience in Africa (UNCTAD, 2022e). Their effectiveness can be strengthened through trade logistics policy reforms. Many transport and trade facilitation measures involve close cooperation among neighbouring countries and regional partners, including through corridors. Competitive regional markets for transport services can also help reduce inefficiencies. Box 1.4 illustrates some of the trade logistics policy measures that will be key to facilitating intra-African trade by leveraging the opportunities from the AfCFTA.

Box 1.4 The impact of the AfCFTA on the demand for transport infrastructure and services

The African Continental Free Trade Area (AfCFTA) Agreement consolidates a growing $2.5 trillion GDP market of 1.2 billion people, making Africa an attractive investment destination. The negotiation of protocols on investment, competition policy, intellectual property rights, digital trade, and women and youth in trade, as well as a dispute settlement mechanism, create predictability for African and foreign investors and businesses interacting with African businesses, including accessing markets more easily using digital trade solutions.

Transport infrastructure and services are critical to facilitating intra-African trade. Research by the Economic Commission for Africa (ECA) finds that intra-African trade in transport services – one of the priority sectors for AfCFTA regarding liberalization of services – could increase by nearly 50 per cent by 2045 with the implementation of the AfCFTA. In absolute terms, over 25 per cent of intra-African trade gains in services would go to transport alone, and nearly 40 per cent of the increase in services production in Africa would be in transport.

A complementary study on the impact of the AfCFTA on the demand for transport infrastructure and services indicates that the AfCFTA would lead to a general increase in intra-African freight demand of around 28 per cent compared to a scenario without the presence of AfCFTA. The implementation of the AfCFTA will lead to an increase in demand for road, rail, maritime and air freight increase by 22, 8, 62 and 28 per cent, respectively.

A significant increase in traffic flows is expected across all transport modes. Subsequently, transport equipment needs for all modes of transport are expected to increase significantly. Africa would require close to two million additional trucks, over 100,000 rail wagons, 250 aircraft and more than 100 vessels by 2030, if the AfCFTA is fully implemented. Aircraft demand to support trade flows within West Africa will increase by 13.2 per cent by 2030. Trade between North and West Africa

Box 1.4 The impact of the AfCFTA on the demand for transport infrastructure and services *(cont.)*

would increase demand for aircraft by 12.9 per cent, while demand within Southern Africa will increase by 12.2 per cent. In East Africa, critical rail links are identified across Kenya, Uganda and the United Republic of Tanzania.

The analysis also considers the additional effects of implementing planned investments such as those under the Programme for Infrastructure Development in Africa. For instance, the modal share of rail transport for intra-African trade is expected to increase from 0.3 to about 7 per cent when considering the implementation of these planned investments.

Looking at cross-cutting issues, this increased demand points to a potential for investment in green transport. Complementary research also suggests that the transport and logistics sectors could greatly benefit from the increased participation of women. A complementary study undertaken by the United Nations Economic Commission for Africa (ECA) in collaboration with other UN Regional Commissions on transport and trade facilitation during COVID-19 identified that optimizing automation and digitalization can reduce the need for human interaction, making cross-border transport safer and more resilient to disruptions. It also highlighted the role of corridor management institutions and the need for integrated corridor management when applying these solutions.

Overall, the results highlight the significant investment opportunities created by the AfCFTA in transport infrastructure and services to benefit from the liberalisation of trade in transport services and to support increased intra-African trade.

The report by the ECA on AfCFTA and demand for transport infrastructure and services provides a treasure trove of investment opportunities in the sector. Harnessing these opportunities would lead to job creation, particularly for youth, and to gender empowerment on the continent. The investments also provide an avenue for a green economic recovery in Africa, with the view to reducing greenhouse gas emissions from the transport sector.

Trade and transport are mutually reinforcing. Current infrastructure and services, across all modes of transport in Africa require upgrading to cope with increased freight from AfCFTA. This underscores the importance of prioritizing the implementation of the Programme for Infrastructure Development in Africa (PIDA), the Trans-African Highway (TAH) network and the Single African Air Transport Market (SAATM).

Source: Inputs provided by UN-ECA Secretariat.

D. OUTLOOK AND POLICY RECOMMENDATIONS

Shipping continues to grapple with complexities generated by the global events that upended the world economy over recent years. This includes the legacies of the COVID-19 pandemic, lower levels of global economic growth, inflation, heightened energy and food security concerns, increased geopolitical risks and trade policy tensions arising from more restrictive trade policy measures introduced to achieve wide-ranging objectives including security, resilience, self-sufficiency and the competitiveness of domestic firms. While the global economy remains vulnerable to disruptive shocks, certain trends are currently supporting the shipping industry. In the short term, this includes redistribution of energy flows and economic recovery in China after the disruption caused by the COVID-19 pandemic, and its associated response measures.

Against this background, UNCTAD forecasts moderate growth in seaborne trade volumes hovering at an average of 2.1 per cent per year during the period 2024–2028. The divergence between growth patterns between energy-related trade and non-energy is expected to continue.

Optimism around increasing Chinese economic activity, which drives dry bulk trade, the redistribution of oil flows in response to the war in Ukraine and the re-opening of the world economy after nearly three years of the COVID-19 pandemic and its fallout bodes well for tanker and dry bulk shipping and trade. Prospects for gas trade are also positive, supported by a greater focus on energy transition, energy security, and a low-carbon development path.

In sharp contrast to a year ago, container markets have corrected in 2022 and are expected to have little growth in 2023. UNCTAD expects container trade to improve and increase at an annual rate of around 3 per cent over the 2024–2028 period.

While distances travelled by tanker trade increased following the war in Ukraine and its fallout on the energy supply landscape, going forward, trends in distances travelled and trade ton-miles will depend on a range of factors including trends in the energy transition, commodity prices, supply-side capacity constraints, climatic factors, and regulatory requirements that may affect shipping fleet speed, routing and operational decisions.

Projected growth in maritime trade volumes assumes that downside risks will dominate international trade and economic growth in the coming years. These risks relate to the timing and path of global economic recovery, the ongoing war in Ukraine and the evolving context of maritime transport and trade. Increased policy-driven geo-economic fragmentation could potentially reshape trade patterns, supply chains and shipping routes.

On the upside, however, drivers expected to provide momentum for an uptick in maritime trade flows include an easing in logistical bottlenecks observed since 2020, easing of COVID-19 restrictions in China and the decision taken by its central bank to cut interest rates, which may stimulate the economy. Other factors include the entry into force of the Regional Comprehensive Economic Partnership (RCEP) in several Asian countries and expected increase in demand for transport and services arising from the AfCFTA.

Policy recommendations

Facilitate trade associated with easing impacts of the cost-of-living crisis

- Disruptions to food and energy distribution channels and shipping networks could exacerbate the situation of people living in poverty and pose significant threats to food security.
- Trade tensions, protectionism and export restrictions entail economic and social costs. These should be limited to the extent possible especially for grains and energy prices to avoid their culmination in global overlapping crises.
- Grain fertilizer exports need to be ensured, including through the Black Sea Initiative and the Memorandum of Understanding on trade facilitation of food and fertilizers from the Russian Federation.
- Monitor trends in maritime trade patterns and shifts in distances travelled to ascertain implications for the availability of ship carrying capacity (supply of shipping services), shipping costs and carbon emissions.

Support regional value chains and trade for resilience building

Recognizing the role of strong regional value chains and trade in building economic resilience and complementing global value chains, it is imperative to support their development. This is particularly important in the current context where uncertainty and volatility are arising from heightened geopolitics risks, climate factors and commodity prices, as well as freight markets and transport costs.

- Monitor changes in seaborne trade and shipping patterns as well as assess related implications for the geography of shipping and trade, fleet and costs as well as for port networks.
- Policymakers involved in designing and implementing trade logistics reforms at the national and regional levels, should cooperate closely and promote public-private partnerships to support effective transport and trade facilitation including through corridors.
- Continued reassessment of supply chain aspects such as sourcing, inventory and transport for maritime transport to strengthen resilience and optimize robustness in the event of future disruptions.

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END NOTES

1 See methodologies and data sources in the Annex.

2 "Oil" encompasses crude oil and refined oil products.

3 "Gas" includes liquefied petroleum gas (LPG), liquified natural gas (LNG) and ammonia.

ANNEX

The UNCTAD seaborne trade forecasts build on IMF projections from July 2023 regarding GDP and elasticities of maritime trade (concerning GDP, export volumes and investment share in GDP as well as monthly seaborne trade data published by Clarksons Research).

The IMF July 2023 forecasts that world output will grow by 2.9 per cent in 2023. The IMF scenario assumes higher-than-expected inflation worldwide leading to tighter financial conditions, a worse-than-anticipated slowdown in China, further negative spill overs from the continued war in Ukraine, and continued supply-demand imbalances weighing on growth prospects. It also assumes a higher-than-expected trade growth in 2022 and 2023, reflecting declining global demand and supply chain problems.

2

WORLD SHIPPING FLEET, SERVICES, AND FREIGHT RATES

Wide-ranging factors are shaping global shipping markets, including the supply of ship carrying capacity and fleet patterns. In 2022 and the first half of 2023, the supply of shipping capacity and services was affected by global economic developments, which determine the demand for shipping. The supply was also impacted by market sentiment and expectations, freight rates, financial liquidity, shipbuilding capacity and ship recycling activity. In 2022, the global fleet continued to grow but was ageing amid rising uncertainty about fleet renewal timelines. In 2022, global ship carrying capacity expanded at an annual rate of 3.2 per cent with overall tonnage hitting nearly 2.3 billion dead weight tons. On average the global fleet was two years older in 2023, compared to a decade earlier.

During the same period, freight markets were affected by a weakening in containerized trade, the easing of port congestion, increased volatility in dry bulk trade, and growth in tanker trade measured in ton-miles. In 2022, container freight rates reached all-time highs in the first half of the year amid the supply chain crisis, before falling in the second half, mainly due to economic pressures. The downward trend continued into 2023 bringing container freight rates back to their pre-pandemic levels.

Dry bulk freight rates followed a similar trend, showing high volatility and a decline in the second half of 2022 as demand for dry bulk commodities in China weakened. In 2023, dry bulk freight rates initially fell but then rose sharply. In contrast and moving away from the lows recorded two years into the pandemic, tanker freight rates recovered in 2022 across various segments, in particular Aframaxes[1]. This was a result of the war in Ukraine, shifts in energy flows and increased ton-miles. Tanker freight rates continued their upward trend in 2023. These are likely to increase further, and experience more fluctuations due to factors including geopolitical tensions and concerns surrounding energy security.

Looking forward, a range of regulatory, commercial, technological and geopolitical forces are adding complexity, volatility, and uncertainty to the industry's operating landscape and to freight markets. The question of how shipping will adapt to change while continuing to provide the requisite ship carrying capacity to effectively deliver global trade and ensuring stable and predictable shipping rates is a key theme facing the sector in 2023 and beyond. This question arises against the backdrop of potential overcapacity in container shipping, a relatively limited ship order book when set against the existing active capacity, subdued ship recycling activity and a tightening in ship building and yard capacity. Meanwhile, trends affecting supply and demand, combined with ongoing economic and trade uncertainties, geopolitical concerns, energy security requirements, changes in trade patterns and average distances travelled, supply-chain reconfiguration, more stringent environmental regulations and the energy transition imperative are all expected to affect trends in freight rates and shipping costs. Alleviating container freight rate volatility will likely be linked to carrier capacity management, operational cost reduction, efficiency enhancement, and mitigating potential risks such as those associated with fluctuations in fuel prices.

Strengthened collaboration across the maritime supply chain is crucial for the shipping industry to safely navigate this growing uncertainty and market volatility. Monitoring trends in shipping and freight markets is necessary; assessing their implications for the increasingly volatile and uncertain operating landscape is crucial.


MSC CORDOBA

A. GLOBAL SHIPPING FLEET DEVELOPMENTS

1. 2022 was a mixed year for shipping and the sector faces operational complexities, uncertainty and volatility in 2023

Shipping continues to navigate the post COVID-19 pandemic trends, the legacies of the 2021–2022 crunch in global logistics, the softening in the container shipping market since the second half of 2022, and the shift in shipping and trading patterns arising from the war in Ukraine. The sector is facing growing operational complexities, volatility and uncertainty amid a global economic climate coming under stress and the impact of the ongoing war in Ukraine, as highlighted in chapter 1. The sector is also facing the need to shift to a more sustainable future, to decarbonize and take up digitalization.

By the second half of 2022 and after the historical boom of 2021, the container shipping market normalized and capacity levels shifted, with an influx of new container capacity in 2023. More capacity is expected to hit the water in 2024 and 2025. Liner operators used different tools to tackle overcapacity, including rerouting, blank sailing, reducing speeds, and idling ships (Drewry Maritime Research, 2023).

Liner operators are pursuing different strategies to build resilience and adjust to an ever-evolving operating context. Some, such as A.P. Moller Maersk are favouring an integrated approach to offer end-to-end service delivery, while others such as the Mediterranean Shipping Company (MSC) have shown a preference for ship ordering and capacity expansion. Meanwhile, some of the new operators who had entered the liner shipping market to take advantage of the high freight rates amid the global logistics crunch of 2021–2022 and who had stayed past the COVID-19 pandemic and subsequent logjam, have been increasing their market participation and deploying more capacity across various container shipping routes.

A major theme for shipping is the uncertainty regarding the best course of action to decarbonize and take up cleaner fuels. Carriers are facing the need to invest in ship carrying capacity to renew the global fleet and transition to a low carbon path amid high uncertainty and lack of visibility about the most suitable future fuel and green technologies for ships (see chapter 3).

2. The global fleet continued to grow at 3.2 per cent in 2022 but aged compared to a decade earlier

In January 2023, global maritime trade was transported on board 105,493 vessels of 100 gross tons (GT) and above, with oil tankers, bulk carriers, and container ships accounting for 85 per cent of total capacity.

Over time, world fleet capacity has expanded at varying rates reflecting booms and busts in the business and shipping cycles as well as trends in shipbuilding and ship financing capacity, among other factors. Growth in the global fleet dead weight tons (dwt) averaged a firm annual 7.1 per cent between 2005 and 2010. As the financial crisis which triggered consolidation in shipbuilding capacity and a downsizing of the ship financing market, the average annual growth decelerated to 4.9 per cent since 2011.

Since the COVID-19 pandemic and the uncertainties related to the future energy transition, fleet growth further decelerated. In 2022, global fleet capacity expanded by 3.2 per cent over the previous year. Overall tonnage totalled 2.27 billion dead weight tons (table 2.1 and figure 2.1). Oil tanker fleet capacity increased by 3.4 per cent, up from 1.6 per cent growth in 2021. For 2023 and 2024, tanker fleet expansion is expected to be limited given the small order book. Bulk carrier capacity increased at a moderate 2.8 per cent while the capacity of liquified gas carriers increased by 5.0 per cent.

The global newbuilding capacity delivered in 2022 fell by 8.6 per cent, totalling 55.6 million GT, down from over 60 million GT in 2021. Dry bulk carriers accounted for the largest share (31.4 per cent) of tonnage delivered in 2022, followed by oil tankers and container vessels (table 2.2). The three leading shipbuilding countries of China, the Republic of Korea, and Japan, accounted for 93 per cent of the total tonnage delivered; China held the lion's share of 47 per cent.

The age profile of the global fleet has implications for fleet renewal and recycling patterns, which are key factors influencing compliance with growing environmental regulations. At the start of 2023, commercial ships averaged 22.2 years of age, a further increase over the previous year (table 2.3). On average, the global fleet was two years older in 2023 compared to a decade before, and more than half the fleet is over 15 years of age.

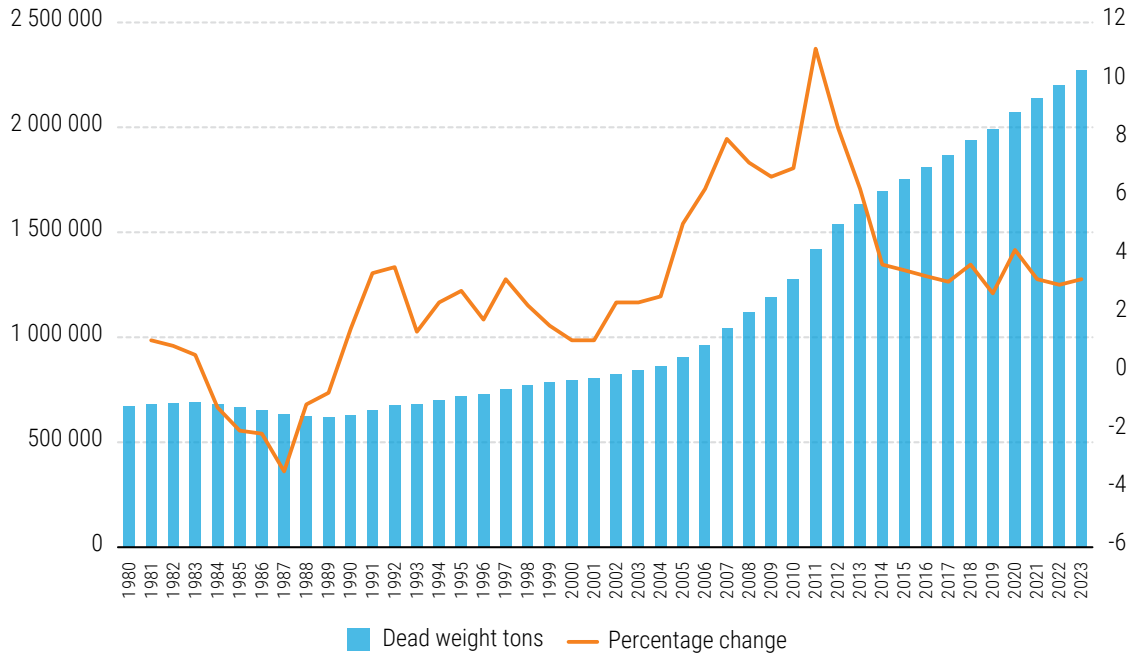
Table 2.1 World fleet by vessel type, thousand dead weight tons, 2022–2023

Principal types	Indicator	2022	2023	Percentage change 2023 over 2022
Bulk carriers	Thousand dead weight tons	947 121	973 743	2.8
	Percentage share	43.0	42.8	
Oil tankers	Thousand dead weight tons	629 890	651 348	3.4
	Percentage share	28.6	28.7	
Container ships	Thousand dead weight tons	293 790	305 313	3.9
	Percentage share	13.3	13.4	
Other types of ships	Thousand dead weight tons	252 489	260 554	3.2
	Percentage share	11.5	11.5	
Offshore supply	Thousand dead weight tons	84 541	86 472	2.3
	Percentage share	3.8	3.8	
Liquefied gas carriers	Thousand dead weight tons	83 841	88 064	5.0
	Percentage share	3.8	3.9	
Chemical tankers	Thousand dead weight tons	49 842	51 411	3.1
	Percentage share	2.3	2.3	
Other/n.a.	Thousand dead weight tons	25 964	26 079	0.4
	Percentage share	1.2	1.1	
Ferries and passenger ships	Thousand dead weight tons	8 300	8 528	2.7
	Percentage share	0.40	0.40	
General cargo	Thousand dead weight tons	79 670	81 815	2.7
	Percentage share	3.6	3.6	
World total	**Thousand dead weight tons**	**2 202 961**	**2 272 772**	**3.2**

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. Dead weight tons for some individual vessels have been estimated.

Figure 2.1 The world fleet, thousand dead weight tons and percentage change, 1980–2023
(Percentage annual change)



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

Table 2.2 Deliveries of newbuilt vessels by type and building country, thousands of gross tons, 2022

	China	Japan	Republic of Korea	Philippines	Viet Nam	Europe	Rest of the world	World total	Percentage share
Bulk Carriers	11 233	5 360	443	344	98			17 477	31.4
Oil Tankers	4 203	1 745	8 294		318	157	10	14 727	26.5
Containerships	5 361	1 487	3 263	50			44	10 205	18.4
Gas Carriers	899	268	3'665			7		4 838	8.7
Ferries and Passenger Ships	391	84	4	2	5	2 028	65	2 580	4.6
General Cargo	1 793	216	52		1	75	118	2 255	4.1
Offshore	1 240	5	184	0	21	39	230	1 720	3.1
Chemical Tankers	614	326	343			26	36	1 345	2.4
Other	160	96	5		0	131	39	431	0.8
Total	**25 895**	**9 585**	**16 254**	**396**	**444**	**2 464**	**542**	**55 580**	**100.0**
Percentage share	**46.6**	**17.2**	**29.2**	**0.7**	**0.8**	**4.4**	**1.0**	**100.0**	

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

Notes: Propelled seagoing merchant vessels of 100 GT and above. See also http://stats.unctad.org/shipbuilding.

Table 2.3 Age of world merchant fleet, by vessel type and flag of registration, years and dead weight tons, 2022 and 2023

Vessel type, country grouping by flag of registration and indicator		Years					Average age	
		0–4	5–9	10–14	15–19	More than 20	2022	2023
World								
Bulk carriers	Percentage of total bulk carriers	16.2	23.7	36.8	11.2	12.1	11.1	11.6
	Percentage of dead weight tons	19.5	25.3	36.6	10.8	7.9	10.0	10.6
	Average vessel size (dead weight tons)	88 699	78 908	73 524	71 798	48 486		
Container ships	Percentage of total container ships	14.5	16.0	24.4	23.8	21.3	13.7	14.2
	Percentage of dead weight tons	19.1	24.8	25.7	19.4	10.9	11.0	11.5
	Average vessel size (dead weight tons)	68 906	81 310	55 335	42 815	26 898		
General cargo	Percentage of total general cargo ships	6.4	8.1	16.2	12.1	57.2	26.8	27.4
	Percentage of dead weight tons	9.7	12.5	25.1	14.1	38.6	20.0	20.3
	Average vessel size (dead weight tons)	6 093	6 217	6 216	4 677	2 702		
Oil tankers	Percentage of total oil tankers	12.9	14.8	21.0	16.4	34.9	19.6	20.1
	Percentage of dead weight tons	21.2	18.9	29.2	20.6	10.1	11.2	11.6
	Average vessel size (dead weight tons)	91 094	70 285	76 700	69 584	16 084		
Other types of ships	Percentage of total other ships	10.1	14.1	18.2	10.7	47.0	23.7	24.2
	Percentage of dead weight tons	18.2	17.8	20.6	13.7	29.7	16.1	16.4
	Average vessel size (dead weight tons)	8 648	6 074	5 434	6 189	3 036		
All ships	Percentage of total all ships	10.7	14.3	20.8	12.4	41.8	21.7	22.2
	Percentage of dead weight tons	19.4	22.1	30.7	15.2	12.5	11.5	12.0
	Average vessel size (dead weight tons)	39 160	33 206	31 890	26 549	6 470		
Developing economies	Percentage of total all ships	10.6	14.7	21.6	12.6	40.4	20.8	21.2
	Percentage of dead weight tons	18.3	19.5	28.0	15.5	18.6	12.7	13.2
	Average vessel size (dead weight tons)	28 345	21 770	21 361	20 222	7 589		
Developed economies	Percentage of total all ships	12.2	14.4	21.3	12.4	39.7	20.9	21.4
	Percentage of dead weight tons	21.5	23.9	33.1	14.4	7.1	10.5	10.9
	Average vessel size (dead weight tons)	53 375	50 628	47 163	35 199	5 460		

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

Notes: Propelled seagoing vessels of 100 GT and above, as of 1 January 2023.

Dead weight tons (dwt) for some individual vessels have been estimated. The average age of a dwt is calculated as the sum of all products of the age and dwt of a ship, divided by the sum of the dwt of all ships.

The fleet's age profile partly reflects modest recycling activity, as owners hold on to old tonnage, anticipating market recovery. It also reflects delays in investing in fleet renewal which stems from shipowners awaiting more clarity on future low carbon fuels, technologies, and regulation. Dry bulk carriers have the lowest average age, while general cargo vessels are much older.

In a separate development, operational complexities increased with the ongoing war in Ukraine. The conflict and related economic restrictions may have increased 'shadow' fleet activity. Since the war in Ukraine, oil exports from the Russian Federation have supported demand for 'shadow' tonnage (Bouissou J, Pravettoni R, Fattori F, 2023;), thereby boosting the sales and purchase transactions and increasing the value of older vessels, in particular tankers (Galanopoulos J, 2023; Telling O, 2023). This trend may also be delaying recycling activity (VesselsValue, 2023). New ship owning entities such as in China, the United Arab Emirates and India have emerged, aiming to take advantage of the high premiums associated with the new trade routes (Galanopoulos J, 2023).

It should be noted that reference to 'shadow' fleet in this context refers to vessels carrying cargo sourced from the Russian Federation and which might be subject to restrictive economic measures. It is therefore not intended to presuppose whether this fleet fits the description known to the International Maritime Organization (IMO) and specifying that a shadow fleet refers to a fleet of ageing, more polluting vessels with opaque ownership that operates without proper identification, and which often turns off their locations.

3. The country of the flag is not necessarily connected to the nationality of the vessel's owner

In 2022, over 70 per cent of global ship capacity in dead weight tons was registered under a foreign flag with beneficial owners and registries being in different countries (table 2.4). For ship owning countries like Germany, Greece, Japan, the Republic of Korea and the United Kingdom, this share was even higher. In China, Denmark, Hong Kong, China, India, Indonesia, Kuwait, Norway, Singapore and the Islamic Republic of Iran, the share of foreign flagged tonnage was lower (table 2.5). The top 35 flag States accounted for 94.1 per cent of the world dead weight capacity, the majority of which was accounted for by nineteen developing countries.

The country of the flag is not necessarily connected to the nationality of the vessel's owner. A large share of the world tonnage is flagged under open registries. Increasingly, the top ten flag registries have strengthened their share of the total global fleet with individual shares and patterns of growth varying across the countries of the flag. This system allows developing countries to contribute to shipping services supply.

Vessel registration services, through open and international registries tend to be concentrated in developing regions like the small island developing States and the least developed countries. In 2022, seven within the top 10 flags of registration were open registers (Panama, Liberia, the Marshall Islands, Malta, the Bahamas, Hong Kong, China, and Singapore), and three were national registries (China, Greece and Japan). These ten leading flags represented 78.5 per cent of the world's dwt. The growth of open registries can be attributed to factors such as beneficial tax regimes and the ability to hire international crew, allowing owners to reduce costs.

The top three flag registration States were Panama, Liberia, and the Marshall Islands. Panama overtook Liberia as the top flag of registration in the mid-1990s, but the Liberian register has been growing rapidly since then. In 2022, Liberia surpassed Panama in terms of dead weight tons under its flag after about three decades. However, Panama continued to lead in the number of vessels, commercial value and gross tons. Growth in the dead weight capacity of Panama (4.2 per cent) was dwarfed by the increase in Liberia (12.7 per cent). The Chinese flag registered the second fastest growth (5.4 per cent) while tonnage registered in Greece declined by 4 per cent over the previous year.

Lack of qualified sea personnel is driving shipowners to consider the use of foreign/open registries (Meade, 2023). Mirroring trends in capacity shares, much of the value of the global fleet is concentrated in Panama (12.9 per cent), followed by Liberia (11.8 per cent) and the Marshall Islands (11.4 per cent) (table 2.6).

Shipowners tend to have more direct control over investment decisions related to their fleets, including vessel sizes and types, ship technology, fuels used, engines installed and propulsion systems. Today, shipowners are largely located in developed countries, although China and Singapore feature among the top 10 ship owning countries. This distinction in the shipping industry underscores the complexities associated with regulating the sector's environmental impact, as demonstrated by the ongoing greenhouse gas (GHG) emission reduction negotiating process at IMO.

Table 2.4 Leading flags of registration by dead weight tons, 2022

Rank	Flag of registration	Number of vessels	Share of world vessel total (percentage)	Dead weight tons (thousands dead weight tons)	Share of total world dead weight tons (percentage)	Average vessel size (dead weight tons)	Growth in dead weight tons 2022 to 2023
1	Liberia	4 821	4.6	378 346	16.6	78 479	12.7
2	Panama	8 174	7.8	365 096	16.1	44 666	4.2
3	Marshall Islands	4 180	4.0	299 170	13.2	71 572	3.2
4	Hong Kong, China	2 537	2.4	200 075	8.8	78 863	-3.7
5	Singapore	3 202	3.0	134 985	5.9	42 156	2.7
6	China	8 262	7.8	124 061	5.5	15 016	5.4
7	Malta	1 957	1.9	109 001	4.8	55 698	-5.0
8	Bahamas	1 274	1.2	72 674	3.2	57 044	-0.9
9	Greece	1 215	1.2	59 016	2.6	48 573	-4.3
10	Japan	5 229	5.0	41 726	1.8	7 980	4.2
11	Cyprus	1 005	1.0	31 164	1.4	31 009	-6.8
12	Indonesia	11 422	10.8	30 171	1.3	2 641	2.5
13	International Shipping Register of Madeira	729	0.7	26 850	1.2	36 832	3.7
14	Danish International Register of Shipping	590	0.6	25 259	1.1	42 811	-3.1
15	Norwegian International Ship Register	684	0.6	21 271	0.9	31 099	1.0
16	Islamic Republic of Iran	965	0.9	20 723	0.9	21 475	1.2
17	Isle of Man	269	0.3	20 109	0.9	74 755	-2.5
18	Republic of Korea	2 149	2.0	18 894	0.8	8 792	20.6
19	India	1 859	1.8	18 133	0.8	9 754	7.1
20	Saudi Arabia	433	0.4	13 406	0.6	30 961	-3.5
21	United States of America	3 531	3.4	12 586	0.6	3 564	0.9
22	Viet Nam	1 973	1.9	12 434	0.5	6 302	0.7
23	Russian Federation	2 910	2.8	11 270	0.5	3 873	3.0
24	United Kingdom excl. Channel Islands and Isle of Man	866	0.8	11 057	0.5	12 768	-2.5
25	Malaysia	1 750	1.7	9 406	0.4	5 375	2.0
26	Belgium	198	0.2	9'160	0.4	46'261	-6.3
27	Italy	1 276	1.2	9 121	0.4	7 148	-8.6
28	Germany	595	0.6	7 249	0.3	12 183	2.1
29	Cameroon	198	0.2	7 228	0.3	36 503	45.1
30	Bermuda	122	0.1	7 043	0.3	57 731	-10.7
31	Türkiye	1 170	1.1	6 651	0.3	5 684	8.5
32	Kingdom of the Netherlands	1 187	1.1	6 618	0.3	5 575	-0.6
33	Taiwan Province of China	465	0.4	6 445	0.3	13 859	-4.6
34	Antigua and Barbuda	614	0.6	6 347	0.3	10 336	2.0
35	Philippines	2 203	2.1	6 125	0.3	2 780	-5.7
	Top 35	***80 014***	***75.9***	***2 138 866***	***94.1***	***26 731***	***3.1***
	World total	**105 395**	**100.0**	**2 272 772**	**100.0**	**21 564**	**3.2**

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. For a complete list of countries, see http://stats.unctad.org/fleet. Dead weight tons for some individual vessels have been estimated.

Table 2.5 Ownership of the world fleet, by carrying capacity, national- and foreign-flagged fleet, dead weight tons, 2022

	Country or territory of ownership	Number of vessels			Dead weight tons				
		National flag	Foreign flag	Total	National flag	Foreign flag	Total	Foreign flag as a percentage of total	Total as a percentage of world dwt
1	Greece	598	4 332	4 936	51 976 486	341 036 573	393 033 425	86.8	17.4
2	China	5 997	2 791	8 839	121 809 591	179 066 943	301 997 355	59.5	13.4
3	Japan	950	3 069	4 023	37 438 045	200 224 252	237 673 376	84.2	10.5
4	Singapore	1 373	1 410	2 813	68 494 373	72 237 484	140 824 814	51.3	6.2
5	Hong Kong, China	842	979	1 842	72 339 321	44 542 059	117 287 467	38.1	5.2
6	Republic of Korea	816	869	1 696	17 588 035	79 517 595	97 144 236	81.9	4.3
7	Germany	184	1 971	2 156	6 834 385	70 143 305	76 980 906	91.1	3.4
8	Taiwan Province of China	151	892	1 054	6 279 703	52 197 018	58 549 256	89.3	2.6
9	United Kingdom	354	975	1 332	9 277 332	48 600 066	58 024 495	84.0	2.6
10	Norway	953	963	1 918	18 081 678	37 307 060	55 519 431	67.4	2.5
11	United States of America	771	978	1 758	10 113 981	40 386 816	51 194 895	80.0	2.3
12	Bermuda	NA	403	403	NA	50 220 307	50 220 307	NA	2.2
13	United Arab Emirates	125	1 152	1 285	577 123	39 125 947	39 732 861	98.5	1.8
14	Denmark	401	411	812	19 728 219	19 659 607	39 387 826	49.9	1.7
15	Switzerland	14	602	616	835 748	36 827 778	37 663 526	97.8	1.7
16	Türkiye	396	1 361	1 766	6 056 462	31 243 034	37 348 182	83.8	1.7
17	Monaco	NA	380	380	NA	36 770 160	36 770 160	NA	1.6
18	India	914	227	1 145	17 357 386	13 202 639	30 726 338	43.2	1.4
19	Indonesia	2 335	112	2 458	25 565 216	2 810 746	28 657 379	9.9	1.3
20	Cyprus	124	291	417	4 828 206	22 461 924	27 341 575	82.3	1.2
21	Belgium	87	210	297	8 453 189	18 243 329	26 696 518	68.3	1.2
22	Russian Federation	1 552	281	1 841	9 813 989	11 777 202	21 639 798	54.5	1.0
23	Islamic Republic of Iran	241	11	253	18 450 865	853 392	19 305 808	4.4	0.9
24	Kingdom of the Netherlands	663	527	1 190	5 396 634	12 290 136	17 686 770	69.5	0.8
25	France, Metropolitan	157	285	442	4 070 356	13 205 297	17 275 653	76.4	0.8
26	Saudi Arabia	172	121	295	13 140 826	3 497 829	16 642 449	21.0	0.7
27	Viet Nam	972	189	1 170	11 633 102	4 359 940	16 059 690	27.3	0.7
28	Italy	445	163	608	8 276 622	6 077 880	14 354 501	42.3	0.6
29	Brazil	297	84	382	4 688 557	9 592 958	14 287 015	67.2	0.6
30	Malaysia	432	161	607	6 664 042	3 248 351	9 959 308	32.8	0.4
31	Canada	220	155	376	2 703 233	7 014 300	9 718 017	72.2	0.4
32	Oman	4	59	64	5 558	8 049 447	8 055 151	99.9	0.4
33	Nigeria	210	75	291	3 953 197	3 973 143	7 947 869	50.1	0.4
34	Qatar	52	83	135	664 130	7 095 509	7 759 639	91.4	0.3
35	Kuwait	44	7	51	4 697 403	446 848	5 144 251	8.7	0.2
	Subtotal, top 35 shipowners	22 846	26 579	49 651	597 792 993	1 527 306 874	2 128 610 247	71.8	94.5
	Rest of the world unknown	*3 281*	*2 648*	*6 940*	*34 906 961*	*61 981 471*	*124 928 662*	*49.6*	*5.5*
	World	**26 127**	**29 227**	**56 591**	**632 699 954**	**1 589 288 345**	**2 253 538 909**	**70.5**	**100**

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

Notes: Propelled seagoing vessels of 1,000 GT and above, as of 1 January 2023.

Ships registered under the national flag are any ship where the registration and ownership are in the same country or territory of ownership. Ships in second registries of Brazil, China, Denmark, France, and Norway are considered to be under the national flag if they are owned in their respective country. Ships registered in the Isle of Man are considered as being registered under national flag if they are owned anywhere in a greater territory of United Kingdom including the Isle of Man and the Channel Islands. Likewise, for the purpose of determining national flag, Madeira and mainland Portugal are considered as one unit.

The totals include vessels for which the flag is unknown. Thus, the sum of national and foreign flags does not equal the total. Foreign flag as a percentage of total is calculated as share of vessels with known flag. See also http://stats.unctad.org/fleetownership.

Metropolitan France is the part of France located in Europe, including the island of Corsica. The term excludes overseas departments and territories.

Table 2.6 Ship owning countries and flags of registration by value, 1 January 2023

	Country or Territory of Ownership	Percentage share		Flag of Registration	Percentage share
1	Greece	11.80	1	Panama	12.86
2	China	11.04	2	Liberia	11.78
3	Japan	10.73	3	Marshall Islands	11.41
4	United States	7.41	4	Bahamas	7.44
5	Singapore	5.29	5	Malta	6.53
6	Norway	4.70	6	Hong Kong, China	6.27
7	United Kingdom	4.33	7	Singapore	6.07
8	Germany	3.67	8	China	5.69
9	Hong Kong, China	3.63	9	Greece	2.15
10	Republic of Korea	3.50	10	Japan	1.85
11	Switzerland	2.50	11	Norwegian International Ship Register	1.75
12	Denmark	2.09	12	Italy	1.73
13	Taiwan Province of China	1.99	13	Danish International Register of Shipping	1.37
14	Bermuda	1.98	14	Cyprus	1.31
15	Italy	1.83	15	Bermuda	1.30
16	Kingdom of the Netherlands	1.74	16	International Shipping Register of Madeira	1.15
17	Brazil	1.45	17	Indonesia	1.06
18	United Arab Emirates	1.39	18	United Kingdom	1.02
19	France	1.32	19	United States	0.95
20	Russian Federation	1.19	20	Isle of Man	0.91
21	Türkiye	1.18	21	Kingdom of the Netherlands	0.89
22	Monaco	1.14	22	Russian Federation	0.87
23	Indonesia	1.05	23	Republic of Korea	0.76
24	India	0.97	24	Norway	0.69
25	Belgium	0.81	25	France	0.68
26	Malaysia	0.81	26	Malaysia	0.66
27	Cyprus	0.78	27	India	0.63
28	Qatar	0.58	28	Nigeria	0.62
29	Canada	0.56	29	Australia	0.55
30	Nigeria	0.56	30	Brazil	0.55
31	Viet Nam	0.53	31	Viet Nam	0.41
32	Sweden	0.52	32	Germany	0.38
33	Australia	0.50	33	Türkiye	0.38
34	Saudi Arabia	0.50	34	Islamic Republic of Iran	0.35
35	Islamic Republic of Iran	0.35	35	Saudi Arabia	0.34
	Top 35 countries or territories	**94.48**		**Top 35 flags**	**93.31**
	Rest of the World	*5.52*		*Rest of the World*	*6.69*
	Total	**100.00**		**Total**	**100.00**

Source: UNCTAD calculations, based on data from Clarksons Research, 2023. Note: vessels of 1,000 GT and above.

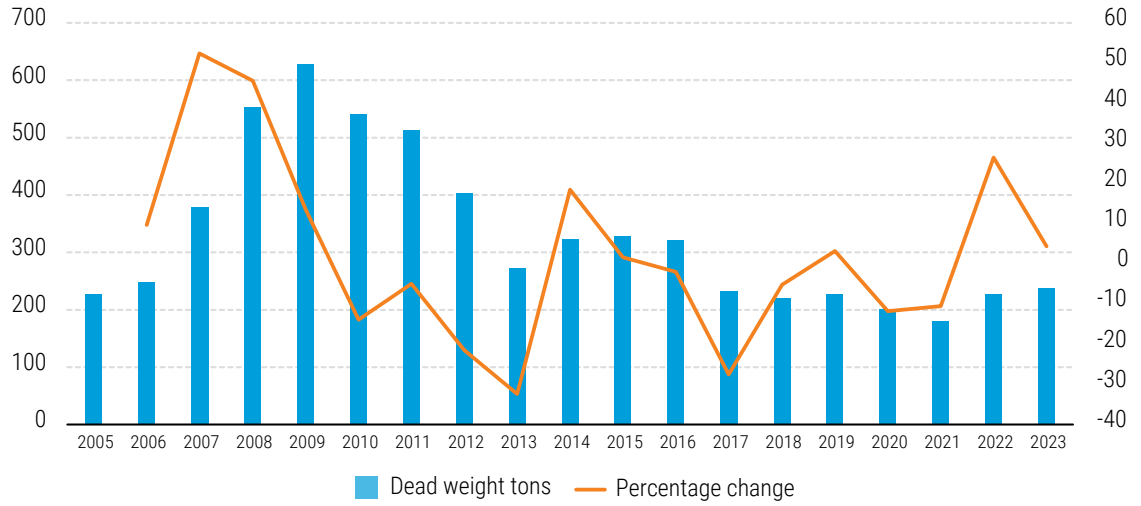
The leading 35 ship owning countries accounted for 94.5 per cent of the world shipping carrying capacity (table 2.5). On 1 January 2023, developed countries accounted for over half of the tonnage owned globally, with 19 developed nations among the leading 35 ship owning countries. Developing countries, particularly in Asia, led by China and Singapore, have been increasing their ownership share and are featured in the top 20 ship owning nations. Within the 35 ship owning economies, 15 were in Asia, 14 in Europe and four in the Americas. Nigeria stands as the largest ship owning country in Africa and Brazil tops the list in South America. The value of the global fleet reached $1.26 trillion with the top ten owners accounting for nearly two-thirds of the total, with Greece leading, followed by China, and Japan (table 2.6).

4. Global fleet renewal and capacity growth faces uncertainty

The global shipbuilding industry witnessed a dynamic year in 2022, marked by an average increase of 15 per cent in shipbuilding prices (Hine, 2023). Owners are showing less appetite for ordering new ships, except for container and LNG vessels.

At the start of 2023, the orderbook stood at 4,029 vessels, totalling 237.3 million dead weight tons. This was down 2.1 per cent in terms of vessel numbers compared to the same period in 2022 but up 4.1 per cent in dead weight tons terms (figure 2.2). The global ship orderbook remains moderate at 10 per cent of the world's existing fleet (Clarksons Research, 2023a). The value of the orderbook increased by nearly 20 per cent in the first quarter of 2023, compared to the same quarter the previous year. This reflects a more sophisticated vessel product mix and a rising demand for green technology and alternative-fuelled vessels.

Figure 2.2 World tonnage on order, million dead weight tons and percentage change, 2005–2023



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

Notes: Propelled seagoing merchant vessels of 100 GT and above. Beginning of year figures.

The mix of ship types being ordered has evolved in recent years. By early May 2023, containerships represented the largest share of the orderbook (37.3 per cent) representing more than double the contribution of early May 2010, i.e. after the financial crisis (Clarksons Research, 2010). In early May 2023, LNG carriers accounted for 18.2 per cent, a significant increase from 1.1 per cent in the same period of 2010. In contrast, bulker and tanker orders, which represented over 70 per cent of the capacity in early May 2010, only made up 27.2 per cent in May 2023. Uncertainty surrounding fuel technology and higher newbuild prices have played a role in limiting new orders for tankers and bulkers (Allen, 2023).

By early May 2023, the tanker orderbook was just 4 per cent of the existing global fleet, the lowest level for over 25 years. The order book for bulkers was also low, at 7 per cent of the existing fleet. In comparison, orders for containerships and LNG vessels reached 26 per cent and 46 per cent of global fleet respectively (Clarksons Research, 2023b). Europe's drive to source energy outside the Russian Federation has fuelled demand for LNG carriers and this trend is expected to continue. Improvements in global economic prospects are likely to support the orderbook for bulkers, while appetite for containerships remains strong despite a weakening market.

Shipowners find themselves in a dilemma: should they invest in ordering additional ship capacity and fleet renewal without clarity on the best alternative fuel and green technology options? Alternatively, should they wait until the alternative fuel pathway and regulatory regime become clearer and more established before making decisions? (See chapter 3).

Shipowners' investment decisions are further complicated by fleet renewal needs, concerns over shipbuilding yard capacity and higher building prices. This is unfolding against the backdrop of the Energy Efficiency Existing Ship Index (EEXI) and Carbon Intensity Indicator (CII) from IMO, which came into force

in November 2022. Complying with these new requirements will alter effective active supply due to operational limitations.

Ports and terminals are facing similar hurdles. They also require clarity about the future regulatory framework and the alternative fuels that will be in demand. Only then can they make informed investment decisions regarding equipment, terminal replacement, construction and, potentially, alternative fuel bunkering facilities.

Despite an ageing fleet, ship recycling remains low. With limited availability at shipyards and high newbuild prices, owners have been active in the sales and purchase market (second-hand), or preferred to make early debt repayments using profits generated since the pandemic (Clarksons Research, 2023c). The second-hand market remained highly active in 2022 and 2023, with slightly lower sales compared to the record-breaking year of 2021. Firm buyer demand and higher interest in older tonnage, partly due to demand for the 'shadow' fleet, underpinned this trend. Tanker sales and purchase transactions reached a record high in 2022, and Aframaxes experienced 15-year highs in February 2023 (VesselsValue, 2023).

In 2022, 7.5 million gross tons, representing less than 0.5 per cent of the total active fleet was sent for recycling (table 2.7). Tankers (36 per cent) accounted for most of the tonnage sold for scrap. Despite more stringent environmental rules and rising steel costs, market conditions took precedence, with shipowners eyeing the peaks in freight rates. Demand for older tonnage increased the average value of older vessels. Some disruption at ship recycling yards, including financial pressures in yards in Bangladesh and Pakistan have also constrained recycling activity. Bulker recycling accounted for 31 per cent of recycling, with gas carriers making up just 2 per cent and recycling of containerships limited to 3 per cent. In a parallel development of significance for ship recycling, was the coming into force of the Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships (the Hong Kong Convention) for Bangladesh and Liberia, which deposited their respective instruments of accession to the Convention in June 2023. The Convention will enter into force on 26 June 2026.

Table 2.7 Reported tonnage sold for ship recycling by major vessel type and recycling country, thousands of gross tons, 2022

Vessel type	Bangladesh	Pakistan	India	Türkiye	China	Rest of the world	World total	Percentage share
Oil tankers	1 411	649	533	57	28	37	2 715	36.1
Bulk carriers	1 148	513	578		131	0	2 369	31.5
General cargo ships	31	12	33	20		141	237	3.1
Container ships	15	0	156		7	0	178	2.4
Liquefied gas carriers	13	0	104	2		20	138	1.8
Chemical tankers	53	34	204	3	13	5	313	4.2
Offshore supply	22	45	568	43		128	806	10.7
Ferries and passenger ships	55	15	239	335		31	676	9.0
Other/n.a.	52	0	18	16	0	12	98	1.3
Total gross tons	**2 801**	**1 270**	**2 432**	**477**	**179**	**374**	**7 531**	**100.0**
Percentage share	**37.2**	**16.9**	**32.3**	**6.3**	**2.4**	**5.0**	**100**	

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

Notes: Propelled seagoing vessels of 100 GT and above. Estimates for all countries available at http://stats.unctad.org/shiprecycling.

In 2023, interest in ship recycling picked up as shipping market conditions softened and issues relating to letters of credit in Bangladesh eased. More recycling is anticipated in 2023 as shipowners renew and upgrade their fleets to comply with new IMO GHG emission regulations. More containerships are likely to be recycled in anticipation of the massive influx of new builds expected in the coming years, and reflecting lower freight rates. The ship recycling market is expected to become more volatile, influenced by the IMO EEXI and CII regulations, and their impact on market dynamics. Factors such as speed reduction and removal from service for ship retrofitting will play a role in shaping the market. Some shipowners may postpone recycling tonnage or investing in tonnage retrofitting until 2026, when the CIIs will be revised.

5. Shipbuilding yard capacity and prices will also shape ship tonnage supply

Shipyard capacity is currently facing constraints. Tanker and dry bulk owners are anticipating long waiting times and high building prices. Increasing shipbuilding capacity is crucial to ensure that shipping meets global demand and its sustainability goals. Global shipyard capacity has decreased dramatically since the global financial crisis (Chambers, 2023b).

Over 3,500 ships needed to be built or refitted annually until 2050 (Splash 247.com, 2022). At its peak in 2010, the global shipbuilding industry built 2,700 vessels a year (Chambers, 2023b). With consolidation, the number of shipyards fell from about 700 in 2007 to about 300 by 2022 (BRS Group, 2023). A total of 68 per cent, 92 per cent and 71 per cent of the shipbuilding capacity in China, the Republic of Korea and Japan, respectively, is in the hands of only three shipbuilding groups (Chambers, 2023c). These three economies are responsible for constructing nearly the entire world dead weight capacity on order.

Tighter environmental regulations, new ship energy saving technologies, and the transition towards alternative fuels are driving reliance on a small group of builders in each vessel segment. At the same time, many yards are struggling to attract orders. Changes in ordering patterns over the years have resulted in a lopsided impact on the industry. Unlike smaller players, large shipyards are fully booked for three years and competition for space by some ship types is putting pressure on yards to diversify and reactivate existing capacity. For example, in 2022, a few additional Chinese yards entered the LNG carrier segment (BRS Group, 2023).

Ship financing has also changed since the 2010 financial crisis, with a reduction in capacity of the overall ship finance market (Clarksons Research, 2023c). While shipping has traditionally relied on bank debt, other financial structures include equity, debts, and leasing (Stopford, 1997). There has also been a geographical move eastward with many western banks reducing their exposure to shipping. In 2021 and 2022, shipping finance activity remained modest with shipowners relying less on debt for liquidity and more on operations, thanks to a strong market and high freight rate environment. Banks saw repayment activity increase, especially in container shipping (Clarksons Research, 2023c). The financing landscape is also influenced by the rise in green finance, which requires ships to comply with conditions such as the Poseidon Principles, the Climate Bonds Initiative, the European Union Taxonomy or the Green Shipping Programme.

More recently, the collapse of three banks in the United States and the rescue of Credit Suisse have added uncertainty to this capital-intensive industry. Credit Suisse is the world's 10th largest shipping lender with about half its portfolio involving Greek shipowners. UBS Group AG will likely shrink the $10 billion shipping portfolio it inherited from Credit Suisse Group AG after its emergency takeover in March 2023 (Paris C, 2023). Speculation about the future of shipping portfolios, underscoring the importance for shipowners to continue diversifying their sources of finance.

6. Container shipping is adjusting to normalized market conditions

In 2022, container ship carrying capacity expanded at a relatively moderate rate of 3.9 per cent compared with 4.1 per cent in 2021. The fleet stood at 5,852 ships at the start of 2023 totalling 25.8 million 20-foot equivalent units (TEU). Container capacity is forecast to grow by 6.3 per cent in 2023 and 8.1 per cent in 2024. However, effective supply is expected to grow at a double-digit rate, reflecting fleet productivity gains with the easing of congestion (Drewry Maritime Research, 2023).

To manage capacity amid a softer market, liner operators implemented blank sailing, lowered sailing speed, rerouted some ships on backhaul legs and idled some capacity. In the first quarter of 2023, the average sailing speed slowed down by 4 per cent year-on-year and could drop by 10 per cent before 2025 (Chambers, 2023a). Layups and recycling are also likely to increase. By the first quarter of 2023, idle containership capacity reached 3.2 per cent of the fleet, up from 2.2 per cent in the previous quarter (Clarksons Research, 2023d).

Depending on whether operators will seek to delay delivery or cancel some new builds and whether speeds will fall due to the new IMO rules, effective supply remains uncertain. Compliance with EEXI and CII requirements as stipulated by IMO is expected to result in lower sailing speeds and a change in effective supply. The time needed to retrofit vessels will also play a role. Maersk, for example, announced that it

could require up to 15 per cent more vessels to maintain service levels, while Hapag-Lloyd estimates an increase of 5–10 per cent (Mandra, 2023).

In recent times, new market entrants and operators have emerged in the logistics market, including in liner shipping. Some small operators who arrived at the height of the pandemic have since left the market. For example, in June 2022, the two Chinese container carriers, BAL Container Line and CULines suspended operations on their Pacific routes, indicating a shift in the shipping industry. By December 2022, CULines had also ended its joint China-Europe service with T.S. Lines. In September 2022, the United Kingdom-based Allseas Shipping discontinued its Asia-United Kingdom service. In the United States, the wholesaler Costco, which had chartered seven containerships through the Pasha Hawaii operator, faced a $93 million charge in November 2022 due to the early termination of its charter agreements (BRS Group, 2023). Others, more strategic in their approach, such as e-commerce platforms (e.g., Amazon) who have expanded their logistics service offering, as well as digital freight forwarders and marketplaces such as Flexport and Fortos/Freighthub continue to operate today. Table 2.8 shows how new entrants active on the specified routes have evolved over the past three years. Their share of container capacity across regions increased more than threefold between the second quarter of 2020 and the second quarter of 2023.

Table 2.8 Container carrying capacity deployed by new operators who entered the market, percentage share, Q2 2020 and Q2 2023

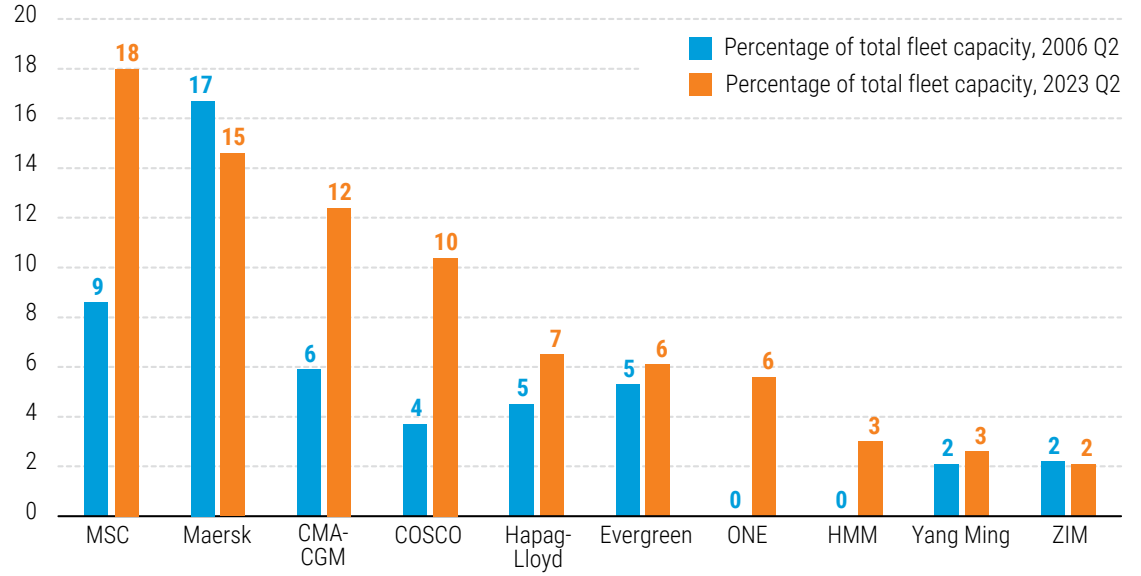
	Q2 2020	Q2 2021	Q2 2022	Q2 2023
Gulf and Indian subcontinent	2.7	4.0	7.2	23.9
Latin America	0.1	0.1	2.9	11.5
Far East	1.8	1.8	4.9	5.4
Gulf and Indian subcontinent - Far East	0.5	1.2	1.8	3.7
Europe and Mediterranean	0.8	0.5	1.6	3.5
Europe and Mediterranean - North America				2.8
Europe and Mediterranean - Far East		0.3	1.4	2.7
Gulf and Indian subcontinent - Sub-Saharan Africa		0.6		1.5
North America - Latin America				1.2
Europe and Mediterranean - Gulf and Indian subcontinent		0.3	0.2	1.0
Far East - Australasia and Oceania		0.1	2.2	0.9
Europe and Mediterranean - Sub-Saharan Africa		0.8	0.8	0.8
North America			0.7	0.8
Europe and Mediterranean - Gulf and Indian subcontinent - Far East			0.8	0.7
Far East - North America			1.1	0.2
Europe and Mediterranean - Latin America				0.2
Grand Total - based on regions where new entrants are active	**5.5**	**5.1**	**10.8**	**16.8**
Grand Total - based on level of capacity scheduled on all deepsea routes	**0.7**	**0.8**	**2.1**	**3.6**

Source: UNCTAD based on MDS Transmodal data. May 2023. https://www.mdst.co.uk.

Meanwhile, traditional ocean carriers are aiming to strengthen their position and mitigate the effect of downturns in business cycles by creating additional revenue streams (Bhonsle, 2023) and investing in new assets and broader logistics. Figure 2.3 features the top ten liner operators by capacity market share between 2006 and 2023. These leading operators have been investing in end-to-end solutions to emerge as service integrators. They have been diversifying their portfolio to focus on more profitable sectors. For example, CMA CGM has created its air cargo business, acquired freighter aircrafts and is in the process of acquiring the logistics part of Bolloré. MSC purchased African ports operated by Bolloré. Hapag Lloyd acquired a terminal business in order to own and operate terminals located in the Americas and Africa.

Meanwhile and as shown in figure 2.3, most carriers increased their ocean shipping capacity, except for Maersk and, to some extent Zim, which saw their shipping capacity decline slightly. In 2022, MSC surpassed Maersk as the largest global liner operator.

Figure 2.3 Fleet capacity of the top 10 liner operators, percentage share, Q2 2023 and Q2 2006



Source: UNCTAD based on MDS Transmodal data. May 2023.

7. Liner shipping operators diverge in their strategies

Vertical integration involving liner operators and terminals can promote the development of transshipment hubs, attract volumes and stimulate feedering services. The full benefits of integration in logistics will need to be assessed within context and take into account the balance of costs and benefits to stakeholders, including smaller shippers and users from developing countries. Governments and port authorities will need to assess whether the potential of additional business compensates for the risks associated with greater vertical integration.

A recurrent concern is that integration may create dominant market positions when the carrier controls upstream and/or downstream activities. This can reduce competition with nonintegrated competitors (ITF, 2022). Gathering experiences from shippers and cargo owners of different sizes and across regions to document the gains and pains that may have been generated by integration is needed to fully appreciate the full costs and benefits of this industry trend.

A significant development in the liner shipping industry occurred in early 2023 when MSC and Maersk announced the end of the 2M alliance, with the termination set to take effect at the start of 2025. Table 2.9 maps out the fleet capacity of the top 10 shipping lines in the second quarter of 2023 versus the equivalent quarter in 2006. Over the past 17 years, the leading liner operators expanded capacity, with COSCO, CMA CGM and MSC recording the largest increases. For COSCO and Maersk, capacity increase also reflects merger and acquisition activities (e.g. Hamburg Sud and OOCL), growth in vertical integration and the need to service new markets (e.g. COSCO/Piraeus).

The end of 2M has implications for MSC and Maersk, their customers, and the shipping industry. Changes in pricing could result as they pursue service differentiation goals. As CMA CGM and COSCO are also set to expand their fleet through 2024, some observers maintain that both carriers will be in a better position to compete with MSC and Maersk in a post-2M landscape. This may add uncertainty to Evergreen's future while some small- and mid-sized carriers could exit an increasingly aggressive market (S&P Global, 2023).

More carriers could break ranks from alliances. A reshuffle would redefine the competitive landscape and market shares. Some operators may prefer to cluster on preferred port-pairs, which could reduce options for shippers (Drewry Maritime Research, 2023). A look at the top 100 ports in 2021 featured on the Lloyd's List and, more specifically the 84 deep-sea ports, reveals that MSC, Maersk and COSCO deployed their highest capacity in over two-thirds of these 84 ports (table 2.10).

Table 2.9 Fleet capacity of the top 10 liner operators, 20-foot equivalent unit capacity and percentage change, Q2 of 2006 and Q2 of 2023

Fleet capacity in Q2 2006 of the 10 liner operators ranked as top 10 in Q2 2023	Alliances (Q2 2023)	**Total capacity**	Fleet capacity in Q2 2023 of the 10 liner operators ranked as top 10 in Q2 2023	Alliances (Q2 2023)	**Total capacity**	**Top 10 liner operators in Q2 2023**	**Percentage change over Q2 2006**
Maersk	2M Alliance	**1 618 539**	MSC	2M Alliance	**4 919 889**	MSC	490
MSC	2M Alliance	**833 375**	Maersk	2M Alliance	**3 991 414**	Maersk	147
CMA-CGM	Ocean Alliance	**574 884**	CMA-CGM	Ocean Alliance	**3 387 627**	CMA-CGM	489
Evergreen	Ocean Alliance	**518 292**	COSCO	Ocean Alliance	**2 848 919**	COSCO	697
Hapag-Lloyd	THE Alliance	**439 523**	Hapag-Lloyd	THE Alliance	**1 767 951**	Hapag-Lloyd	302
COSCO	Ocean Alliance	**357 266**	Evergreen	Ocean Alliance	**1 657 307**	Evergreen	220
ZIM		**209 704**	ONE	THE Alliance	**1 536 945**	ONE	
Yang Ming	THE Alliance	**204 285**	HMM	THE Alliance	**814 147**	HMM	
All others		**4 950 934**	Yang Ming	THE Alliance	**715 390**	Yang Ming	250
			ZIM		**565 435**	ZIM	170
			All others		**5 062 962**	All others	2
Total TEU capacity		**9 706 802**	**Total TEU capacity**		**27 267 986**	**Total**	**181**

Source: UNCTAD based on MDS Transmodal data. May 2023.

Table 2.10 Number of ports where carriers offer the highest level of capacity, 2019 and 2023

	Number of ports where the carrier offers the highest level of capacity 2023	**Number of ports where the carrier offers the highest level of capacity 2019**	**Percent change 2019–2023**	**Median market share, 2023**	**Median market share, 2019**	**Percentage change 2019–2023**
MSC	29	20	9	31.5	29.2	2.3
Maersk	16	21	-5	30.5	40.9	-10.4
COSCO	10	16	-6	26.3	24.5	1.8
CMA-CGM	9	7	2	29.1	27.1	2.0
ONE	5	8	-3	25.8	30.1	-4.3
Evergreen	4	4	0	52.7	42.1	10.6
Hapag-Lloyd	3	3	0	18.4	23.9	-5.4
Akkon Lines	1			34.9		
Ethiopian	1			59.8		
FESCO	1			100.0		
HMM	1			94.5		
IRISL	1			100.0		
Torgmoll	1			32.6		
TS Lines	1			28.3		
Yang Ming	1	1	0	45.2	23.5	21.7

Source: UNCTAD based on MDS Transmodal data. May 2023.

Notes: Median refers to the share within the market of the ports in which the carrier offers the highest capacity.

In 2023, the leading three carriers, Maersk, MSC and COSCO, deployed the highest level of capacity in 55 out of a total of 84 deep-sea ports. The past four years has seen these lines shift their presence in ports. While MSC increased the number of ports where it deployed capacity compared to 2019, Maersk and COSCO reduced the number of ports. MSC closed the gap with Maersk, who held the market leader position in terms of capacity across 38 out of the 153 countries served by the leading container shipping lines in 2019. As of early 2023, MSC has surpassed Maersk and now leads in 36 countries, while Maersk maintains its lead in 30 countries. MSC has overtaken Maersk in key markets such as India and the United States of America (Financial Times, 2023a).

The port business of various shipping lines is highlighted in table 2.11 which also shows the relation between several global port terminals and leading liner operators. At ports, the presence of shipping lines and the capacity of the ships served are key sub-indicators for liner shipping connectivity. It will be important to continue to monitor relevant trends and how ports adjust their business relations with large liner shipping companies and keep an eye on how the alliances and industry continue to evolve. An important development to monitor is the regulatory landscape, with liner shipping businesses moving into the sharp focus of regulators. A case in point is the recent proposed Ocean Shipping Antitrust Enforcement Act in the United States of America, which is seeking to abolish the antitrust exception for maritime carriers. While the future of the proposed legislation remains uncertain, the passing of any such legislation has ripple effects that require further monitoring.

Table 2.11 Top three liner operators' presence in selected world port terminals, 2021

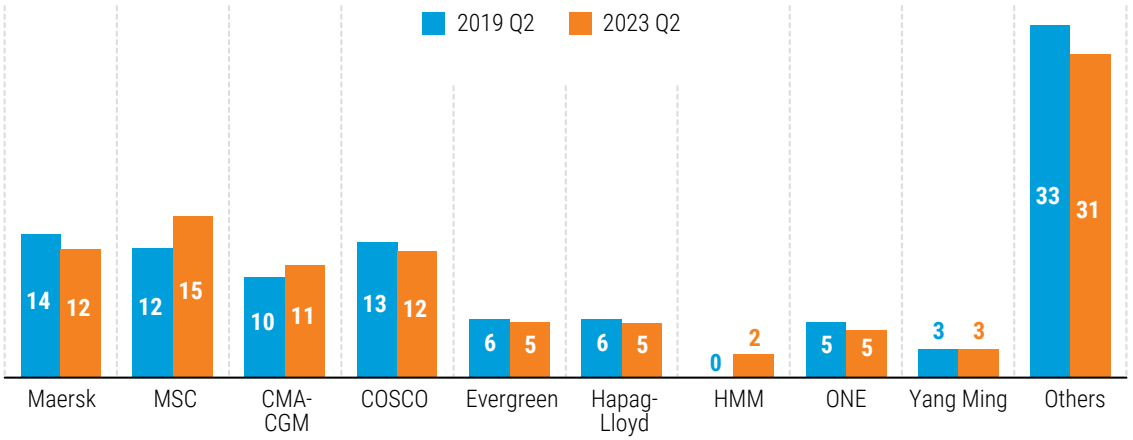
Terminal Operator	Terminal	Capaciy in 20-foot equivalent unit	Throughput in 20-foot equivalent unit	Shareholding in percentage
MSC/TIL				
Rotterdam	Delta MSC Terminal	1 900 000	1 150 000	50 JV
Antwerp	MPET PSA- DGD	9 000 000	6 380 000	50 JV
Gioia Tauro	Medcenter Container Terminal	4 200 000	3 020 000	100 owned
Freeport	Freeport Container Port	1 900 000	1 650 000	49 JV
Singapore	MSC-PSA Asia Terminal Pte Limited	7 700 000	6 710 000	49 JV
Maersk/APMT				
Rotterdam	APM Terminals Rotterdam Maasvlakte II	2 260 000	2 742 000	100 owned
Algeciras	APM Terminals Algeciras	4 214 000	3 677 000	100 owned
Tangier	APM Terminals Tanger-Med	2 519 000	2 252 000	90 owned
Tangier-Med II	APM Terminals MedPort Tangier	2 829 000	2 688 000	80 owned
Port Said	Suez Canal Container Terminal	3 900 000	3 648 000	55 JV
Salalah	Salalah Port Services	5 222 000	4 512 000	30.1 owned
Tanjung Pelepas	Port of Tanjung Pelepas	11 330 000	11 200 000	30 owned
CMA/CGM				
Malta	Malta Freeport Terminals	3 600 000	2 968 000	50 owned
Tangier Med	Eurogate Tanger	1 600 000	1 244 000	40 owned
Kingston	Kingston Freeport Terminal Limited	3 200 000	1 836 000	100 owned
La Réunion	SAMR	230 000	188 000	70 owned
Singapore	CMA CGM PSA Lion Terminal (CPLT)	4 900 000	4 651 000	49 owned

Source: UNCTAD, based on Drewry - Global Container Terminal Operators Annual Review and Forecast Annual Report 2022/23, tables 5.2, 5.7, and 5.12.

Market shares change over time in tandem with changes in the structure of the market and the diversity of its players (figure 2.4). For example, the share in terms of capacity scheduled to be deployed by carriers alone (i.e., not within their own alliance or in collaboration with other alliances or independent carriers) increased from 59 per cent to 67 per cent between the second quarter of 2019 and the equivalent quarter in 2023 (figure 2.5).

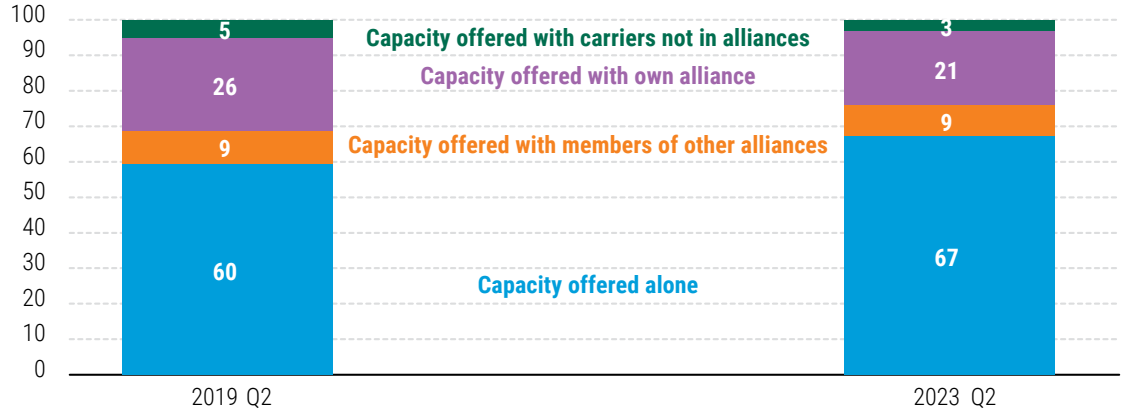
Over the same period, the share of capacity scheduled to be deployed by independent carriers as well as carriers as part of their own alliance or in collaboration with other alliances, declined from 35 to 30 per cent. Meanwhile individual liner operators have seen their market shares change. Maersk, for example, took 12 per cent of the market during the second quarter of 2023, down from 13 per cent during the same period in 2019. By contrast MSC and CMA CGM increased their shares.

Figure 2.4 Scheduled capacity of leading liner operators, percentage share, Q2 2019 and Q2 2023



Source: UNCTAD based on MDS Transmodal data. May 2023.

Figure 2.5 Capacity offered alone or as part of consortium by leading liner operators, percentage share, Q2 2019 and Q2 2023



Source: UNCTAD based on MDS Transmodal data. May 2023.

In a separate development, new patterns in the configuration of liner services and capacity deployment may be in the making. While not necessarily drawing any conclusions as to whether these changes may be caused by shifts in manufacturing, material sourcing and procurement decisions, it will be important to monitor these trends to ascertain whether supply chain diversification and resilience-building efforts could be driving these market share and port presence developments.

In 2022, and partly reflecting a weakening in containerized trade volumes on the main East-West routes, transatlantic services and capacity deployed increased. As an example, Hapag-Lloyd suspended the China–Germany Express service and redeployed ships on the transatlantic service. COSCO and OOCL launched a Southeast Asia–India—United States East Coast service in December 2022 after closing a China–Viet Nam–United States East Coast loop (Borgohain and Kapoor, 2023). Other developments relate to the Indian sub-continent and the Middle East services, as CMA CGM announced the launch of the new Bangladesh India Gulf Express service, while Maersk integrated services to form a new combined loop for the Indian sub-continent, Middle East, and Africa region. Target markets include Cameroon, Côte d'Ivoire, Ghana, India, Kenya, Nigeria, Pakistan, Saudi Arabia, Senegal, South Africa and the United Arab Emirates.

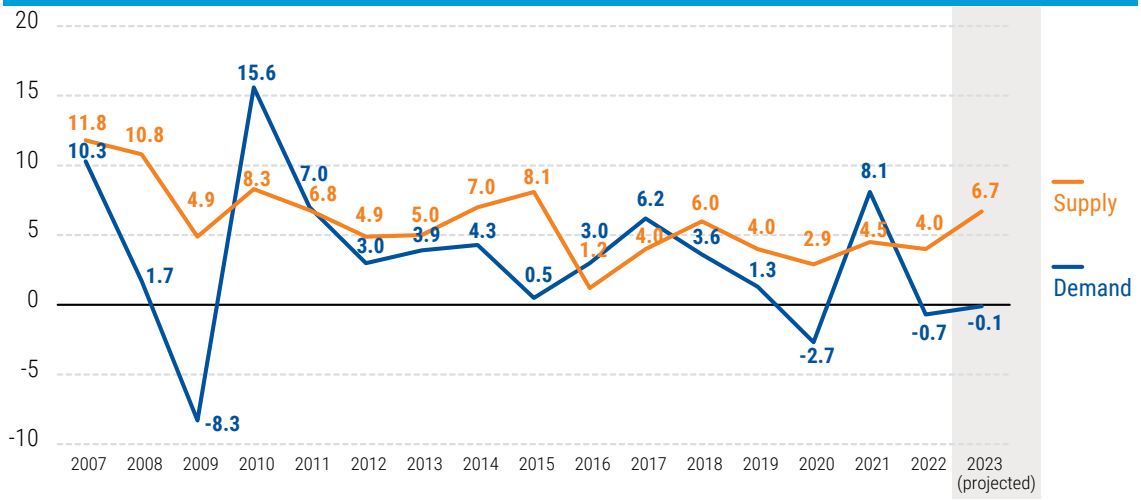
B. TRENDS IN FREIGHT MARKETS

1. Container freight rates: shifting tides in 2022 and stabilization in 2023

Container freight rates rose to record levels by the end of 2021 and continued to rise into early 2022. In the third quarter of 2022, spot container freight rates on most major trade lanes decreased significantly, away from the extremes seen earlier in the year and in 2021. By the end of 2022, container rates approached pre-pandemic levels before stabilizing in early 2023.

Supply and demand rebalancing and reduced port congestion have played an important role in resetting container freight rate levels (figure 2.6). Global containerized trade fell by 0.7 per cent in 2022, a marginal decline compared to the contraction of 2009 (-8.4 per cent) and 2020 (-2.7 per cent). Meanwhile, container ship carrying capacity, as noted in section A of this chapter, expanded by 3.9 per cent in 2022, creating a gap in demand and raising the prospect of supply overcapacity with an expected influx in container capacity in 2023 through 2025. In this context, spot container freight rates continued to ease in the first half of 2023, with rates returning to similar pre-COVID-19 levels and potentially falling below historical averages.

Figure 2.6 Growth of demand and supply in container shipping, percentage change, 2007–2023



Source: UNCTAD secretariat calculations. Demand is based on data from chapter 1, and supply is based on data from Clarksons Research, Container Intelligence Monthly, various issues.

Notes: Supply data refer to total capacity of the container-carrying fleet, including multipurpose and other vessels with some container-carrying capacity.

2. Container freight rates fall in the latter half of 2022, yet liner operators register record profits

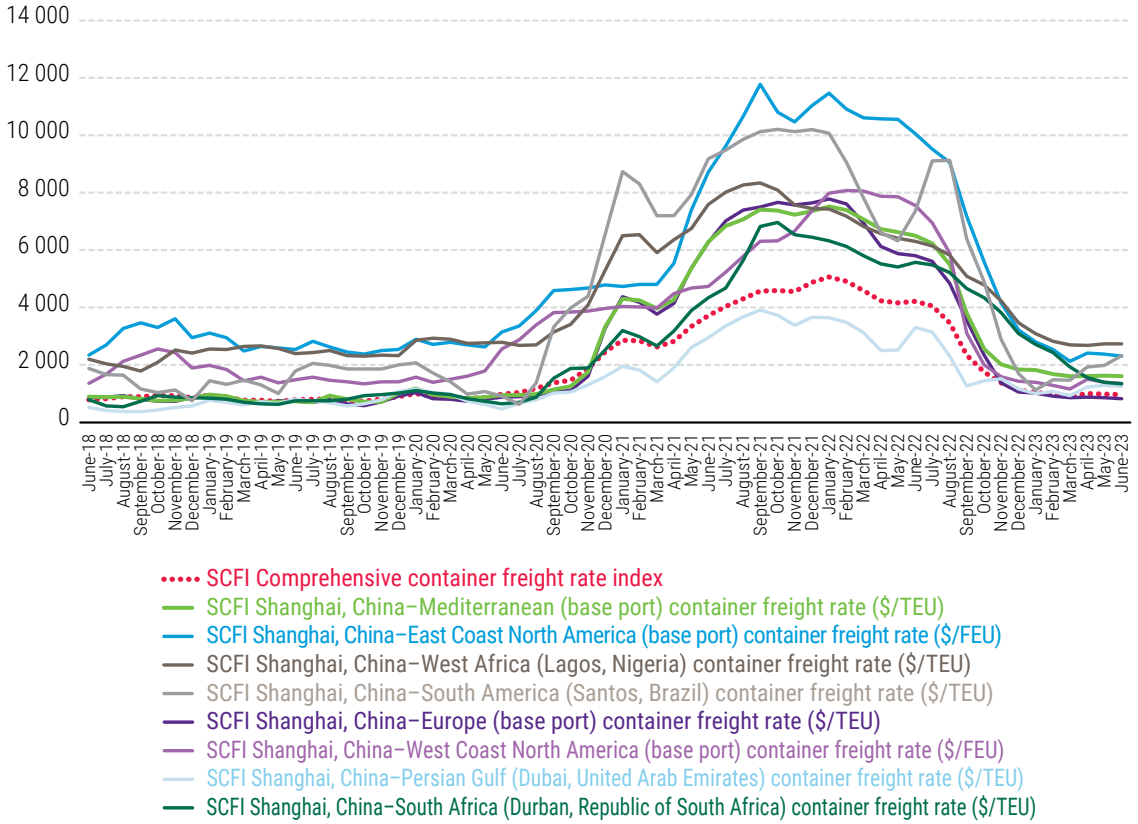
The year 2022 started at very high levels for container freight rates, a continuation of the 2021 trend. This was primarily driven by sustained pandemic-related demand and port congestion, which held up containership capacity and reduced effective supply. The war in Ukraine has also had some impact, amplifying operational complexity and congestion at European ports. However, the supply and demand dynamics shifted in the second half of the year, altering the balance and the rate levels. An easing from the pandemic-induced disruption and inventory adjustments, particularly in Europe and the United States of America resulted in a normalization in demand and trade volumes, especially on the main East—West trade.

As demand decreased, logistical disruptions eased, and port congestion improved as shown in the Clarksons port congestion index, which measures port congestion tying up fleet capacity.[2] The index was around 35 per cent in January 2022, peaking at about 37 per cent in July 2022, before falling to about 33 per cent in December 2022, i.e., close to the pre-COVID-19 averages. Improved port congestion resulted in increased availability of supply capacity in the face of slower demand, which exerted downturn pressure on freight rates. In the second half of 2022, the median time in port for container ships worldwide was about 0.77 days, an improvement from 0.8 days in the first half of 2022 (see also chapter 4).

Against this backdrop and ongoing shifts in supply and demand patterns, spot containerized freight rates approached pre-COVID-19 levels by the end of 2022. The Shanghai Containerized Freight Index (SCFI), a measure for spot container freight rates from China, illustrates this trend. Starting in June 2022, the SCFI slumped by 78 per cent, reaching an average of 1,129 points in December 2022, 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 (see figure 2.7), and reaching 967 points in June 2023.

Spot rates dropped significantly across all shipping routes, particularly on main lanes. In December 2022, the SCFI for the Shanghai—Europe route fell to an average of 1,062 points, an 86 per cent drop from its January average (7,784 points). Similarly, the average SCFI for the Shanghai—West Coast America route dropped to 1,426 points (an 82 per cent decline from 7,980 points in January 2022).

Figure 2.7 Shanghai Containerized Freight Index monthly spot rates, selected routes, June 2018–June 2023



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

The average SCFI for the Shanghai—West Africa route was 3,469 points in December 2022, compared to 7,430 points in January 2022. The average SCFI for the Shanghai—South Africa route was 3,095 points in January 2022, compared with 6,322 points in December 2022, representing declines of 53 per cent and 51 per cent respectively.

Despite the challenges faced in the second half of 2022 and market weakening, container carriers are estimated to have generated a record-breaking profit of $296.3 billion in earnings in 2022 before interest and taxes, due to the high freight rates and strong demand in the first half of the year. This represents a significant increase of about 38 per cent compared to the $214 billion accumulated in 2021 (Drewry Maritime Research, 2023).

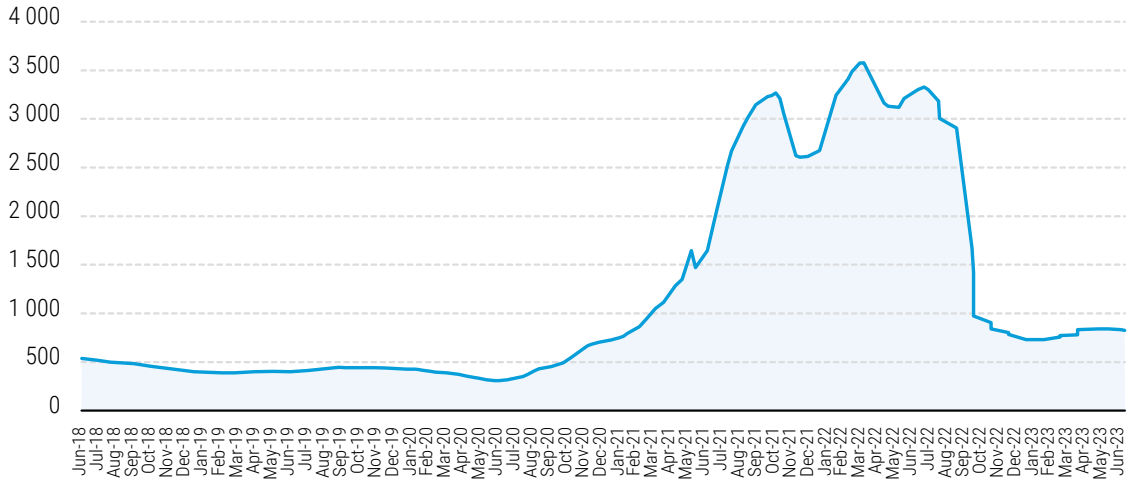
However, this was not the case for the newly established small carriers that had recently entered the market to take advantage of high rates and robust demand. These carriers suspended or terminated some operations or withdrew from the markets, as remarked in section A of this chapter.

3. Charter rates declined significantly in 2022, in line with the decline in spot freight rates but not entirely in synch

Container charter rates declined in tandem with spot rates in 2022 but at varying speeds. The gradual decline in charter rates that began in the second quarter of 2022 was more than a simple correction. Instead, it highlighted a return to more normal levels after the exceptionally high levels of 2021 and early 2022.

The New ConTex index, a benchmark for assessing the time charter rates of containerships, averaged 792 points by the end of 2022 (figure 2.8). This was over three times lower than the levels observed in December 2021 (2,610 points) and much lower than the record highs attained in March 2022 (3,577 points).

Figure 2.8 New ConTex index, June 2018–June 2023



Source: UNCTAD secretariat, based on data from the New ConTex index for container ship chartering produced by the Hamburg Shipbrokers Association. See http://www.vhss.de (Accessed on 26 June 2023). Index base: October 2007 – 1,000 points.

Notes: The New ConTex is based on assessments of the current day charter rates of six selected container ship types, which are representative of their size categories: Type 1,100 TEUs and Type 1,700 TEUs with a charter period of one year, and Types 2,500, 2,700, 3,500 and 4,250 TEUs with a charter period of two years.

Spot and charter rates moved in the same direction but not in entirely in synch. In comparison with spot rates, when the SCFI peaked at 5,109 points in January 2022, time charter rates, as illustrated by the New ConTex reached historic high two months later, in March (3,577 points). At the same time, while spot rates fell significantly between January and September 2022, the fall in charter rates was delayed until September 2022. The lower spot rates helped to reduce the high long-term contract rates that shippers were willing to pay at the beginning of 2022 to guarantee space on containerships. Unlike spot freight rates, in mid-2023, average charter rates remain above their pre-pandemic levels.

4. Contracted freight rates and associated costs surged in 2022

In 2022, contracted freight rates, which include additional charges such as terminal handling fees, which can vary depending on the specific terms negotiated between the shipper and the shipping line, experienced a significant increase. This is consistent with trends shaping the spot rates and reflects similar driving factors including the demand and ship supply mismatch, disruptions in the supply chain, port congestion, inflation and cost pressure, as well as trade imbalances.

When carriers and shippers negotiate contracts, they also consider the fact that there is a head haul (full container) and a backhaul (less than full container). The costs associated with the return of empty containers from imbalances in container shipping also impact contract price. Table 2.12 provides a comprehensive overview of the actual base freight rates on various routes, including inter-regional routes, and how they have changed over time.

Specifically, and compared with 2021, contract rates in 2022 covering intra-South American trade saw a drastic escalation of 397 per cent, while rates from Africa to Asia also increased by 248 per cent, and rates from Asia to Africa grew by 160 per cent compared to the rates in 2021. The increased rates were

primarily influenced by imbalances in supply and demand, where the demand was strong while the supply capacity fell short. Compared with 2019, the highest increases in contract rates were seen across routes originating from Asia and destined to South America. Asia—South America rates surged by 389 per cent in 2022 compared with 2019. Higher rates in these developing regions are compounding existing challenges undermining their transport and logistics.

Furthermore, the trade imbalances in these regions continue to have a significant influence on contracted freight rates, and the substantial increase in transport costs has the potential to engender inflationary pressures on the broader economy.

Table 2.12 Annual Full Container Load Gate-in/Gate-out rates, in $/40-foot equivalent unit 2018–2022

From	To	2018	2019	2020	2021	2022	Change 2022 vs. 2021	Change 2022 vs. 2019
Africa	Africa	1 812	1 849	1 924	2 013	3 382	68	83
Africa	Asia	748	750	775	664	2 313	248	208
Africa	Europe	1 431	1 643	1 747	1 487	2 463	66	50
Africa	South America	2 010	1 860	1 979	1 616	2 388	48	28
Asia	Africa	1 800	1 927	2 112	2 733	7 094	160	268
Asia	Asia	737	747	821	1 194	2 214	85	196
Asia	Europe	1 782	1 847	1 916	3 285	8 880	170	381
Asia	North America	2 426	2 603	2 711	3 820	9 610	152	269
Asia	Oceania	1 770	1 790	1 850	2 800	8 241	194	360
Asia	South America	2 290	2 075	2 230	3 589	10 154	183	389
Europe	Africa	1 595	1 650	1 858	1 727	2 907	68	76
Europe	Asia	967	870	1 004	1 225	2 109	72	142
Europe	Europe	804	881	976	1 077	1 757	63	99
Europe	North America	1 518	1 742	2 256	2 304	6 340	175	264
Europe	Oceania	1 996	1 933	2 077	2 319	6 795	193	251
Europe	South America	1 019	1 302	1 376	1 465	4 026	175	209
North America	Africa	2 890	3 112	2 981	2 639	3 972	50	28
North America	Asia	1 009	1 111	1 269	1 385	2 646	91	138
North America	Europe	858	1 109	1 323	1 053	1 742	65	57
North America	North America	1 534	1 429	1 584	1 362	2 589	90	81
North America	Oceania	2 538	2 634	2 996	2 475	6 060	145	130
North America	South America	1 254	1 318	1 486	1 064	2 153	102	63
South America	Africa	1 778	1 951	2 000	2 187	5 432	148	178
South America	Asia	1 623	1 963	1 802	1 841	4 106	123	109
South America	Europe	1 313	1 977	1 961	1 767	4 369	147	121
South America	North America	1 521	1 882	1 745	1 969	7 397	276	293
South America	South America	1 349	1 699	1 539	1 243	6 179	397	264
Unweighted average		**1 569**	**1 691**	**1 789**	**1 937**	**4 716**	**143**	**201**

Source: UNCTAD, based on data provided by Transporeon Market Intelligence, www.transporeon.com.

Notes: The data set provides regional averages for 40-foot container dry cargo freight, as negotiated for routes on representative main ports. All rates are "gate-in gate-out", i.e., including terminal handling charges and all charges and surcharges of ocean transport. The rates also include (temporal) surcharges for contract rates during the reporting year to represent paid rates. Not included are pre- and on-carriage or classical administrative services of forwarders (customs clearance, booking and freight audit fees, etc.).

5. After record profits in 2021 and 2022, container carrier revenues decline in early 2023

After a year of high profits, the decline in freight rates is creating financial challenges for carriers. A case in point is HMM from the Republic of Korea, which saw revenues drop by 58 per cent to $1.6 billion in the first quarter of 2023, from $3.7 billion in the same period last year (Journal of Commerce, 2023). Maersk's ocean segment also saw revenues fall by $5.7 billion to $9.9 billion in the first quarter of 2023, a drop of approximately 37 per cent from the first quarter of 2022 (Maersk, 2023). Orient Overseas International (OOIL) which operates Overseas Orient Container Line (OOCL), reported revenues of $2.18 billion for the first quarter of 2023, a decrease of around 58 per cent from the same period in 2022, largely due to falling container freight rates (SeaTrade Maritime, 2023).

Smaller carriers, including those that entered the market to take advantage of high freight rates, are confronted with even more significant challenges which can impact their profitability and sustainability. These companies, already grappling with declining freight rates, may be forced to reduce their supply capacities, which could involve reducing the number of ships or services they offer. They may also consider mergers and consolidations to enhance their competitiveness and viability in a challenging market. Consequently, as competition decreases, this could lead to higher rates in the long-term (Shipping and Freight Resource, 2023).

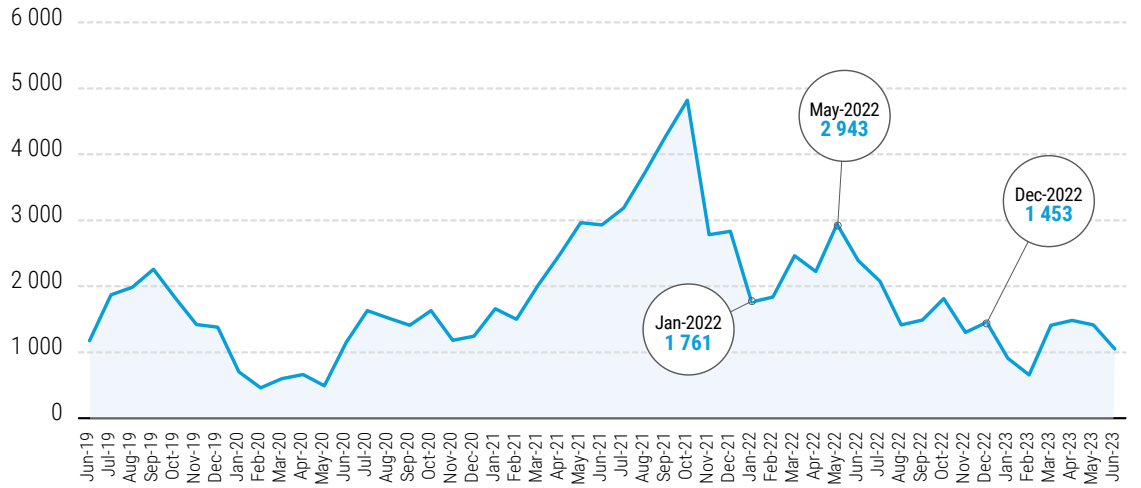
6. Dry bulk rates marked by volatility in 2022 and a downturn in the second half

Dry bulk freight rates fluctuated during most of 2022 before returning close to their pre-COVID-19 pandemic levels by the end of the year. Until May 2022, there was a surge in dry bulk freight rates caused by a rise in demand for dry bulk cargo (namely coal) and port congestion, limiting the effective supply. However, this upward trend reversed in the latter part of the year due to a combination of factors, including a deceleration in macroeconomic conditions, weak trends in China, namely reduced demand for steel, weather-induced disruptions (notably in Brazil), escalating geopolitical tensions, and the normalization of port congestion, which subsequently led to an increase in available tonnage. This, in turn, had a further downward impact on freight rates.

Dry bulk ship carrying capacity increased at a moderate 2.8 per cent year-on-year in 2022, (see table 2.1) while demand dropped by 2.9 (chapter 1). Irrefutably, the war in Ukraine was the dominant factor in impacting trade patterns. As shown in chapter 1, maritime trade flows have shifted since the war in Ukraine, with cargo travelling longer distances and driving ton-miles growth. This was the case with coal, which experienced a significant increase of 2.3 per cent in ton-miles in 2022.

These factors collectively led to substantial volatility and a subsequent decline in freight rates later in 2022. The Baltic Dry Index (BDI), a key indicator of shipping prices, averaged 1,761 points in January 2022 but fluctuated, averaging a peak of 2,943 points in May 2022 and a low of 1,453 points in December 2022 (figure 2.9). Within six months, the BDI returned to levels comparable to pre-COVID-19 pandemic averages.

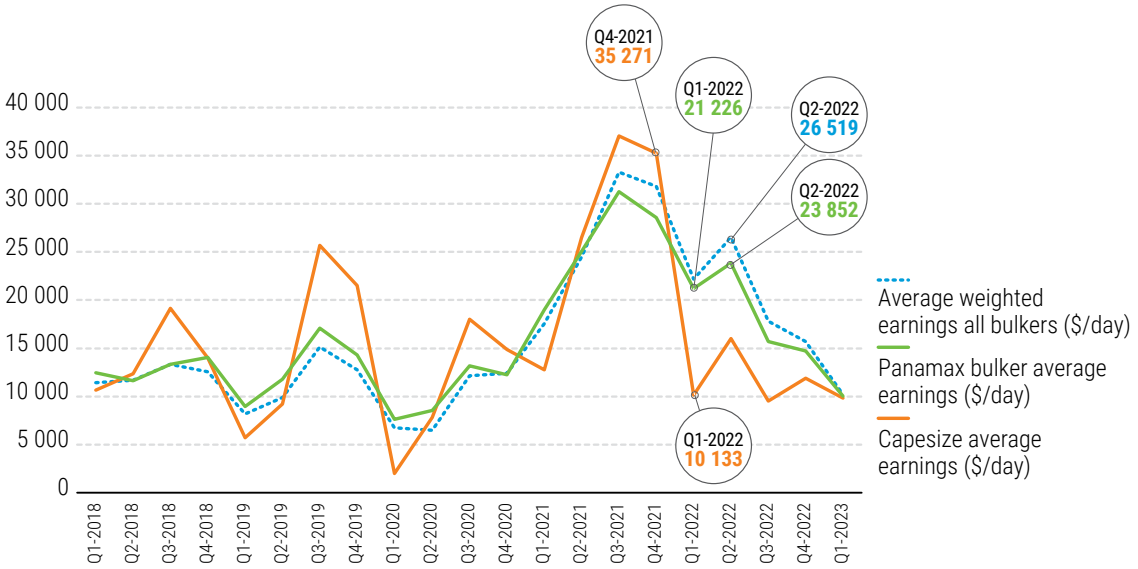
Figure 2.9 Baltic Exchange Dry Index, June 2019–June 2023



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

Revenues in most segments of the dry bulk shipping industry remained higher than pre-COVID-19 levels during the beginning of the year. A spike in earnings for all bulkers was observed in the second quarter, reaching an average of $26,519 per day, before declining thereafter, as illustrated in figure 2.10. Among the different segments, Panamax showed a more substantial performance in the first half of 2022. This was driven by the energy crisis triggered by the war in Ukraine and the search for new markets and suppliers by the Russian Federation and Europe, which drove up coal shipments. Meanwhile, demand for Capesize vessels fell, reflecting lower demand for iron ore and a weakening in the Chinese economy, in particular the steel manufacturing and real estate sectors. As a result of these developments, Capesize earnings fell by to $11,891 per day in the last quarter of 2022 compared to $35,271 per day in the last quarter of 2021, a 66.3 per cent drop.

Figure 2.10 Dry bulk average weighted earnings all bulkers, Capesize, and Panamax ($/day), 2018–2023



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

7. Dry bulk freight rates remained volatile in 2023 with a notable surge in the latter half of the year

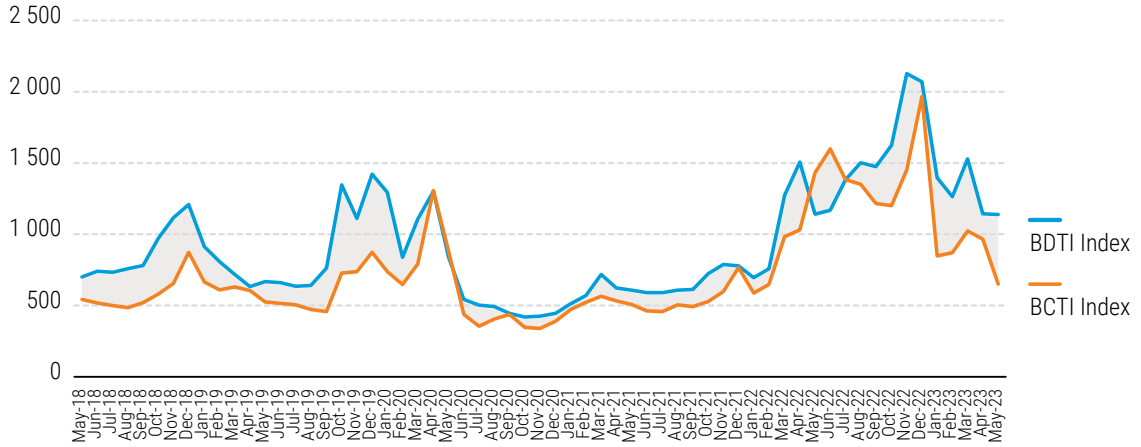
Dry bulk freight rates continued to decline in early 2023, mainly due to the seasonal slowdown resulting from the celebration of the Chinese New Year, which led to reduced demand for dry bulk vessels. Moreover, adverse weather conditions disrupted commodity production, contributing to a further decrease in shipments. These fluctuations were reflected in the BDI, which dropped to 658 points in February 2023, marking a 55 per cent decrease from its levels in December 2022.

In the second quarter of 2023, several factors contributed to a surge in the demand for dry bulk cargo, while the supply remained limited, leading to an increase in freight rates across all dry bulk segments. In China, reopening post-COVID-19 and increased industrial activity played a significant role in driving up the demand for iron ore and coal in the country. Demand for coal experienced an impressive year-on-year increase of 151 per cent, the largest growth seen since January 2020 (Hellenic Shipping News, 2023). Brazil also observed a substantial surge in soybean shipments due to favourable weather conditions and the beginning of the export season. Additionally, the renewal of the Black Sea Initiative in March 2023 fostered grain trade (UNCTAD, 2023).

8. Strong revival of the tanker market in 2022 and into 2023

In 2022, the tanker market experienced an extraordinary surge due to increased global oil trade disruptions and ton-miles. The Baltic Dirty Tanker Index (BDTI) and Baltic Clean Tanker Index (BCTI) annual averages reached peak levels of 1,394 and 1,238 points respectively. This marked a significant recovery from 2021, a historically challenging year for the tanker market, with the annual BDTI and BCTI averages falling to low levels of 644 and 534, respectively (figure 2.11).

Figure 2.11 Baltic Dirty Tanker Index and the Baltic Exchange Clean Tanker Index, May 2018–May 2023



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

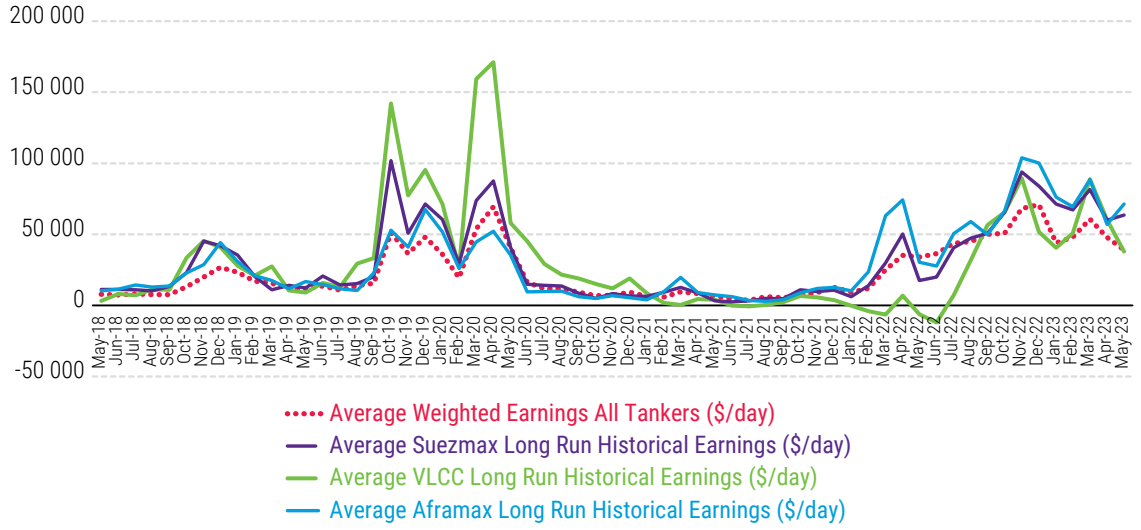
Throughout the year, there was a marked increase in ton-miles, a key freight transport metric, as the Russian Federation, a major oil exporter, redirected its shipments of oil and gas oil away from Europe, its typical short haul import destination, to Asia, requiring longer haul shipping. Crude oil trade in ton-miles witnessed a growth of 8 per cent in 2022 (see chapter 1). This shift led to longer travel distances and a reduction in the effective ship supply capacity, impacting supply-demand imbalances.

As tanker fleet capacity expanded by 3.4 per cent in 2022, namely at a slower rate compared to demand, crude tanker earnings across all segments jumped. This was particularly the case for Suezmax and Aframax tankers, which benefited from the increased ton-mile trade between the Russian Federation and Asia. In 2022, Aframax spot earnings reached an average of $55,967 per day, surpassing $100,000 per day for the first time in November. Similarly, Suezmax spot earnings averaged $44,324 per day in 2022. However, Very Large Crude Carriers (VLCCs) had a comparatively lesser advantage due to weaker Chinese import demand, coupled with China using its own capacity (figure 2.12).

The product tankers market witnessed the same high rates scenario, with earnings supported by longer distances between Europe and the Russian Federation and the Middle East, Asia and Latin America. The average weighted product tanker earnings reached $38,053 per day (Clarksons Research, 2023e). While ton-mile trade for petroleum products increased by 5 per cent (see chapter 1), the ship carrying capacity in dead weight tonnage increased by 2 per cent.

Tanker market rates witnessed fluctuating conditions in early 2023, but continued the trend of strong earnings that started with the onset of the war in Ukraine and the subsequent increase in ton-miles.

Figure 2.12 Average earnings, selected tankers, $ per day, May 2018–May 2023



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

C. OUTLOOK AND POLICY RECOMMENDATIONS

Outlook

Shipping is currently navigating economic headwinds, trade policy tensions, geopolitical risks, changes in globalization patterns, increases in shipping distances, growing environmental regulation and a heightened sustainability and resilience-building agenda. Together, these forces are adding complexity, volatility, and uncertainty to the industry's operating landscape and shipping freight markets. The question of how shipping will adapt to change while continuing to provide the requisite ship carrying capacity that effectively delivers global trade and ensures stable and predictable shipping rates are among the key themes facing the sector in 2023 and beyond.

With shipping networks being reconfigured and trade patterns altered by the legacies of the COVID-19 pandemic and the war in Ukraine, among other factors, the industry needs to rethink its role and business strategies. The sector must continue to monitor trends in shipping and freight markets and assess how these are affecting an increasingly volatile and uncertain operating landscape.

Ship carrying capacity management is growing in importance as a softer container shipping market is met with a pending influx of vessel capacity in the coming few years. Without the congestion of 2021–2022, and with the fleet expected to expand at firm rates in 2023 through 2025, the actual effective supply of the global container ship carrying capacity is expected to grow at a double-digit rate in 2024. Liner operators will aim to manage capacity using all strategies at hand, including slippage, idling of vessels, and recycling.

As container tonnage supply increases during a period of low and uncertain demand, it would likely lead to lower freight rates. The implications of this situation are mixed. For shippers, cheaper rates can make spot rates shipping more appealing, allowing them to choose the most suitable carrier offering. Carriers, amidst uncertainty, may focus on risk mitigation through capacity management and operational efficiency improvement. Strategies applied by container carriers to manage capacity and sustain freight rate levels are likely to support rate levels. However, they are also amplifying unpredictability of shipping schedules and creating planning issues and inventory management challenges to shippers. Overall, and particularly during times of low freight rates, it is crucial for carriers to explore mechanisms that can enhance further efficiency, reduce costs, and promote a more resilient and sustainable shipping industry. This can be achieved by optimizing operations, managing and mitigating risk, adopting advanced technologies, and sustainable practices, which can help address the challenges faced by both container carriers and shippers. Trade facilitation efforts can further enhance sector efficiency and lower costs by reducing barriers and improving customs processes (see chapter 4).

Elsewhere, market conditions for the LNG sector are firm and the outlook is positive. The war in Ukraine, the drive towards energy security in key regions, the energy security goals in Europe, rapid expansion of LNG projects and an expected firm growth in Asian demand are key support factors (Gordon, 2023).

Dry bulk freight rates are expected to remain highly volatile and largely determined by the dynamics of ship supply and demand. Higher dry bulk freight rate levels may stimulate new vessel orders which are currently modest, although uncertainty is also shaping shipyard capacity and the ability to expand the fleet within the coming years. Compliance with IMO EEXI and CII requirements is also likely to alter dry bulk carrier effective capacity given the associated implications for sailing speeds and removal of capacity to undergo necessary retrofits.

High tanker freight rates are likely to be sustained by the demand and supply imbalance. The war in Ukraine and geopolitical developments will continue to impact ton-miles demand, while overall supply of tonnage is expected to remain modest and could remain low due to uncertainties arising from the pace of the energy transition and future oil mix. Like other shipping segments, compliance with the EEXI and CII will also constrain effective tanker capacity.

Shipbuilding activity should pick up in the years to come as the need for fleet renewal intensifies. However, by mid-2023, uncertainty about trends in the global fleet remain. The global ship orderbook is still relatively low, which could limit fleet growth in the coming years while vessels are ageing. To comply with the IMO EEXI and CII requirements, ships are expected to reduce speed and take time off for retrofitting, which in turn will reduce the active supply. At the same time, capacity at the large leading shipbuilding yards is declining and uncertainty about future fuels is amplifying concerns about a potential supply crunch in ship carrying capacity.

Policy recommendations

To effectively address the fast-evolving operating environment and emerging challenges in shipping, stakeholders must consider a number of priority actions. These should include responding to heightened market uncertainty and volatility while ensuring sustainability, resilience, and the continued efficient delivery of global trade. Actions include the following:

Improve the industry's capacity to better navigate through uncertainty, which undermines timely investment in fleet renewal and ship carrying capacity

- Improve understanding of issues at stake and identify solutions by conducting feasibility studies, monitoring market trends, and consulting with experts.
- Promote information sharing and provide timely access to relevant data to inform decisions and policies pertaining to fleet capacity investment, renewal, resale, and recycling. Data in particular can enable reliable forecasting, predictive analysis, and informed planning.
- Strengthen cooperation among countries, shipyards, and maritime supply chain stakeholders to share information about shipyard capacity and resources and ways to avoid bottlenecks in shipbuilding.

Support fleet renewal by enabling sustainable ship recycling

- As more ship scrapping can be expected in the coming years, enforce global regulations for ship recycling, including guidelines for environmentally sound practices and labour safety. In this respect, the recent triggering of the coming into force of the Hong Kong Convention on sustainable ship recycling by Bangladesh and Liberia is an important step in the right direction.

Build capacity and promote cooperation to enable a sustainable and resilient shipping

- Build countries' capacity to create an enabling environment for sustainable shipping and enhance resilience to withstand and recover from volatile shipping market conditions. In this respect, the particular needs of developing countries will require special attention.
- Build institutional capacity and expertise and strengthen maritime administrations to effectively monitor and enforce compliance with international maritime regulations.
- The international community needs to invest in the capacity of developing countries and facilitate access to finance to develop sustainable and resilient transport systems, including shipping. This should include new sources of finance such as blended finance, public-private partnerships, and climate/sustainable finance.

Ensure competitive liner shipping services

- International development partners should provide capacity building and strengthen the capacity of national competition authorities in the area of maritime transport, and provide platforms for international cooperation and coordination.
- Governments need to provide a conducive framework to encourage private sector investments in terminals and intermodal connectivity.
- Competition regulation in liner shipping needs to take into account the potential impacts of cooperative agreements among shipping lines on market behaviour, while also recognizing the potential savings and efficiency gains from vessel sharing. Competition needs to ensure that potential gains are passed on to the clients.

Support developing countries to mitigate freight rate volatility and unpredictability

- Support research and analysis on freight rates and market dynamics, including at regional level. Studies should focus on improving the forecasts of demand and supply to gain better insights into the factors influencing freight rate fluctuations and market behaviour and should assess the impact of freight rates on transport and trade, with a focus on developing countries.
- Establish advisory mechanisms, at national and regional levels, to monitor and assess how freight rates and surcharges are formulated and clarify the basis for their calculations. This entails strengthened collaboration between carriers, shippers and other relevant stakeholders across the maritime supply chain. This will help improve the understanding among industry players of freight rate levels, promote transparency in setting rates and charges and foster trust among key stakeholders.

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END NOTES

1 See vessel groupings used in the *Review of Maritime Transport* at the beginning of this report.

2 Data based on the proportion of vessels (in terms of TEU) in the fleet in a defined port or anchorage location based on vessel's closest to midday AIS signal on the date specified. Where a vessel has not transmitted on a particular day, the last position transmitted within the previous 30 days is used. Excludes vessels last seen 30 or more days ago from the date specified.

3

DECARBONIZING SHIPPING

The shipping sector is at the centre stage of the debate on sustainability. Like other economic sectors, shipping generates greenhouse gas (GHG) emissions and must reduce its carbon footprint. International shipping, which carries over 80 per cent of the world merchandise trade by volume, is responsible for nearly 3 per cent of all global GHG emissions.

Although shipping contributes relatively small shares of GHG emissions per unit of transport work, without further action, emissions from the sector would continue to increase. For shipping to succeed in decarbonizing and help prevent dangerous levels of global warming, the sector must reach consensus regarding the regulatory framework and GHG mitigation measures of the future as soon as possible. International shipping is governed by rules and regulations negotiated and agreed at the International Maritime Organization (IMO), and work is currently under way at IMO to develop global rules on shipping decarbonization that apply to commercial shipping. At the same time, regional regulations are influencing the global process, as illustrated by the regulations adopted at the European Union level and applying to all ships calling at European ports.

Decarbonizing shipping will require a shift in technology and operations and an uptake of alternative low and zero GHG fuels. The transition entails a potential increase in maritime logistics costs, shipping rates and voyage times. Investments required to adjust ship designs, engines, operations, generate alternative low and zero carbon fuels at scale and implement green onboard technologies all have a price tag. This will drive up costs for shipowners, industry and, ultimately trade and the final consumer.

Implementing differentiated rules, whether by country of the flag or ownership, trade route, type of commodity, fleet profile, or any other basis, presents a considerable challenge. Shipping is inherently global: ships call at ports of different countries, cross various national and international waters, and operate in a context where a vessel's ownership, flag of registration, crew, insurance, management and classification are associated with a range of countries. Thus, it would be difficult to make developing countries or the least developed countries and small island developing States exempt from the application of the decarbonization rules to avoid the associated costs. Exemptions would likely lead to distortions and potential carbon "leakage" and could cause some countries to lag behind in progress on achieving the Sustainable Development Goals, while undermining an inclusive transition in shipping.

Compliance with new IMO rules should be uniformly enforced to reflect common responsibilities. However, mitigating measures for transition costs will be required to ensure that the most vulnerable economies are not unduly burdened. IMO member States are currently negotiating economic measures that could generate funds which could partly be channelled to support developing countries, including to alleviate the rise in maritime logistics costs and support a level playing field in maritime transport and trade. However, delaying decarbonization action in shipping would also be costly. First, there are the costs of climate change and its impacts. Second, starting the decarbonization process later will result in the need for steeper emissions reductions in an even shorter period. Thirdly, delayed action will lead to higher shipping rates and costs, as it adds uncertainty to investment decisions.

Scaling up investment in new ships (design, engines, onboard technologies, crew skills), energy supply and bunkering infrastructure (i.e., alternative fuels availability and supply through dedicated and adequate production, bunkering facilities, and storage) is crucial. Minimizing uncertainty about future regulations and reducing a lack of clarity about carbon prices and fuels is needed to spur action and investment by shipowners and other stakeholders across the maritime transport and energy production value chain.

The global shipping sector has a large potential to usher in a synchronized technology change and energy shift, guided by just and equitable transition objectives. If the international community can advance with a predictable regulatory framework and agree on clear, cost-effective technical and economic measures, the sector will minimize uncertainty and reduce transition costs.

A. RIDING UNCERTAINTY AND CHARTING THE COURSE TO LOW CARBON SHIPPING

1. Momentum for decarbonizing grows as regulatory and commercial pressure mounts

Shipping is at the forefront of the sustainability and climate change debate and must reduce its carbon footprint as soon as possible. Trends show that the sector continues to grapple with how to meet the greenhouse gas (GHG) emission targets as set out in the 2018 Initial Strategy on Reduction of GHG Emissions from Ships adopted at the International Maritime Organization (IMO) (IMO, 2018), as well as the most recent revised strategy (IMO, 2023a, Annex 15). International shipping is responsible for 2.8 per cent of all global GHG emissions. Without further action, carbon dioxide (CO_2) emissions from the sector are projected to increase from about 90 per cent of 2008 emissions in 2018 to 90–130 per cent of 2008 emissions by 2050 (IMO, 2020).

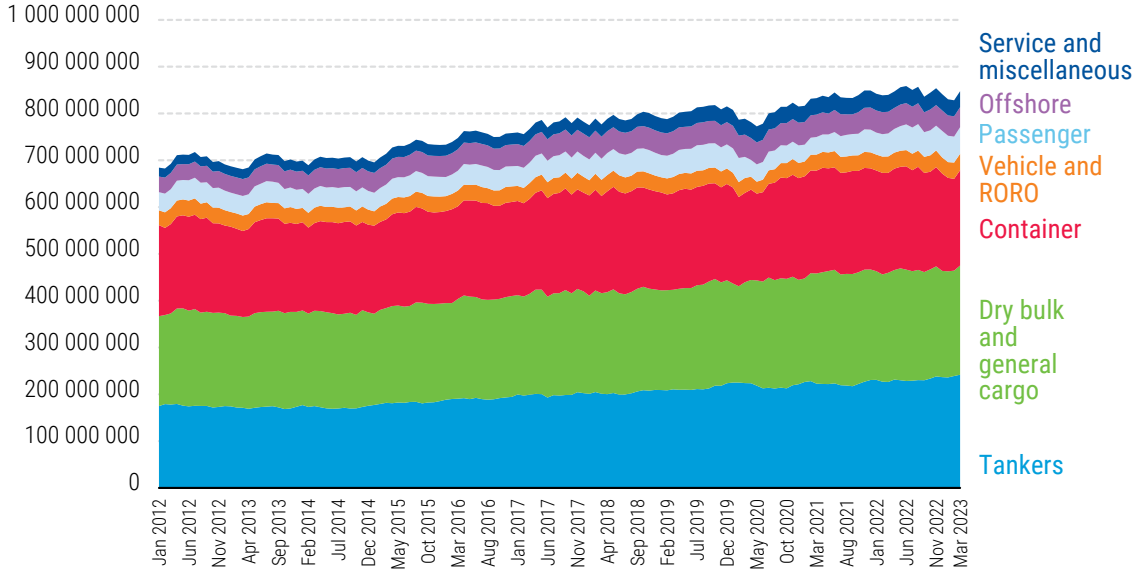
For shipping not to erode its own benefits, particularly as demand for shipping has grown faster than fuel efficiency improvements over the years, mainstreaming shipping decarbonization objectives is an urgent priority. This goal needs to be addressed to achieve the ambitions of the Paris Agreement (UNFCCC, 2015),[1] which include 'pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels', by 2100 (Art. 2(1)(a)). However, this threshold is likely to be reached by 2040, or earlier, if emissions are not slashed in the next few years, giving rise to rapidly growing risks of increasingly extreme heatwaves, droughts, and flooding that could have devastating consequences (IPCC, 2022a, 2022b). By the end of the century, global warming of 2.7°C is considered "very likely" in the IPCC's intermediate emissions scenario and could range from 3.3°C–5.7°C in the very high GHG emissions scenario (IPCC, 2023). Implementing existing policies and pledges will only reduce this to a 2.4–2.6°C temperature rise by 2100 (UNEP, 2022). Accelerated mitigation action in shipping is a matter of increasing urgency, as is effective action on climate impact adaptation, including for ports (UNCTAD, 2023).

To better align with GHG emission reduction targets, the shipping industry requires a portfolio of measures. Relevant intervention measures will affect operations (e.g., route optimization, vessel speed, and maintenance), fleet design, propulsion, engine, and fuels as well as infrastructure for alternative fuel bunkering supply.

2. Emissions vary by engine and ship type, age, and service

GHG emissions vary with shipping activity levels, trade flows, ship type, size, age, and operational practices. As shown in figure 3.1, total CO_2 emissions have evolved over the last ten years and continued to grow, even though the emissions per ton-mile have decreased. Carbon intensity by vessel type varies, with emissions from container shipping being higher per ton-mile than those from dry and liquid bulk shipping. However, overall shipping emissions per transport work improved over the last decade (figure 3.2).

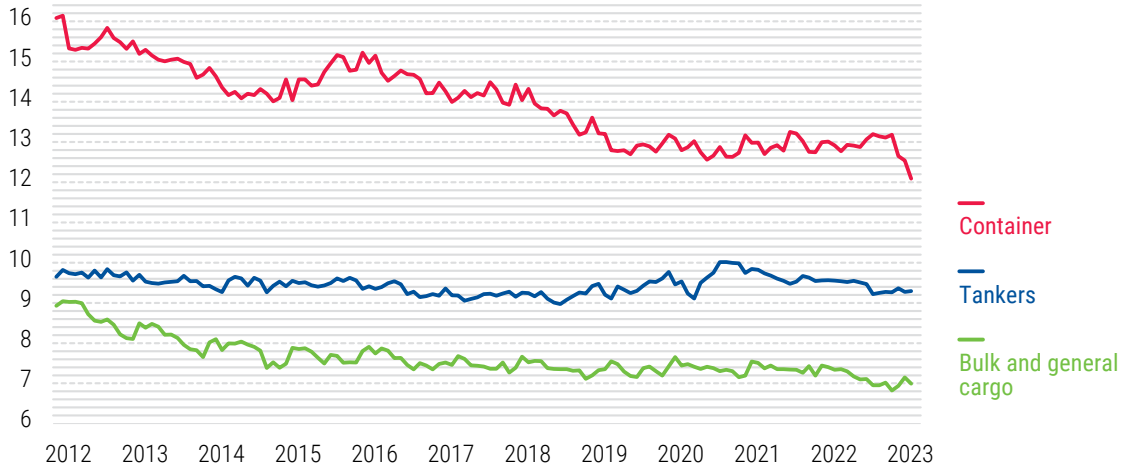
Figure 3.1 Total carbon dioxide emissions by vessel types, tons, January 2012—March 2023



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

Note: RORO means roll-on/roll-off vehicle carrier.

Figure 3.2 World fleet, three main vessel types, monthly carbon dioxide emissions per ton-mile, January 2012—March 2023
(Gram/ton*nautical mile)



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

Figure 3.3 and figure 3.4 depict trends in ships' carbon emissions by flag of registration and country of ownership. The countries of the flag are responsible for enforcing IMO regulations on reducing GHG emissions, while owners are generally responsible for making commercial and investment decisions pertaining to the ships, including when to order new capacity and the type of engines and fuels to be used by ships ordered.

In 2022, ships flying the flags of Panama, Liberia and the Marshall Islands, the world leading flags of registration by tonnage and number of vessels, accounted for over one-third of CO_2 emissions, similar but not identical to their share in tonnage registered under their respective flag (see chapter 2). Registries provide their flags to different ships, including both highly and less efficient vessels, which can impact the registry's overall emission profile.

As regards ownership, vessels controlled by owners in China, Japan and Greece account for the largest share of CO_2 emissions. As owners invest in different vessel types, the countries ranking in terms of tonnage owned diverge from their ranking in terms of carbon emissions.

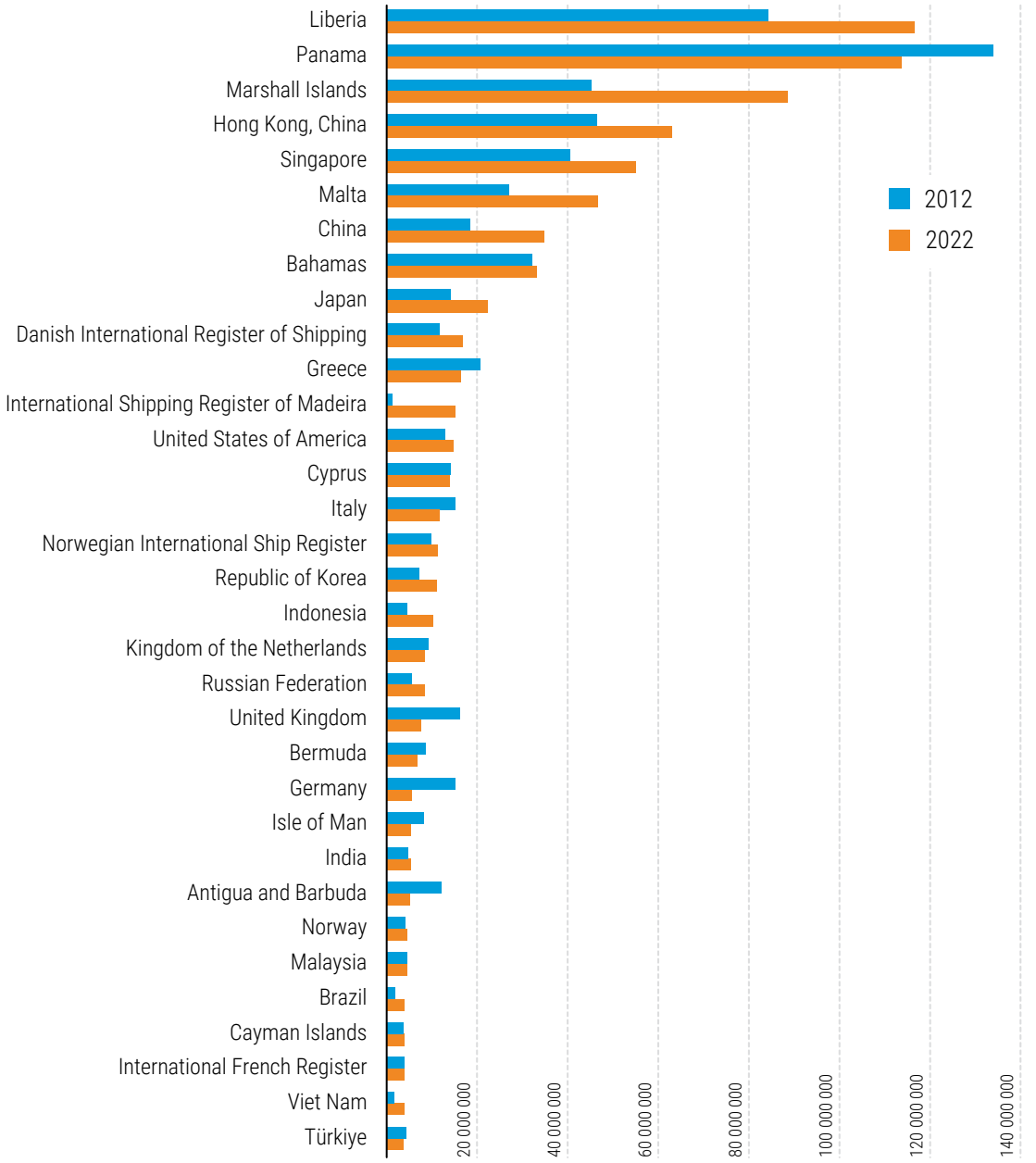
Shipowner investments in the future fleet, fuels and onboard green technologies play an important role in shaping the global shipping fleet's emission profile and its ability to meet IMO GHG emission targets. Enforcement of globally applicable IMO rules by both flag States and port States will be important for ensuring compliance and achieving effective decarbonization. At the same time, national and regional measures can contribute significantly to GHG emission reduction from shipping. For example, the European Union is enforcing regional measures, such as the inclusion of shipping into the European Union Emissions Trading System (ETS), irrespective of flag of registration or ownership.

In addition to the flag States and shipowners, stakeholders from several other countries may also determine the GHG emission performance of the fleet. As an example, decisions of shipbuilders pertaining to ship design and onboard technology to be fitted on vessels and the requirements by lending institutions for ships to comply with environmental sustainability standards and decarbonization objectives can contribute to shaping the carbon footprint of the global fleet.

3. Measures from the International Maritime Organization aim to reduce greenhouse gas emissions and improve energy efficiency

Regulatory requirements play a critical role in decarbonizing and improving the energy efficiency of the shipping sector. Following the adoption of a number of short-term measures since 2011, ongoing work at IMO is focusing on medium and long-term measures and related comprehensive impact assessments on States. A Revised Strategy with strengthened levels of ambition were adopted at the 80th session of the Marine Environment Protection Committee (MEPC 80), held by the IMO in July 2023 (IMO, 2023a, Annex 15).

Figure 3.3 Carbon dioxide emissions by main flags of registration, tons, 2012 and 2022



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

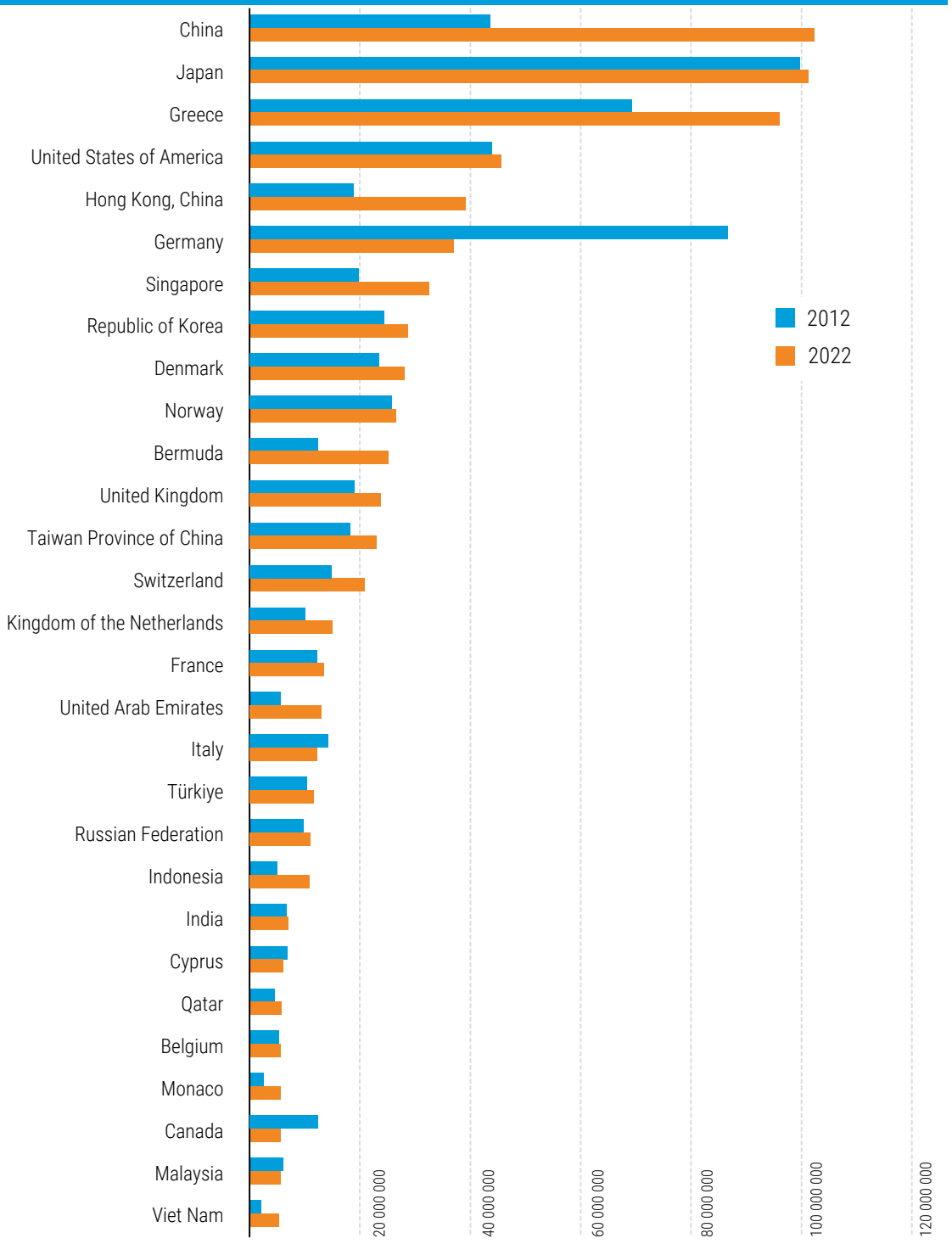
Note: Carbon dioxide emissions from vessels' mains and auxiliary engines calculated based on AIS data (Automated Identification System) on bunker fuel consumption.

Short-term decarbonization measures, adopted by way of revisions to chapter 4 of the International Convention for the Prevention of Pollution from Ships (MARPOL) Annex VI (IMO, 2021a), include the Energy Efficiency Design Index for Existing Ships (EEXI) and the Carbon Intensity Index (CII) rating scheme. These need to be implemented from 2023 onwards. These complement earlier rules, namely the Energy Efficiency Design Index (EEDI) (Regulations 22 and 24) focusing on newbuild ships only, and Ship Energy Efficiency Management Plan (SEEMP) (Regulation 26) (UNCTAD, 2021, chapter 6). The short-term measures are set to be reviewed by 2026 (IMO, 2023b).

a) Energy Efficiency Existing Ship Index – Regulations 23 and 25

The EEXI is a technical measure in force since 1 November 2022 and applies to all existing ships of 400 gross tons (GT) or above. EEXI is a "sister" measure to EEDI and concerns design parameters of the vessels and measures their structural efficiency in terms of energy efficiency level per capacity mile (for related industry guidance, see IMO, 2023c).

Figure 3.4 Carbon dioxide emissions by main economies of ownership, tons, 2012 and 2022



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

Note: Carbon dioxide emissions from vessels' mains and auxiliary engines calculated based on AIS data (Automated Identification System) on bunker fuel consumption.

Compliance with EEXI can be enforced by issuing and verifying the International Energy Efficiency Certificate (IEEC) and can be initially met through technical improvements such as fitting engine power limiters or shaft power limitation systems (Lloyd's Register, 2022). Results suggest that the EEXI as proposed would make only a small contribution to the climate goals of IMO and would reduce CO_2 from the 2030 fleet by 0.7 — 1.3 per cent from a baseline without the EEXI (ICCT, 2020).

b) Carbon Intensity Indicator – Regulation 28

The CII is an operational measure that also applies to existing ships. Since 1 January 2023, ships of 5,000 GT and above have to calculate their Attained CII, which links the CO_2 emissions to the cargo carrying capacity over distance travelled, and rates the vessel on a scale of A to E. The CII is calculated according to the Annual Efficiency Ratio (AER), which is the ratio of CO_2 produced in a year, divided by the product of dead weight tons multiplied by miles sailed in a year.

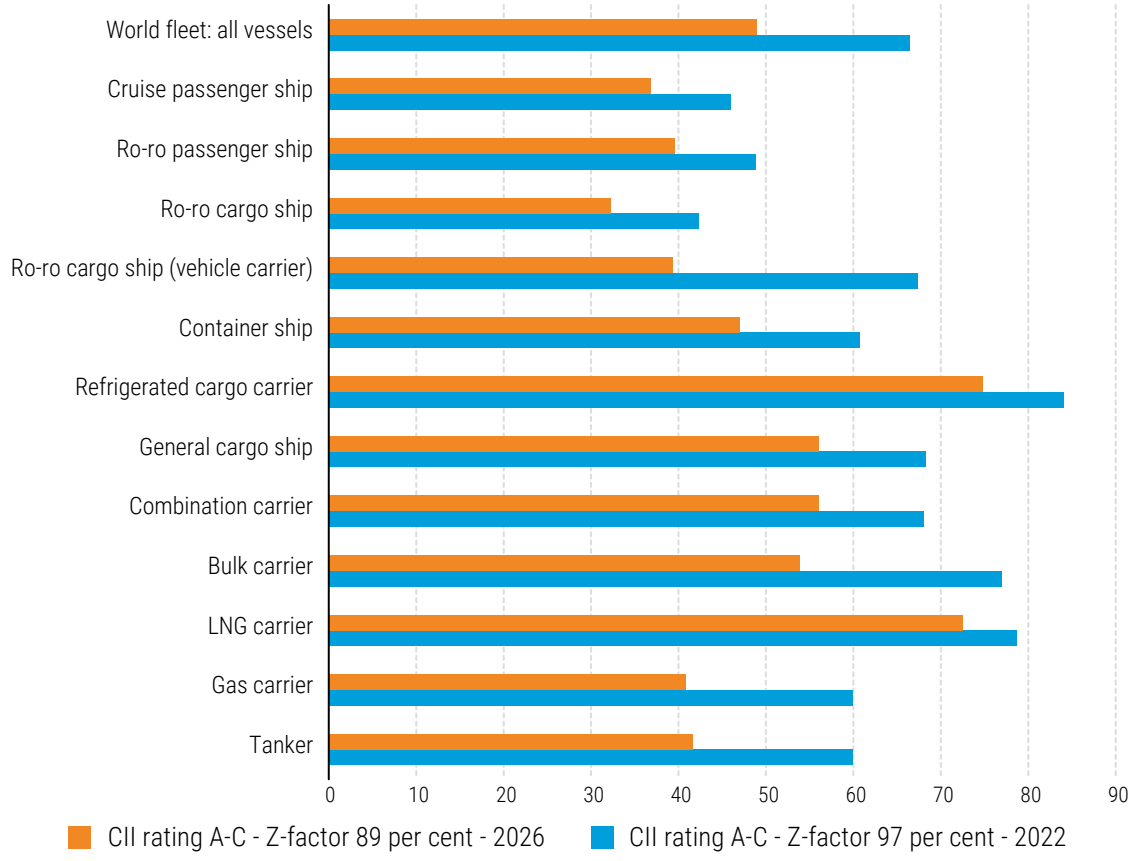
CII ratings will be recorded in a ship's SEEMP. If the ship is rated as D or E for three consecutive years, its SEEMP will need to be reviewed and include corrective actions to improve the rating. The annual carbon intensity reduction factor was equivalent to business-as-usual until entry into force; then 2 per cent from 2023 to 2026; and to be further strengthened for the period 2027 to 2030. IMO will review the effectiveness of the implementation of the CII and EEXI requirements by 1 January 2026 at the latest and develop and adopt further amendments as required.

Compliance should be ensured by both flag States and port States, which respectively issue and verify the existence of a statement of compliance in relation to fuel oil consumption reporting and operational carbon intensity rating, while the IMO provides implementation guidelines.

A good CII score will require ships to operate efficiently by leveraging route optimization, fuel efficiency, and speed. Figure 3.5 presents the performance of the world fleet against the 2022 CII ratings and how performance could deteriorate in 2026 if no action is taken to ensure compliance. In 2022, two thirds of the world fleet performed within the A to C rating. However, by 2026, this share will drop to 49 per cent if further measures are not taken to improve operations and reduce carbon intensity.

The regulation for CII uses a reference line of CO_2 emissions per capacity mile with the year 2019 as the base. Each year after 2019 has a lower permissible CO_2. The factor for multiplying the 2019 year values is called the Z-factor. The Z-factor is 0.99 for 2020, 0.98 for 2021, 0.97 for 2022, 0.95 for 2023, 0.93 for 2024, 0.91 for 2025 and 0.89 for 2026. The Z-factors are regulated under MEPC.328 (76) (IMO, 2021).

Figure 3.5 Percentage of vessels with Carbon Intensity Indicator ratings, A, B or C – with z—factor for 2022 and 2026



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

Note: Carbon dioxide emissions from vessels' mains and auxiliary engines calculated based on AIS data (Automated Identification System) on bunker fuel consumption.

Concerns have been raised regarding CII as it favours lengthy journeys and incentivizes activities that may lead to higher CO_2 emissions (StormGeo, 2023). Some ships maybe be penalized with low CII grades, not due to technical deficiencies but rather due to trading patterns, such as brief voyages or frequent waiting times that are needed to fulfil charter requirements.

Even a new, modern and efficient vessel may receive lower CII ratings than an older one, when engaged in short voyages or long waiting times. CII's perceived shortcoming lies in its use of dead weight or gross ton capacity as a proxy for cargo weight, making it impossible to distinguish or reward ships operating more efficiently on a cargo ton-mile basis. It has also been argued that the CII overlooks logistical and geopolitical limitations of sourcing compliant or low carbon fuel and the poor performance consequences of unforeseen bad weather (Safety4Sea, 2022).

Responding to these concerns regarding CII calculation, several correction factors have been under consideration, and related IMO guidelines (Resolution MEPC.355(78)) (IMO, 2022b, Annex 17) have been adopted. These would enhance the methodology for CII calculation and adjust CII scores for certain vessels in certain circumstances.

Since the CII is based directly on fuel consumption, its value and related correction factors mainly relate to fuel type, vessel efficiency, and operational parameters such as vessel speed, cargo, weather conditions and the general condition of the vessel (e.g., biofouling). For example, a clean biofouling-free hull can be around 10–15 per cent more fuel efficient than a fouled hull, but this is often overlooked, as it is challenging to monitor (Wartsila, 2022). Shipowners and charterers can influence the CII by maintaining vessels in good condition and optimizing operations.

Responsibility for compliance with CII primarily falls on the shipowners, unless that responsibility is contractually shared with charterers. To this end, the Baltic and International Maritime Council (BIMCO) recently issued the *CII Operations Clause for Time Charter Parties 2022* (BIMCO, 2022), which contractually assigns some of the responsibility for CII to charterers and requires both shipowners and charterers to work together in good faith to ensure the agreed CII score is met. In that sense, the CII mechanism is already leading to enhanced dialogue and transparency between shipowners and charterers regarding how best to manage energy efficiency onboard ships.

Both CII and EEXI requirements impact vessel speed, ship values and earnings, liquidity, capacity and the supply and demand balance. As EEXI is based on design parameters of the ship, most ships should already be compliant if they are relatively new Eco ships. Ships would also be compliant if they were fitted with engine power limitation or an energy saving technology, with no knock-on impact on current operating speeds. Less efficient older ships will need engine power limitation or be retrofitted with energy saving technology to comply. For old ships, this may not be cost-effective and could lead to more scrapping (Clarksons Research, 2023).

c) Complementary recent regulatory actions at IMO relevant for greenhouse gas emissions

These include the following decisions taken at MEPC 79 in December 2022 (IMO, 2022a), and MEPC 80 in July 2023 (IMO, 2023a):

- Adoption by MEPC 79 of revised resolutions on voluntary cooperation with ports and on national action plans (amendments (to resolution MEPC.323(74)) and resolution MEPC.327(75)), which include references to shipping routes to support decarbonization.
- Approval by MEPC 79 of the revised procedure for assessing impacts on States of candidate measures (MEPC.1/Circ.885/Rev.1), which takes into account the experience of the comprehensive impact assessment of short-term GHG reduction measures. This includes a new appendix largely following the methodology used for the comprehensive impact assessment of the short-term measures.
- Adoption by MEPC 79 of amendments to appendix IX of MARPOL Annex VI on the information that has to be submitted to the IMO Ship Fuel Oil Consumption Database in relation to the implementation of the short-term GHG reduction measure. This includes the attained values of the EEXI, CII and rating, and approval by MEPC 80 of an additional set of draft amendments to include data on transport work and an enhanced level of granularity and accessibility in the IMO Ship Fuel Oil Consumption Database.
- Approval by MEPC 80 of a plan for the review of the short-term GHG reduction measures.

Adoption by MEPC 80 of Guidelines on life cycle GHG intensity of marine fuels (LCA guidelines) allowing for a well-to-wake calculation,[2] including well-to-tank and tank-to-wake emission factors, of total GHG emissions related to the production and use of marine fuels and establishment of a Correspondence Group on the further development of the IMO LCA framework.

Approval by MEPC 80 of an MEPC circular on interim guidance on the use of biofuels under regulations 26, 27 and 28 of MARPOL Annex VI (Data Collection System (DCS) and CII), expected to incentivize the use of sustainable biofuels in the short-term as a compliance option for CII.

MEPC 80 also discussed proposals on onboard CO_2 capture and forwarded them to the Intersessional Working Group on Reduction of GHG Emissions (ISWG-GHG 16), set to meet in March 2024) for further consideration.

In addition to MEPC intensifying work around reducing GHG emissions from ships, in its work programme, the Maritime Safety Committee of IMO included a continuous output on “Development of a safety regulatory framework to support the reduction of GHG emissions from ships using new technologies and alternative fuels".

d) Adoption of the 2023 greenhouse gas reduction strategy by the International Maritime Organization

The Initial Strategy on the reduction of GHG emissions from ships (IMO, 2018) aimed in particular to reduce the carbon intensity of international shipping by at least 40 per cent by 2030, and total GHG emissions by at least 50 per cent by 2050, compared to 2008 levels.

To achieve these targets, the strategy outlined a range of candidate measures, including operational improvements, technological innovation, and alternative fuels. In December 2022, MEPC 79 reaffirmed its commitment to adopt a Revised Strategy in all its elements, including with a strengthened ‘level of ambition’, by MEPC 80. To this end, work continued during the Intersessional Working Group on Reduction of GHG Emissions from Ships (ISWG-GHG) 14 and 15, (March and June 2023) to finalize the draft Revised Strategy in that time frame (IMO, 2022a). Given the growing urgency of reducing global GHG emissions, the revised 2023 IMO GHG Strategy adopted in July 2023 (IMO, 2023a, Annex 15) establishes new, more ambitious targets.

A large number of documents on the Revised Strategy were submitted for consideration by the ISWG-GHG and MEPC in 2023.[3] They broadly related to: 1. Vision; 2. Levels of ambition and guiding principles; 3. List of candidate mid- and long-term further measures with possible timelines and their impacts on States; 4. Barriers and supportive actions, capacity-building and technical cooperation, Research and Development; 5. Follow-up actions and periodic review of the Strategy.

Some of the key elements of these documents are summarized below.

Proposals on the levels of ambition suggested levels for 2030, 2040 and 2050 with different numbers of absolute reduction of emissions. These could be grouped as proposals relating to the phase out date and the 2050 level of ambition; early action by 2030; additional milestones, in particular 2040; the further improvement of the energy efficiency of ships; and the structure and introductory text of the section on levels of ambition (for more information and a summary of proposals see, IMO, 2023a, 2023e).

Outside of IMO, including at the United Nations Framework Convention on Climate Change Conference of the Parties (UNFCCC COP), the European Union, the Group of 7, and at national levels, most of the discussions and focus have been on the “zero by 2050 target”. Against this background, there seemed to be consensus at IMO as well that anything below this ambition would not contribute to meeting the Paris Agreement temperature goal (see e.g. TradeWinds, 2023a).

As regards governing principles in the revised 2023 Strategy, it had been suggested that they should include, in addition to those already in the Initial Strategy, widely used legal principles such as: the polluter pays principle, the principles of equity and of greatest possible ambition enshrined in the UNFCCC Paris Agreement, and the recognition of the human right to a clean, healthy, and sustainable environment. However, during the Intersessional Working Group meetings, there was no sufficient support for their inclusion. Most member States agreed that the existing guiding principles in the Initial Strategy, such as the principle of non-discrimination and the principle of no more favourable treatment, enshrined in MARPOL and other IMO conventions should be retained with minimum adjustments. Also, the principle of common but differentiated responsibilities and respective capabilities, in the light of different national circumstances, enshrined in the UNFCCC, its Kyoto Protocol and the Paris Agreement, should be retained with minimum adjustments.

MEPC 80 adopted by acclamation on 7 July 2023 resolution MEPC.377(80) on the 2023 IMO Strategy on reduction of GHG emissions from ships (IMO, 2023f).The 2023 IMO GHG Strategy includes an enhanced common ambition to reach net-zero GHG emissions from international shipping close to 2050, a commitment to ensure an uptake of alternative zero and near-zero GHG fuels by 2030, as well as indicative checkpoints for 2030 and 2040:

(a) To 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;

(b) To reduce the total annual GHG emissions from international shipping by at least 70 per cent, striving for 80 per cent, by 2040, compared to 2008.

The Vision has been revised to include a reference to promoting a just and equitable transition for international shipping.

The 2023 GHG Strategy states that a basket of candidate measures that deliver on the reduction targets should be developed and finalized. These should also comprise both a technical element, namely a goal-based marine fuel standard regulating the phased reduction of the marine fuel's GHG intensity; and an economic element, on the basis of a maritime GHG emissions pricing mechanism. The candidate economic elements will be assessed observing specific criteria to be considered in the comprehensive impact assessment, with a view to facilitating the finalization of the basket of measures.

Developing the basket of candidate mid-term GHG reduction measures should take into account the well-to-wake GHG emissions of marine fuels as addressed in the LCA guidelines developed by IMO. The overall objective is to reduce GHG emissions within the boundaries of the energy system of international shipping and prevent a shift of emissions to other sectors.

Finally, the 2023 Strategy sets out a clear timeline towards adopting the basket of measures in autumn 2025 and adopting a new updated IMO GHG Strategy on reducing GHG emissions from ships in 2028.

e) Development of a basket of mid-term measures

Further to adopting the 2023 IMO GHG Strategy, in July 2023, MEPC 80 further discussed a set of candidate mid-term GHG reduction measures which are key to enabling the Strategy, and moved from Phase 2 to Phase 3 of a structured work plan to finalize these measures.

A large number of submissions to MEPC and the Intersessional Working Group on GHG emissions related to various candidate measures to be developed as part of a basket of measures consisting of both technical (e.g., a GHG fuel intensity standard and/or enhancement of IMO carbon intensity measures) and economic (e.g., a levy, a reward, feebate or flat rate contribution) elements.

The 2023 GHG Strategy provides that the impacts on States of a measure/combination of measures should be assessed and taken into account before adopting the measure(s) in accordance with the revised procedure for assessing impacts on States of candidate measures (IMO, 2022a). Particular attention should be paid to the needs of developing countries, notably the least developed countries (LDCs) and the small island developing States (SIDS).

The 2023 GHG Strategy recognizes that LDCs and SIDS have special needs with regard to capacity-building and technical cooperation. An appendix provides an overview of relevant IMO initiatives supporting the reduction of GHG emissions from ships.

The 2023 IMO GHG Strategy revokes the Initial IMO GHG Strategy of 2018, and will be kept under review with a view to adopting another revised IMO GHG Strategy in 2028.

4. Other measures to reduce greenhouse gas emissions in shipping

In parallel to the IMO work, some regional developments are also directly relevant for reducing shipping emissions, energy efficiency, market-based mechanisms, and energy taxation in the shipping sector, including in trade outside the European Union. More specifically:

Under Regulation 2015/757 (European Union, 2015) on the monitoring, reporting and verification of CO_2 emissions from maritime transport (MRV Regulation), shipowners and operators of ships above 5,000 GT and making commercial voyages to, from, or within European Union ports are required to submit a verified emissions report to the European Commission. A recent amendment to the regulation (European Union, 2023a) adopted in April 2023, provides that emissions from shipping will be included within the scope of the European Union ETS for the first time to ensure that maritime transport activities contribute their fair share to the increased climate objectives of the European Union as well as the objectives of the Paris Agreement (para. 8).

Amendments to the ETS adopted in April 2023 (European Union, 2023b), increase the overall ambition of emissions reductions by 2030 in the sectors covered by ETS to 62 per cent compared to 2005 levels (para. 39). Moreover, 100 per cent of emissions from the European Union's internal shipping and at European Union ports, and 50 per cent of emissions from ships engaged in voyages between European Union and non-European Union ports will be covered by the European Union ETS (pg. 97, art. 3ga). While there is no explicit reference to developing countries, "this approach has been noted as a practical way to solve the issue of common but differentiated responsibilities and respective capabilities, which has been a longstanding challenge in the UNFCCC context" (para.20). Obligations for shipping companies to surrender allowances will be introduced gradually, starting with 40 per cent for verified emissions from 2024, 70 per cent from 2025 and 100 per cent from 2026. Most large vessels above 5,000 GT will be included within the scope of the ETS from the start, while offshore vessels between 400 and 5,000 GT will be included in the MRV regulation first, and only later in the ETS (pg. 23, para. 30). Non-CO_2 emissions (methane and N_2O) will be included in the MRV regulation from 2024 and in ETS from 2026 (pg. 17) (see also Verifavia, 2023).

A number of other related regulatory proposals are under active consideration. These include an update of the Energy Taxation Directive 2003/96/EC, which restructures the framework of the European Union for taxation of energy products and electricity (European Commission, 2021), and a regulation on the Fuel European Union Maritime Initiative known as the FuelEU) which was adopted in July 2023[4] (European Union 2023c, Riviera 2023). The latter establishes requirements to gradually reduce GHG emissions across a ship's life cycle. It also requires, from 2030 onwards, that passenger and container ships connect to an onshore electricity supply for stays longer than two hours. According to the regulation, ships should hold a valid FuelEU document of compliance, and if they fail to do so, may be banned from European Union waters until the obligations are fulfilled.

The recent amendments may have significant implications for European trade, including trade with developing countries. They may also prompt other countries to adopt similar measures, supporting global efforts to reduce emissions from shipping and a shift towards cleaner technology and industry practices.

Voluntary initiatives to develop standards for ships and fuels are undertaken by industry, including in partnership with other stakeholders. These include the Poseidon Principles initiative for responsible ship finance which involves 30 banks and seeks to align ship finance portfolios with climate action and sustainability; the Sea Cargo Charter scheme for cargo owners; and the Poseidon Principles for marine insurance adopted in 2021. Table 3.1 features selected voluntary initiatives of private or public-private partnerships (OECD, 2023).

Table 3.1 Selected voluntary initiatives for decarbonizing shipping

Initiative	Members	Purpose
Getting to Zero Coalition	200 organizations, including entities from the maritime, energy, infrastructure, and finance sectors	Decarbonize maritime shipping and develop and deploy commercially viable deep sea zero emission vessels by 2030 and full decarbonization by 2050
Mission Innovation	Co-led by Denmark, Norway, United States, Mærsk Mc-Kinney Møller Center for Zero Carbon Shipping, Global Maritime Forum	Demonstrate commercially viable zero-emission ships by 2030 and promote zero-emission fuelled vessels
Poseidon Principles	30 banks jointly representing approximately $200 billion in shipping finance	Voluntary principles by global shipping banks to promote shipping decarbonization, a framework for disclosing the climate alignment of lending portfolios to the shipping industry
	36 charterers and operators	A framework for aligning chartering activities with responsible environmental behaviour and disclosing the climate alignment of global ship chartering activities
Clean Energy Marine Hubs	International Chamber of Shipping, International Association of Ports and Harbours and the Clean Energy Ministerial	A public-private platform across the energy-maritime value chains to promote green fuels and support the global energy transition. Includes the governments of Canada, Norway, Panama, Uruguay, and the United Arab Emirates
GreenVoyage2050	Led by IMO and funded by Norway. Aims at selected developing countries	Cooperation between SIDS and the LDCs and maritime-related international associations and the industry
Zero-Emission Waterborne Transport	Horizon Europe, European maritime companies	Provide and demonstrate zero-emission solutions for ships before 2030

Source: OECD (2023).

B. POTENTIAL IMPLICATIONS OF DECARBONIZATION ON STATES

1. Assessing possible impacts on States

Reducing GHG from shipping will require investments in technologies and alternative fuels. Accordingly, IMO short- and medium-term GHG reduction measures will lead to investments in new technologies and ships that use alternative fuels. This may lead to increased maritime logistics costs and affect trade and economic output.

To clarify the potential impact of short-term IMO GHG reduction measures on States, in 2021, UNCTAD conducted a Comprehensive Impact Assessment of the proposed IMO short-term GHG reduction measures, namely the EEXI and CII.

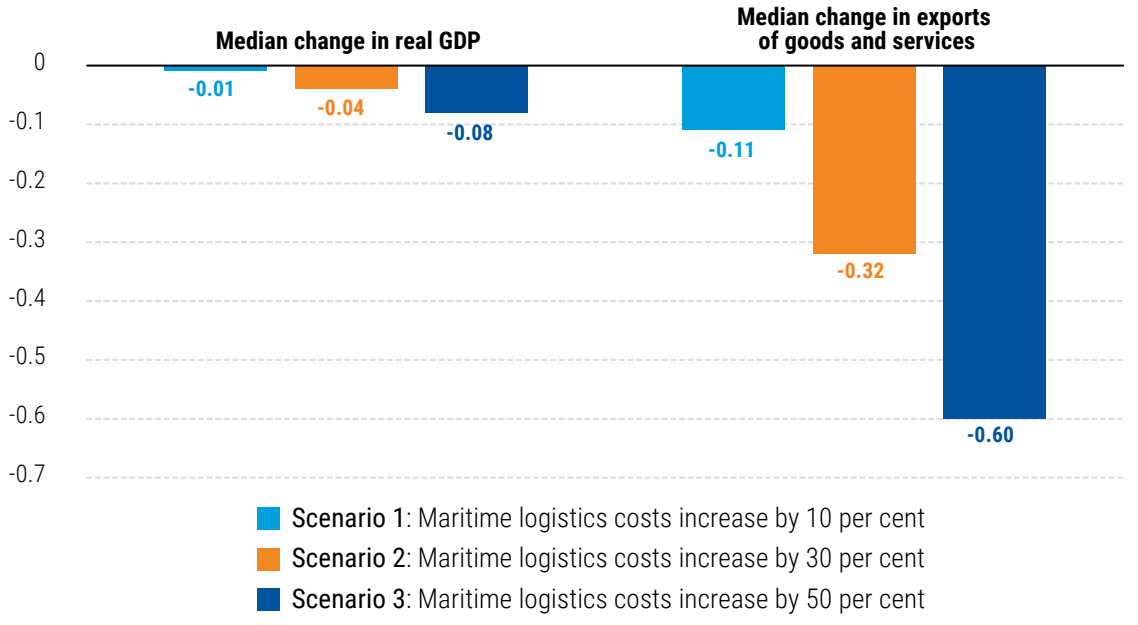
UNCTAD assessed the potential impact of a technical approach embedded in the EEXI, setting out scenarios for 2030 with or without the measure, across three levels of emission reduction ambition. The three scenarios included the EEXI-only scenario, high-GHG reduction scenario and low-GHG reduction scenario, each compared to the baseline 2030 scenario (current regulations). The aim was to quantify the changes in maritime logistics costs, including shipping and time costs (UNCTAD, 2021b). IMO subsequently adopted the low EEXI scenario which came into force in November 2022. In its assessment, UNCTAD concluded that the agreed measure would lead to a reduction of 2.8 per cent in average speed and an increase of 1.5 per cent over average maritime shipping costs in 2030.

While significant, these changes are relatively small when compared to typical variations in freight rates. They will also have a very small impact on global gross domestic product (GDP) and be far smaller than the disruption caused by the pandemic or climate change, or the costs of not acting in the face of climate change. However, IMO measures – short and medium term – will have a greater impact on some countries than others, notably on SIDS or LDCs, which may need support to mitigate the increased costs and alleviate the consequent fallout on their incomes and trade flows (UNCTAD, 2021b).

In 2023, UNCTAD carried out the "Expert Preliminary Review of the Technical and Economic Elements, and their Possible Combinations, of the Proposals for Candidate Mid-term Measures" (for a preliminary assessment of six proposals see IMO, 2023g; for the final report see IMO, 2023h).

To explore the potential impact of an increase in maritime logistics costs, UNCTAD modelled the outcome of a hypothetical increase in maritime logistics costs on global trade and GDP. Simulations assumed three levels of maritime logistics cost increases of 10 per cent, 20 per cent and 50 per cent, respectively. At a global level, the 50 per cent scenario implies changes in trade flows of minus 0.6 per cent (median per country). This translates into an impact on real GDP of minus 0.08 per cent (figure 3.6). Based on International Monetary Fund data (2023) for the global GDP of $104 trillion in 2022, a reduction of 0.08 per cent would be equivalent to a reduction of global GDP of about $80 billion.

Figure 3.6 Assessing the impacts of increased maritime logistics costs, percentage change



Source: IMO (2023h).

Although the changes may seem relatively small on a global scale, countries heavily reliant on specific trade sectors could experience more significant impacts due to the potential for larger increases in maritime logistics costs.

The mechanism driving the result is that higher shipping costs and fuel charges translate into higher trade costs. This in turn drives a larger divergence between consumer and producer prices which is to the disadvantage of consumers, including firms that use imported intermediates. The trade numbers depicted in figure 3.6 account for total goods and services trade and incorporate the shift of some economic activity towards services because of the increased trade costs in goods.

These simulations provide indicative values for the potential impact of shipping decarbonization measures on trade and global output. For a complete picture, the impact of the measures on maritime logistics costs must be estimated.

2. Monitoring shipping costs and fuel charges amid the rise in alternative fuels

Fuel costs account for a significant portion of the overall ship operating costs. Transitioning to cleaner fuels may be more expensive and add to these costs. Depending on factors such as vessel size, efficiency and the distance travelled, fuel costs can account for up to two thirds of the overall expenses making it by far the largest component of the carrier's variable cost base. Consequently, the shift towards cleaner fuels will generate additional costs and will make fuel an ever more critical component in the cost structure of shipping operations.

When comparing bunker fuels to their low and zero GHG fuel alternatives, the price differential can be significant. Data from Clarksons Research shows that in December 2022, very low sulphur fuel oil was priced at approximately $635 per metric ton and the average cost of heavy fuel bunker oil (380 centistoke in Rotterdam, Kingdom of the Netherlands) hovered around $515. Meanwhile, under an assumption of green hydrogen at $2.5 per kilogram, the cost of ammonia would amount to $1,239 per ton (fuel oil equivalent), and methanol would reach approximately $1,400 per ton (*Financial Times*, 2023).

Comparing prices for alternative fuels is not straightforward. Energy content of the fuels per ton varies significantly. Prices may be referred per gross calorific value. There are also different standards regarding units (energy vs quantity) and currencies across markets. Argus Media publishes alternative marine fuels prices based on energy equivalents, including marine gas oil equivalent, very low sulphur fuel oil and British thermal units. These allow for fair price comparisons based on energy density (DNV, 2023).

Alternatively, fuelled vessels are also more capital intensive. For example, the cost of building a new liquified natural gas-powered-powered ship is estimated at around 10–20 per cent higher than a conventional ship (OECD, 2023). Similarly, additional expenditure involved in vessel dual fuel capability, which enables a ship to operate on both methanol and conventional low sulphur fuel, is in the range of 10–15 per cent of the total price, estimated at around $175 million (Frangoul, 2021). Similar values have been suggested with an ammonia dual-fuel vessel. Many of the existing, conventionally fuelled fleet could be retrofitted to ammonia or methanol dual-fuel use, with a similar total expenditure to a dual-fuel newbuild (Mærsk Mc-Kinney Møller Center, 2022).

It is important to understand and monitor the evolution of freight rates and associated costs, namely fuel surcharges, in the context of the energy transition. The precise formulas used to calculate the various surcharges applied in shipping, including fuel surcharges, are generally an issue of concern for shippers. Shippers argue that more clarity is required, and that evidence of cost-recovery as opposed to revenue generation is necessary for greater transparency and visibility.

With the energy transition in shipping is expected to accelerate in the coming years, the way in which alternative fuels will be priced and charged to carriers and, consequently, shippers and trade, will require attention. All relevant stakeholders should collaborate to devise suitable pricing mechanisms and avoid different and unfair practices and imbalances. Transparent, fair, and sustainable pricing will be key.

It will be important to understand how freight rates and the cost of new, low- or zero-carbon bunker fuels will be established and incorporated into the final costs. For example, a mechanism or framework could be developed to help define the basis used to determine the shipping rates and surcharges levels. This would help standardize the calculation of these rates and charges, enhance transparency and promote greater collaboration in shipping and trade.

Monitoring alternative fuel prices would also provide valuable data for assessing the economic implications of decarbonization efforts. This information can guide decision-making processes, inform regulatory efforts, and boost sustainable shipping practices.

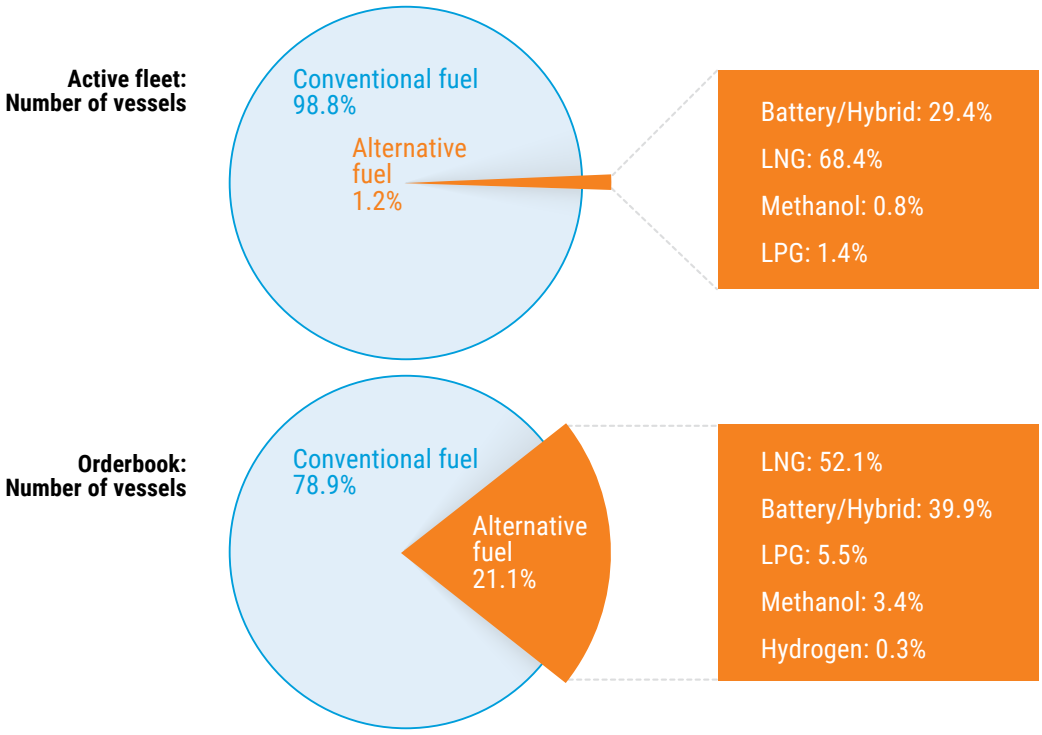
C. FUEL TRANSITION PATHWAYS

1. The fuel transition in shipping is still in its infancy, but progress is under way

While logistics, digitalization, hydrodynamics, machinery and "after treatment/carbon capture and storage" measures have a potential to curb GHG emissions from shipping by up to 30 per cent on average, the largest potential for deeper GHG emission cuts lies in a fuel switch to low- or zero-carbon fuels (DNV, 2022a). Shipping needs to replace fossil fuels with alternatives that do not emit GHGs across their entire life cycle (well-to-wake). At present, there is no readily available, one-size-fits-all solution. The pathway to decarbonization shows that zero emission fuels will need to make up 5 per cent of the international shipping fuel mix by 2030 (Osterkamp, Smith, Søgaard, 2021). The 2023 IMO GHG Strategy also includes a commitment to ensure an uptake of alternative zero and near-zero GHG fuels by 2030. The Strategy provides that uptake of zero or near-zero GHG emission technologies, fuels and/or energy sources should represent at least 5 per cent, striving for 10 per cent of the energy used by international shipping by 2030.

The transition to alternative fuels is still in its infancy. A total of 98.8 per cent of the global fleet in terms of number of vessels use conventional fuels. Only 1.2 per cent are using alternative fuels, mainly liquified natural gas (LNG), and to a lesser extent, battery/hybrid, liquified petroleum gas (LPG), and methanol (figure 3.7).

Figure 3.7 Alternative fuel uptake, world active fleet and orderbook, number of vessels, 2022



Source: UNCTAD based on DNV (2022a).

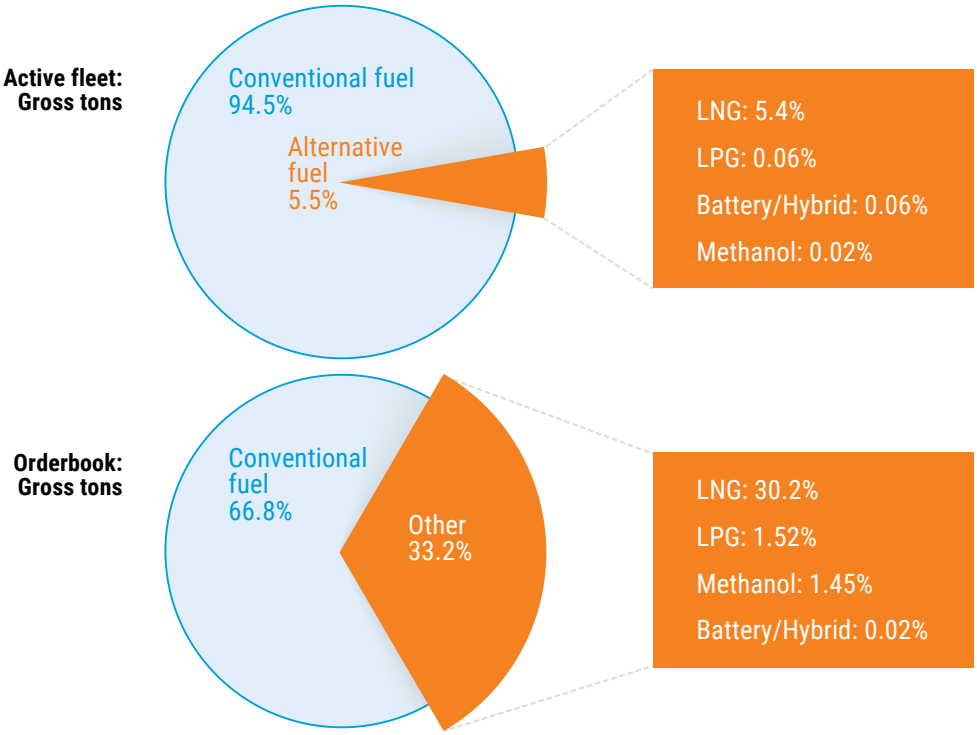
Technological readiness, scalability, and regulatory certainty are required to firm up demand for alternative fuels and vessels. Testing and demonstration, which allows for a solid proof of concept is important given the average age of the existing vessel fleet and the long lifespan of ships (25 to 30 years). In this context, the design of new vessels and engines needs to occur now to enable the deployment of zero-carbon vessels fuelled by alternative fuels. These vessels will still be in operation in 2050 (IRENA, 2021).

Shipowners need to decide whether to order more capacity and renew the fleet now while lacking clarity about the best alternative fuels and technologies or wait until the alternative fuel pathway and regulations are clearer. Fleet renewal needs, concerns over shipbuilding yard capacity and higher building prices are posing challenges for shipowners and complicate their investment decisions. The mid-term measure will come into force no earlier than 2027. Starting from that year, a portion of the fleet will be able to use these fuels and green technology options.

Depending on whether operators will seek to delay the delivery or cancel some new builds and whether speeds will fall due to IMO EEXI and CII requirements, effective supply remains uncertain. Compliance with these requirements will likely result in lower sailing speeds and alter the effective ship capacity supply. Meanwhile, trends in ship recycling can also affect effective supply. If, by 2027 all container ships aged 25+ are scrapped, annual fleet container capacity would expand by 4.6 per cent over the 2023–2027 period instead of 5.6 per cent if no scrapping is carried out. If, by 2027 all container vessels aged over 20 years old are scrapped, the fleet will expand at an annual 1.5 per cent over the same period (MDST, 2023). In this context, ambitious energy transition and decarbonization targets could cause a container capacity crunch. The supply will grow at a slower rate than both the long-term annual growth in container demand – 4.8 per cent for nearly three decades – and the annual growth of 2.5 per cent over the 2023–2027 period projected by UNCTAD (see chapter 1).

Despite the conundrum faced by shipowners, progress is under way as 21 per cent of vessels currently on order are designed to run on alternative fuels, notably LNG, LPG, battery/hybrid and methanol. In terms of active tonnage (figure 3.8), nearly 6 per cent of the active fleet is operating on alternative fuels, mainly LNG, while one-third of the tonnage on order is designed to run on alternative fuels (DNV, 2023a). It should be noted that while LNG may have a lower carbon footprint than heavy fuel oils, it remains a fossil fuel and faces problems such as methane slip and 'well-to-tank' emissions. As for batteries, these are more suited for use by vessels operating on shorter distances.

Figure 3.8 Alternative fuel uptake, world active fleet and orderbook in gross tons, 2022



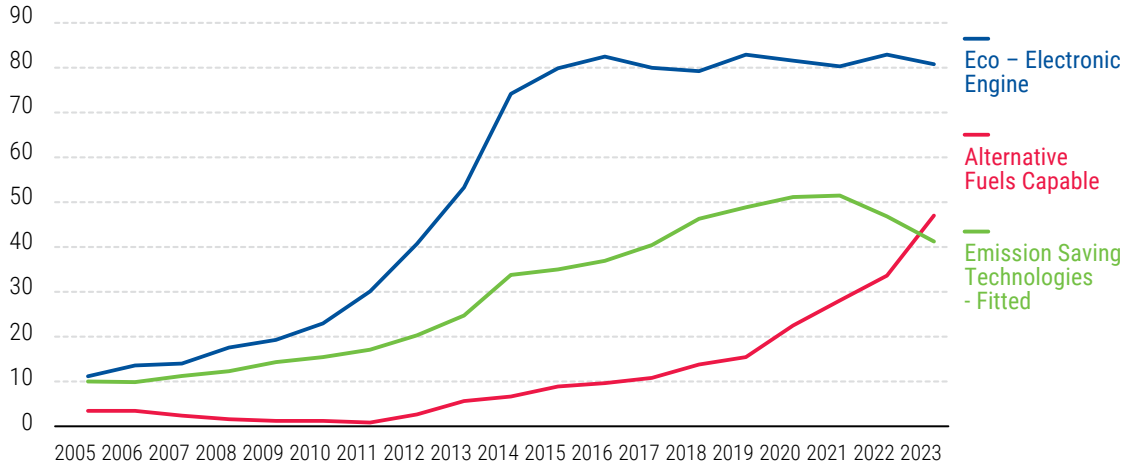
Source: UNCTAD based on DNV (2022a).

Alternative fuel capacity on order increased in recent years, particularly since the COVID-19 pandemic (figure 3.9). At the same time, vessels fitted with energy saving technologies and Eco ships with electronic engines also gained traction in recent years.

Alternative fuels, depending on the feedstock used and the specific production pathways involved, are often identified using colour codes. "Grey/black" and "brown" fuels are generated from fossil fuels. "Blue" fuels are sourced from fossil fuels, but carbon emitted during their production is captured and stored using carbon capture and storage from either direct air capture or point source. "Green" refers to fuels produced with electrolysis powered by renewable energy. Green fuels also include fuels produced from biomass sources. Table 3.2 offers an overview of alternative fuels by category and production pathways.

The alternative energy fuels most suited for international shipping are primarily advanced biofuels and e-fuels (i.e., synthetic fuels), namely methanol and ammonia. Each alternative energy fuel varies in terms of benefits and challenges. The choice of fuel depends on factors such as the supply chain, engine technology, environmental impacts and production costs (IRENA, 2021).

Figure 3.9 Trends in alternative fuels capable and energy saving technology fitted fleet, percentage of the orderbook and gross tons, 2005—2023



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

Note: "Eco vessels" mean vessels with an electronic injection main engine.

Table 3.2 Overview of alternative fuels and their production pathways

Production pathway	Input/feedstock	Fuel produced
Electrolysis	Water and electricity	Hydrogen (electrolytic)
Natural gas extraction	Gas energy	Methane (natural gas)
Biogas production	Farm waste	Biogas
Biogas upgrading	Biogas	Methane (bio), CO_2
Steam methane reforming	Methane and water	Syngas
Synagas pressure swing absorption	Syngas	Hydrogen (blue or bio) and CO_2
Nitrogen separation (PSA or cryo)	Air	Nitrogen and oxygen (and other traces)
Haber Bosch process	Nitrogen, hydrogen and heat energy	Ammonia
Carbon capture (industrial)	Fuel gas	CO_2
Carbon capture (air)	Air and electricity	CO_2
Sabatier process	CO_2 and hydrogen	Methane (synthetic) and oxygen
Methane liquefaction	Methane (natural gas, bio) and electricity	LCH_4 (liquid methane)
Hydrogen liquefaction	Hydrogen and electricity	LH_2 (liquid hydrogen)
Ammonia liquefaction	Ammonia and electricity	LNH_3 (ammonia)
Liquid bio-fuels	Wastes, oils and crops	Hydrotreated vegetable oil, fatty acid methyl esters, etc.
Methanol synthesis	CO_2 and hydrogen	Methanol (synthetic)
Fischer- Tropsch	Hydrogen and CO_2	Blue crude, e-diesel
Hydrogen ICE (hydrogen internal combustion engine)	Hydrogen	Water (+ nitorgine oxides)
Hydrogen fuel cell	Hydrogen	Water
Methane ICE	Methane (+diesel)	CO_2+ NOx + CH_4 (methane)
Methanol ICE	Methanol (+diesel)	CO_2+ NOx
Ammonia ICE	Ammonia + diesel	CO_2+ NOx + NH_4 (ammonium) + N_2O (nitrous oxide)
Diesel ICE	Diesel	CO_2+ NOx

Source: UNCTAD, based on Ricardo and DNV (2022).

Ammonia is more attractive as it has zero carbon content when produced from renewable sources. It does not require capturing CO_2 emissions, which can increase the final cost of e-methanol (IRENA, 2021). Methanol is gaining attention while hydrogen, sail power, biofuels and other technologies are being explored, including batteries. Electric and hybrid propulsion systems relying on batteries or a combination of batteries and diesel or gas engines are also evolving, especially among small and coastal tonnage. Technology readiness levels of methanol fuel technologies are higher than for ammonia and hydrogen, while onboard fuel technologies for ammonia and hydrogen are not readily available. Although green ammonia is expected to have the lowest total cost of operation whilst achieving zero or near zero GHG emissions on a well-to-wake basis, safety and availability issues remain important barriers that need to be overcome before it can be used at scale.

Advanced biofuels are a viable short-term option for the shipping industry because current rules allow for fuel blends of up to 20 per cent without a change in engines. As methanol engines are a proven technology, new ships can easily rely entirely on biofuels. Renewable methanol such as bio-methanol and renewable e-methanol require little to no engine modification and can provide significant GHG emission reductions in comparison to conventional fuels. Renewable e-methanol is of particular interest in the shipping sector. While the production cost ranges for advanced biofuels are similar to the various alternatives, the sustainability of the biomass feedstocks used is a critical factor. The current focus is therefore on the use of waste fats, oils, and greases to produce biofuels that do not impact food security, and land availability. Other production options using other feedstocks are possible but not yet mature. The shipping sector will face competition for suitable feedstocks and fuels from other sectors, including road transport and aviation.

The current vessel orderbook suggests that, for now, LNG dual fuel remains the most popular choice, although methanol-capable ordering is becoming increasingly attractive. There have also been orders for LPG, ethane, and hydrogen capable vessels, while some ships ordered are set to be equipped with battery or battery-hybrid propulsion. Some owners are pursuing fuel optionality which allows for more flexibility, by ordering ships with LNG, methanol, or ammonia with the ‘ready’ notation or label attached (Clarksons Research, 2023). This ensures that ships ordered are propelled by an oil-based marine fuel but also fitted with the space to enable future fitting of a technology that enables the use of alternative fuels such as LNG, methanol or, later, ammonia.

LNG and LPG can offer a reduction in carbon intensity of 15–25 per cent (DNV, 2022b), although these numbers are lower if considering a well-to-wake GHG basis (Englert et al, 2021). LNG technology is well-developed, and bunkering infrastructure is currently expanding. LPG is also emerging as a fuel for ships with LPG infrastructure being well developed.

Alternative fuels must comply with the requirements of the International Convention for the Safety of Life at Sea (SOLAS) and MARPOL, including the International Code of the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk (IGC Code). There is also interest in using onboard carbon capture and storage with conventional fossil fuels. More pilot projects are needed to enhance the readiness of this technology.

Deploying alternative fuels on a large scale calls for a revamping of fuel production and distribution value chains. This involves stakeholders from within the shipping industry as well as the port, energy, and finance sectors, among others. It also requires policy and regulations to move rapidly to stimulate demand for these fuels; this will encourage industry to invest in required ships and fuels.

One estimate suggests that achieving full decarbonization by 2050 requires the fuel infrastructure to deliver around 270 million tons of the heavy fuel oil equivalent of alternative fuels (DNV, 2022a). Switching to alternative fuels requires investments in the fuel infrastructure that will outpace onboard vessel investments. As the development of alternative low- or zero-carbon fuels is mainly in the hands of out-of-sector stakeholders (fuel producers and suppliers, engine manufacturers, shipyards etc.), collaboration across the wide-ranging stakeholders from inside and outside the shipping sector is crucial.

Decarbonizing shipping requires major investments: just halving shipping emissions by 2050 may require $1.4 trillion in investment ((Krantz R, Søgaard K, Smith T, 2020). Existing estimates indicate that additional investments of $8 billion to $28 billion are required annually by ships to decarbonize by 2050. About $28 billion to $90 billion are needed annually onshore to scale up production, fuel distribution, and bunkering infrastructure to supply the totality of carbon-neutral fuels by 2050. The more expensive energy sources and onshore investments could increase annual fuel costs by over $100 billion to $150 billion when fully decarbonized or incur a 70 per cent to 100 per cent increase from today (DNV, 2022a).

There is a need to progressively but rapidly replace fossil fuels with renewable fuels. The energy transition must move beyond the current infancy stage and the search for alternative fuel must move beyond the exploration and testing phase in favour of large-scale deployment, availability and adequate supply of alternative and safe fuels.

The timescales and targets of the revised IMO GHG strategy imply that the majority of the sector's energy transition must happen by 2040. Additionally, it is critically important to ensure that the requisite regulatory technological and safety maturity and readiness levels are in place. Furthermore, as ports and terminals face the same uncertainty and dilemma as shipowners regarding future fuels and regulatory requirements, efforts should aim to speed up the transition and enable timely investment in port cargo handling equipment, infrastructure/storage facilities and replace or construct new terminals.

2. Clarifying the transition pathway key to addressing barriers to alternative fuels and technologies

Some of the key factors currently hindering a rapid shipping energy transition and decarbonization include alternative fuel availability and costs, fuel technology maturation levels, technical feasibility, safety, bunkering infrastructure requirements and onboard storage, not to mention implications for ship and engine design and crew skills and capabilities.

Shipping cannot decarbonize on its own. It requires action across the entire ecosystem, involving shipping and the energy sector. This collaboration should include carriers, port and terminal operators, manufacturers, shippers, investors, energy producers and distributors to drive the necessary change. Ports are positioning themselves to take a more active role in enabling the energy transition and decarbonization in the maritime supply chain (box 3.1). They are increasingly aligning their activities with global policy processes on sustainable development and climate action (box 3.2).

Box 3.1 Port of Antwerp-Bruges aims to become a green energy hub and climate neutral by 2050

The Port of Antwerp-Bruges, Belgium aims to become climate neutral by 2050. This requires a switch to green energy strategically focused on:

1. Production and supply, by drawing on renewable energy sources, including imports, and local hydrogen production. This is for energy and feedstock purposes.

2. Provision of infrastructure for fuel distribution by adding to the extensive facilities already available to support alternative fuels.

3. Consumption in port (bunkering) and transport to end users in the hinterland such as local chemical plants.

Hydrogen, ammonia, and methanol are already being traded today. The chemical industry uses these products in large quantities when refining or producing chemicals. The market for green hydrogen and derivatives is growing rapidly for use as feedstock, in heat production and heavy transport.

As the second largest bunkering port in Europe, the bunker market in the Port of Antwerp-Bruges is still mainly based on conventional shipping fuels. Alternative fuels for shipping are already offered on a small scale, in addition to conventional fuels. The Port of Antwerp-Bruges is strengthening its position as a bunkering port on a global scale by actively promoting the use of alternative fuels. The strategic objective is to become a multifuel port by building a framework that enables safe bunkering and use of alternative fuels on a large scale and to establish alternative fuels within the local bunker market. Alternative fuels include methanol, ammonia, hydrogen gas, LNG, and electrical energy.

Given its specific properties in comparison with fuel oil, much attention has been paid to LNG and its use as a fuel by government authorities, classification companies, shipping operators and ports over the last decade. The International Association of Ports and Harbors has developed an audit tool that can be used by ports to award permits to bunkering companies in accordance with the highest industry standards, as well as a bunker checklist that many ports around the world have incorporated into their port regulations. This tool is being extended to zero carbon fuels. Following detailed risk analyses, it was determined where and under what conditions LNG may be bunkered in the port of Antwerp-Bruges. The result is the LNG Bunkering Map. Considering this development, the port has established basic principles that can also be applied to other alternative fuels.

Source: Input received from the Port of Antwerp-Bruges, June 2023.

Box 3.2 The Port of Las Palmas shows commitment to environmental sustainability

The Port of Las Palmas, Spain, situated in the Canary Islands archipelago, holds a crucial position in the maritime routes connecting Europe, West Africa, and Latin America. The port has aligned its operations with the Sustainable Development Goals and its sustainability strategies are in line with the goals of Spain and the European Union, as defined within the Strategic Framework of State Ports.

The Port Authority of Las Palmas (the governing body of the ports of Las Palmas, Salinetas, Arinaga, Puerto del Rosario, and Arrecife) has established four key environmental commitments:

1. Implement control and prevention systems related to quality of port waters, atmospheric pollution, noise pollution, exotic species, waste generated by ships, sanitation networks and early detection of the presence of hydrocarbons in port waters.

2. React to and contain crises by establishing Internal Maritime Plans along with actions for combating pollution, promoting regular interisland traffic, traceability of MARPOL waste discharges, and initiatives that reduce the carbon footprint of Port Authority facilities.

3. Promote research into sustainability by facilitating alliances with organizations and scientific institutions such as the Spanish Seaweed Bank, the University of Las Palmas de Gran Canaria, the University of Oviedo, the Clean Landscape Association, State Ports and the Cabildo de Gran Canaria, resulting in projects such as the floating garden of algae, which absorbs CO_2.

4. Promote environmental industry projects, such as the ones hosted by the Port of Arinaga, or the ones focusing on delimiting maritime areas off its coasts for the exploitation of offshore wind energy or approving maritime space management plans.

In addition, the Port of Las Palmas is facilitating new infrastructure projects, such as the Prolongación Dique de la Esfinge which focuses on technical parameters that can forecast increases in sea level and its effect on port operations.

Source: Input received from the Port of Las Palmas, June 2023.

The role of ports is recognized in the Clydebank Declaration of the Conference of the Parties 26 (COP26), which pledges to establish green shipping corridors, i.e., routes that leverage collaboration across multiple stakeholders operating between two or more ports. The aim is to offer bunkering options for vessels running on low or zero carbon fuels, test various solutions and support first movers in their efforts. Ports should not only offer bunkering options for low/zero carbon vessels, but also run on zero-emissions equipment themselves to ensure truly green corridors. Since the signing of the Clydebank Declaration, 21 green shipping corridor initiatives have emerged (Global Maritime Forum, 2022). More than 110 stakeholders from across the value chain are engaged in these initiatives, with a high level of public–private collaboration.

Translating the green corridor concept into concrete action requires assessing the feasibility of such corridors. These corridors can help to reduce the costs of zero-emission fuels, enable the mobilization of demand, and lower risks to incentivize stakeholder investment (McKinsey, 2022). Experiences with green shipping corridors will vary by region and will entail both challenges and opportunities (box 3.3).

Most initiatives are still at an early stage and corridors currently considered are in the feasibility study phase (Global Maritime Forum, 2022). Going forward, it will be important to clarify whether the corridor projects will morph into a lasting solution once the demonstration phase is completed (Hubatova, 2022). It will also be important to revisit the concept and ensure more inclusiveness in terms of vessel types, shipping routes and geographic distribution.

Box 3.3 Promoting low- and zero-emissions shipping in Asia and the Pacific

A recent study by the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) on the Implementation Strategy of the Green Shipping Corridor in Asia and the Pacific provides an overview of green shipping corridor initiatives worldwide. The study highlights that one of the main challenges in successfully implementing these corridors includes helping shipping companies to build zero-emission ships and run their fleets competitively, as well as ensuring that sufficient green energy and fuels can be produced and deployed along the shipping routes.

The study also identifies key success factors, which span government leadership, infrastructure, governance, legal system and involving stakeholders along the supply chain. Particularly important is the incentivization of the green corridors though funding from major stakeholders and monetary and non-monetary incentives. Innovative financing schemes are especially needed, as these

Box 3.3 Promoting low- and zero-emissions shipping in Asia and the Pacific *(cont.)*

corridors come with much higher operating and capital costs than conventional shipping. Finally, on the operational side, the economies of scale and density that prevail across longer corridors with more frequent shipping services and involving larger vessels allow for better decarbonization performance.

Stakeholders participating in green shipping corridors in Asia and the Pacific face various challenges, notably, lack of awareness and insufficient infrastructure for green shipping such as green energy bunkering facilities or green energy plants. The study underscores the links between green shipping corridors and digitalization. It demonstrates how digitalization could further promote shipping decarbonization, enable seamless cargo, and ship traffic along the green shipping corridors.

Source: ESCAP (2023).

3. Digitalization can enable decarbonization

All available options to reach net-zero GHG emissions should be pursued. Exploiting the full potential of digital tools for energy-saving in shipping should also be pursued. Energy-efficient technologies can deliver up to 15 per cent of the GHG emission savings required by 2050 (DNV, 2022a). Thus, in tandem with the fuel switch, technology should be leveraged for greater energy efficiency gains.

Digitalization and decarbonization are both transformative forces in shipping. In many ways, digitalization enables decarbonization. Combined, digitalization and technology can help unlock energy-efficiency potential and support the collaboration needed to accelerate the transition. Various digital tools can be used to provide digital-enabled optimization and reduce emissions in shipping.

Applying technologies such as blockchain, machine learning, artificial intelligence, Internet of things, and performance optimization platforms (e.g., monitoring, routing, speed, predictive maintenance, crew training), and "digital twin" applications can all help accelerate decarbonization. In a digital ecosystem, vessels can integrate applications and data models and leverage digital tools to unlock the power of advanced predictive analysis, including for operations and maintenance. The digital twin combines all available information and models of a ship throughout its life cycle. It allows a range of useful operations to be performed and simulated, such as system design, assurance and verification services, simulator-based testing, virtual system integration and to generate predictions (Smogeli, 2017).

Ships can use speed optimization and weather-routing services to plan routes around weather forecasts. An AI-enabled fuel model, incorporating a ship's digital twin, enables ships to accurately predict fuel consumption. Technology can be used to measure the efficiency of elements such as the hull, the propeller, the boiler, and the auxiliary engine, leading to improved performance (Stone, 2023).

When applied in a port environment, the digital twin can reduce GHG emissions and support efficiency, productivity, energy saving. Port call optimization (see chapter 4) can help support energy efficiency and fuel saving by enabling better access to data and improved synchronization of ship arrival in ports (McLeman, 2023). Other technologies such as exhaust gas savers, propeller efficiency equipment, bow enhancement, hull fins and air lubrication systems are also becoming popular, as they enable energy efficiency gains.

Despite the potential for technological advances and innovation to help maritime transport curb emissions, it should be emphasized that leveraging technology should also adopt a full life cycle perspective and prevent carbon leakage. The recent boom in the use of AI has raised concerns over the emission impact of the servers that power AI. One estimate suggests that AI language models and data centres are estimated to account for 1 per cent of global carbon emissions (Biggs, 2023). Another estimate expects that by 2040, server farms may account for 14 per cent of global carbon emissions (Auslender and Ashkenazi, 2023).

4. Successful shipping decarbonization and energy transition requires a level playing field

For shipping to succeed in decarbonizing and help prevent dangerous levels of global warming, the sector needs to act swiftly. The sector must also reach consensus regarding the regulatory framework and measures of the future as soon as possible.

The shipping industry requires a clear, uniform, and predictable operating landscape with minimum regulatory uncertainty. Delaying the adoption of IMO mid-term or long-term measures aimed at managing shipping GHG emissions will jeopardize decarbonization targets. It could also result in different tiers of overlapping regulations at multinational, national and regional levels and regional tiers of compliance such as specific green corridors or exemptions. Additionally, it may pave the way to regional pockets of unsustainable and substandard shipping.

If a GHG mitigation policy (e.g., fuel standards or an economic measure) is implemented regionally or is designed with many shipping and trade route exemptions, there is a high risk of carbon leakage and excessive tax base erosion. Ships could alter their route to evade the system and/or refuel outside its jurisdiction. One study has suggested that in the case of the European Union ETS, transshipment hubs could relocate from the European Union to non-European Union ports to avoid paying into ETS (Lagouvardou and Psaraftis, 2022).

Delaying action will also generate more costs and undermine the legal certainty required to incentivize prompt action and investment in low or zero carbon ships, fuels, and bunkering infrastructure. While many estimates underscore the magnitude of damages and losses that may result from unchecked global warming, Oxford Economics (2022) finds that 2.2°C of warming by 2050 has the potential to reduce global GDP levels by up to 20 per cent.

Given the globalized nature of international shipping, fragmented solutions that favour exemptions and differentiated rules can lead to sub-optimal outcomes. A universal regulatory framework for decarbonization that applies to all ships irrespective of their flags, country of ownership and region of activity is critical to ensure a level-playing field and avoid a two-speed decarbonization shipping landscape. For developing countries, a multilateral solution adopted under the auspices of IMO, which considers the special needs for assistance of the most vulnerable economies such as SIDS and LDCs, will provide a workable outcome and avoid fragmented regional and unilateral approaches. Fragmentation increases uncertainty, undermines the level playing field and distorts markets while jeopardizing the achievement of climate targets due to, among other factors, lack of incentives, carbon leakages, compliance evasion, etc.

The flag of registration of most ships differs from the nationality of their owners, and international trade typically involves two or more countries. In principle, ships that trade internationally must comply with the same rules when it comes to reducing GHG emissions. That said, there is a need to recognize the importance of the common but differentiated responsibilities and respective capabilities principle, to reflect the special requirements of the most vulnerable economies and consider the impact of climate change mitigation measures on these States. Economic elements such as a levy or a contribution that has to be paid when fuel emits GHGs can incentivize investment and action by making alternative fuels more competitive. This can be done by narrowing the cost differential with conventional heavy fuels, as well as through the targeted use of the revenues arising from these levies and contributions.

The proposed midterm measures of IMO are expected to generate funds that could support the maritime sector's decarbonization efforts. Some of the funds generated by these measures could assist developing countries impacted by potential increases in maritime logistics costs. They could also help them enhance the resilience of their critical port infrastructure to the impacts of climate change and seize the business opportunities arising from the energy transition and decarbonization in shipping. Some of the funds generated could be invested in developing countries, including SIDS and LDCs, to mitigate transition costs or reduce trade costs, thanks to trade and transport facilitation intervention measures in ports and hinterland connections. As complying with the new IMO requirements entails administrative costs, funds generated could also help bridge these costs.

Proceeds from the economic measures could also be leveraged to tap into emerging business opportunities arising from alternative fuel production, storage, bunkering and distribution. Ultimately, the potential economic measures can help achieve the twin objective of decarbonizing shipping while ensuring a just and equitable energy transition.

D. OUTLOOK AND POLICY RECOMMENDATIONS

1. Outlook

Important progress made at the MEPC 80 held in July 2023 at IMO, has helped clarify the pace of the fuel transition. Still, the future low and zero carbon fuel mix is yet to be decided and rapid progress at IMO regarding the particular targets and regulations needed to reach decarbonization goals, is essential.

Soon, energy production and associated fuel bunkering systems will need to change considerably to offer the fuels of the future. The uncertainty surrounding the adoption of green technologies and alternative fuels, as well as the regulatory framework, is increasing the risk of stranded assets. However, as the deployment experience of key candidate fuels improves throughout this decade, this uncertainty should gradually resolve into clarity. However, the real danger in striving for decarbonization targets at the lowest possible cost, is for shipowners to adopt a "wait and see" policy. This means they will delay investment in fleet renewal, alternative fuels, and green technologies for ships. As the shift to low-carbon fuels and technologies requires significant investments onboard and onshore, delaying the timing and scale of investments, both in newbuildings and the energy supply chain, can lead to ship capacity bottlenecks, supply chain disruptions and increased costs for shipping and trade.

Fuel costs account for a significant part of vessel operating expenses, and the transition to alternative low or zero GHG fuels is likely to generate additional costs. Added expenses will likely be passed on to shippers and consumers via increased freight rates and surcharges. It will be important to improve understanding of how freight rates and the cost of new, low or zero GHG bunker fuels will be established and incorporated into the final ship operating costs and shipping rates.

Ships call at ports in many countries, cross different national and international waters, and operate in an international environment. As such, decarbonizing international maritime transport will require a global perspective. Given the resources required to implement IMO regulations whilst avoiding disproportionate increases in costs, including maritime logistics costs for the most vulnerable economies, it will be necessary to provide technical and financial assistance to these countries. An economic measure agreed under the auspices of IMO could generate funding for such assistance.

2. Policy recommendations

To accelerate the energy transition in shipping and achieve the GHG emission targets of IMO, robust collaboration is required among all stakeholders. These include Governments, policy makers, shipping and ports, as well as energy suppliers and lending institutions, among others. Some key priority actions, including the following:

Facilitate the fuel transition and enable a level playing field

- Develop regulations and set clear targets for the use of zero and near-zero GHG fuels in the shipping industry. Encourage carriers to adopt the associated energy sources, vessels, operational practices, and technologies.
- Support research, development and deployment initiatives promoting innovative and sustainable technologies for shipping, including fuel-efficient engines, alternative and renewable energy, and emission reduction technologies. Stimulate the supply of zero and low carbon fuels for international shipping.
- Prepare for shipping fleets that simultaneously run on more than one fuel type and promote optionality through dual-fuel and tri-fuel designs.
- Gather the low hanging fruit by leveraging technologies in shipping that improve operational efficiency, fuel saving and energy efficiency and promote digital solutions that accelerate shipping decarbonization.
- Build partnerships between Governments, academia, and industry stakeholders to foster knowledge sharing and collaboration; scale up efforts to implement sustainable and resilient shipping.
- Promote sustainable facilities at ports, clean energy marine hubs and green shipping corridors that are more geographically, vessel and commodity inclusive.
- Ensure stakeholders in seaports collaborate widely across the port ecosystem with fuel suppliers to ensure a sufficient supply of alternative low and zero GHG fuels and infrastructure for distribution.

- Assess the readiness of the alternative fuels and vessel designs, the sustainability and scalability of potential solutions and their regulatory and safety maturity levels.
- Governments, academia, and public- and private-sector organizations should analyse the upstream footprint of alternative fuel production for shipping, including the GHG life cycle of the different fuels, as well as their full potential and production limits (e.g., biofuels).
- Ensure that international rules enable a level playing field and promote measures to lower the cost or price gap between alternative and conventional marine fuels.
- Create certainty regarding the volume of low and zero carbon fuels and energy that will be needed at different points in time, through technical measures such as a fuel standard.
- Consider economic measures such as a levy that acts as a price for carbon to support the energy transition and incentivise investment in alternative fuels and green technologies for ships.

Monitor impacts of the energy transition and decarbonization in shipping on costs, trade, and economic output

- Monitor alternative fuel prices to help generate data for assessing the economic implications of decarbonization efforts. This information can guide decision-making processes, inform regulatory efforts, and boost sustainable, fair, and transparent shipping practices.
- Establish an advisory mechanism to guide the setting of freight rates and fuel surcharges. Communicate and monitor trends in freight costs and fuel surcharges. The advisory mechanism should bring together shipping, trade and relevant stakeholders in the maritime supply chain, including government and regulatory bodies. It could, for example, set guidelines on how to determine low and zero carbon fuel prices, freight rates and surcharges. This will help ensure transparency, an inclusive operational environment and enable a smooth decarbonization process. International organizations such as UNCTAD and IMO could provide support in this regard.

Align the regulatory framework in shipping with internationally agreed goals

- Targets for usage of low and zero carbon fuels in the shipping industry are needed to ensure progress on global climate mitigation objectives set out in the Paris Agreement.
- A strong regulatory framework for shipping to reduce GHG emissions and protect the environment should align with the 2030 Agenda for Sustainable Development.
- The regulatory framework should also ensure an equitable transition. In this regard, economic measures such as a carbon levy can help make alternative fuels competitive vis-à-vis GHG-generating traditional fuels and alleviate the transition costs in many developing countries. Support fleet renewal and avoid a capacity crunch in shipping.
- National and international regulations should minimize uncertainty, which prevents shipowners' timely investment in a new and modern fleet that runs on low or zero carbon fuels and which delays the introduction of onboard and onshore energy saving and green technologies.
- Monitor trends in ship finance for both fleet renewal and green investment and scale up ship financing and investment levels.
- Monitor trends in shipbuilding capacity to ensure a timely energy transition for shipping decarbonization.
- Ensure that crews are adequately trained in the use of alternative fuels and related shipboard systems.

Support developing countries particularly small island developing States and the least developed countries during the transition

- Continue to assess the impacts of the decarbonization of international shipping on the most vulnerable economies, who already pay higher shipping costs and depend heavily on maritime transport for their trade, consumption needs and economic development.
- Provide technical and financial support to countries where maritime logistics costs increase due to shipping decarbonization. Support could include investing in port infrastructure and services, implementing trade facilitation measures, and taking up ship and port technologies and digital tools, as well as providing capacity-building for national maritime, port and competition authorities.

- Provide support to developing countries grappling with higher maritime logistics costs. The economic component of the proposed IMO midterm measures such as levies on bunker fuels or carbon could generate funds to scale up decarbonization efforts. These funds could partly be channelled to support investment for SIDS and LDCs in ports, including investment in enhancing the resilience of their critical port infrastructure to the impacts of climate change and seizing business opportunities relating to the energy transition. Support to developing countries could also aim to promote trade and transport reforms, as well as transport and digital connectivity.

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END NOTES

1 195 out of the 198 Parties to the United Nations Framework Convention on Climate Change (UNFCCC) 1992 adhere to the 2015 Paris Agreement which has been in force internationally since 4 November 2016. With international shipping emissions deeply integrated into countries' economies, a recent legal analysis concludes that emissions from international shipping should be included in government climate targets under the Paris Agreement (Transport and Environment, 2021).

2 "Well-to-wake" refers to the entire process of fuel production, delivery and use on board ships, and all emissions produced therein. An important related argument is that using alternative fuels in shipping will only bring climate benefits if they are produced sustainably. Any regulation of international shipping which encourages the sector to switch fuels must examine the full life cycle of the fuels to control the impact (TradeWinds, 2023b).

3 See in particular, ISWG-GHG 14/2 -14/2/12, ISWG-GHG 15/2 -15/2/11, ISWG-GHG 15/INF.2, ISWG-SP 1/2/1, MEPC 80/7/8 and 80/7/11. For a mapping of the various proposals on the draft Revised GHG Strategy, submitted to ISWG-GHG 14, see IMO, 2023d.

4 According to a European Union press release, "the new regulation will be published in the official journal of the European Union after the summer and will enter into force the twentieth day after this publication. The new rules will apply from 1 January 2025, apart from articles 8 and 9 which will apply from 31 August 2024" (see European Council, 2023).

Port performance and trade facilitation are integral to ensuring the efficiency of maritime transport. Recent port performance indicators and data indicate that world ports have, for the most part, fared well during the recent global supply chain crises and disruptions. They have embarked on a path of recovery, supported by policy reforms and digital innovations. In this context, facilitating maritime trade has been crucial for seamless and efficient maritime supply chains, including in ports and their hinterland connections. Trade facilitation generates efficiency gains and cost reductions in maritime trade procedures by streamlining and harmonizing regulatory procedures by border agencies involved in goods clearance at both ports and at hinterland borders.

4

PORT PERFORMANCE AND MARITIME TRADE AND TRANSPORT FACILITATION

A. PORT PERFORMANCE

1. Port calls and traffic recover from the pandemic crisis

Port calls over the last five years reflect the response of key shipping markets to the pandemic, the post-COVID-19 recovery, and the war in Ukraine. All shipping markets saw a steep decline during the first semester of 2020, and all have since recovered, albeit at different speeds.

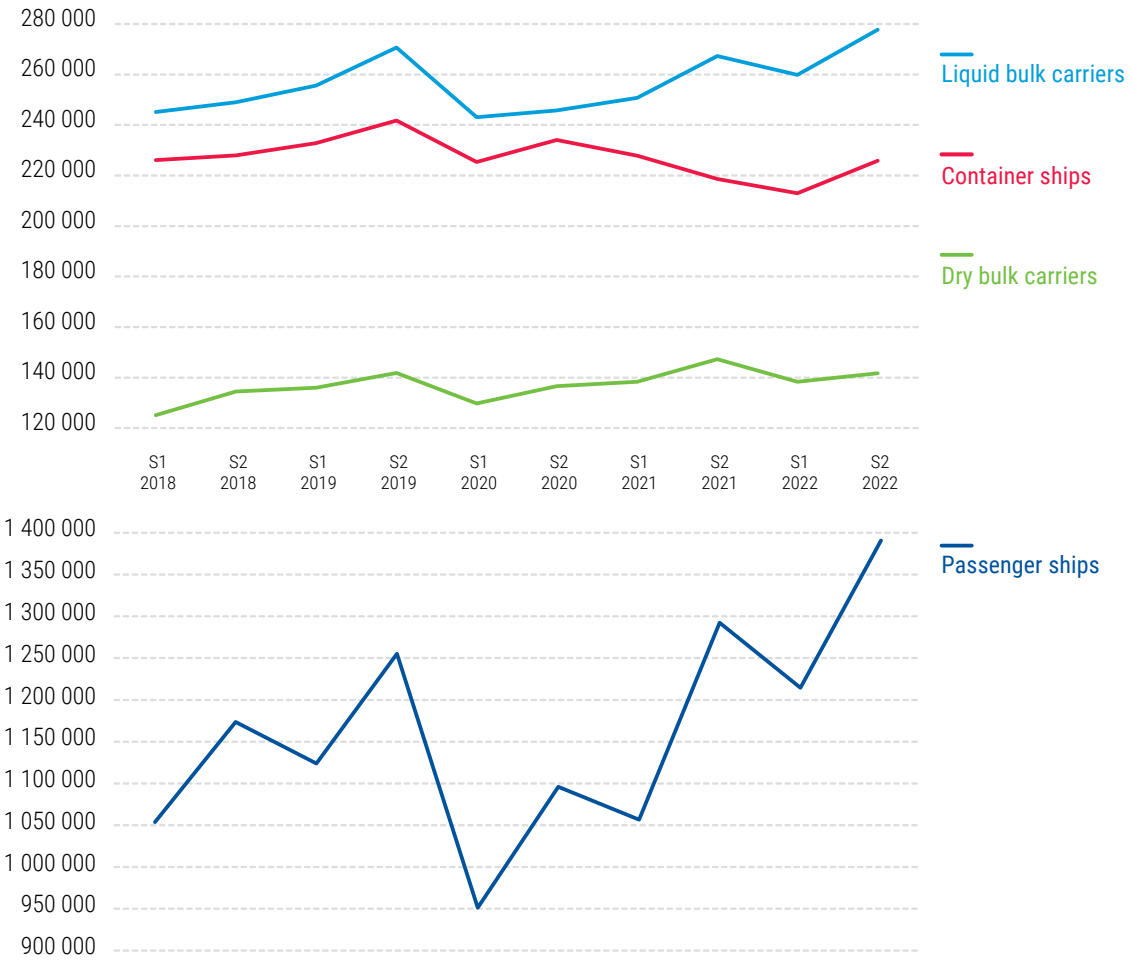
Recovery for container ships and bulk carriers was hampered, while tankers and passenger ship port calls surged beyond pre-COVID-19 levels

The number of port calls of container ships and dry bulk carriers, after observing a year-to-year drop in the first half of 2022, increased by 3.3 and 4.1 per cent respectively in the second half of 2022. However both segments were still below earlier peaks.

Liquid bulk carriers recorded steady growth of 3.9 per cent year-to-year to the second semester of 2022 and reached a historical high of almost 280,000 port calls per semester.

Port calls by passenger ships saw the most volatility. With the relaxing of the COVID-19 pandemic restrictions, port calls jumped by 15.0 and 7.6 per cent during the first and second semesters of 2022, respectively (figure 4.1).

Figure 4.1 Port calls per half year, world total, 2018–2022



Source: UNCTAD, based on data provided by MarineTraffic.

Note: Ships of 1,000 GT and above. For the underlying data see http://stats.unctad.org/maritime.

Dry and liquid bulk carriers port calls follow different regional patterns

Port calls by liquid bulk carriers increased in all regions in 2022, with Africa and Latin America and the Caribbean recording more than a 5 per cent increase, while the slowest growth of 2.3 per cent was in Europe. Oceania took longer to start recovering from pandemic-induced disruptions and saw a 4 per cent increase in 2022.

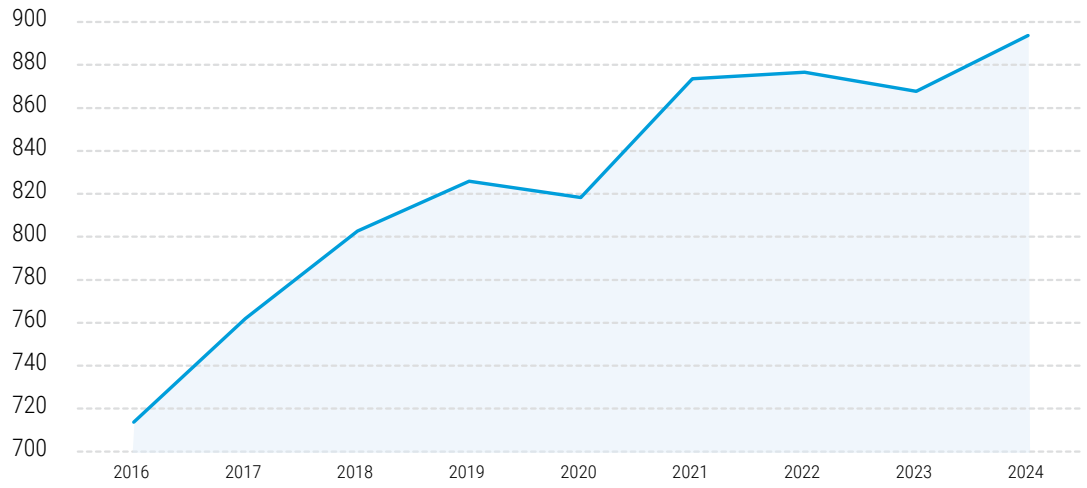
The situation was different for dry bulk carriers, with Africa being the only region to show an increase of 2.5 per cent in 2022. The highest drops of 2.8 and 1.9 per cent were observed in Asia and North America respectively.

Container throughput grows faster than port calls

Containership port calls continued a downward trend for most regions in 2022, with the highest annual drops in Europe (7.5 per cent), North America (5.4 per cent), and Latin America and the Caribbean (4.4 per cent). Oceania recorded growth of 2.4 per cent but is yet to recover from a steep decline in 2021.

As container ship and call sizes go up, in spite of a relatively stagnant trend in port calls (figure 4.1), the volume of containers loaded and unloaded saw a positive trend (figure 4.2). After a strong growth of 6.8 per cent in 2021 and a slight increase of 0.3 per cent in 2022, global container throughput is expected to decline by 1.0 per cent of container traffic in 2023. For 2024, the forecast is 3.0 per cent growth.

Figure 4.2 Container throughput, million 20-foot equivalent units, 2016–2024



Source: UNCTAD, based on Clarksons Research, Shipping Intelligence Network timeseries.

Note: Annual Clarksons Research estimates/projections. Data basis range of sources including World Bank, ports, and industry associations.

2. Liner shipping connectivity back to a growth trend

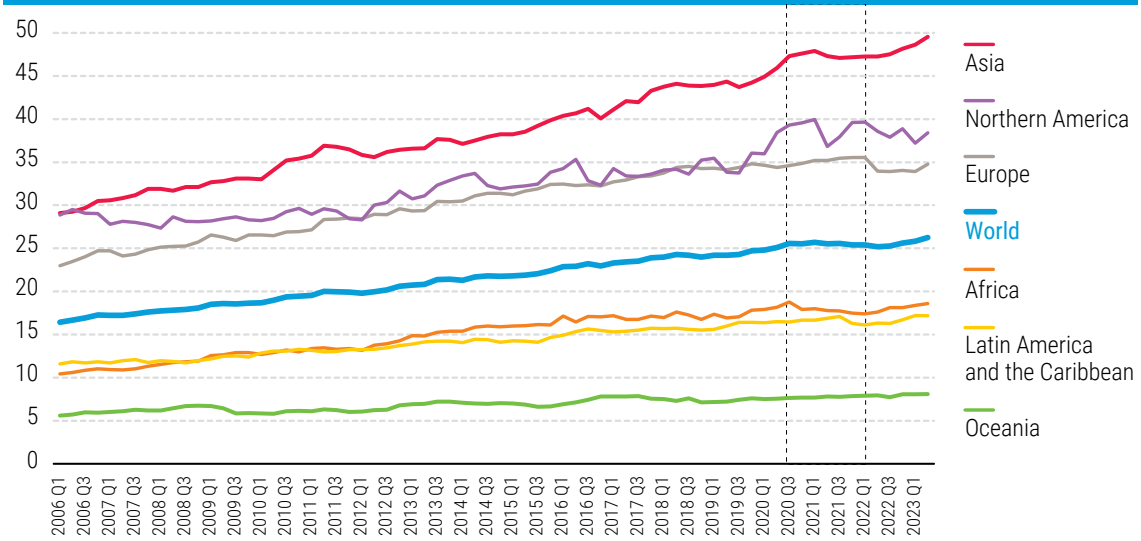
Positive global trends but a persistent connectivity divide

In the second quarter of 2023, the most-connected economies, as measured by the Liner Shipping Connectivity Index (LSCI) were in Asia, with China at the top, followed by the Republic of Korea, Singapore, and Malaysia (UNCTAD, 2023d). All these countries recorded a year-to-year increase in connectivity of between 3 and 5 per cent and reached record highs in their index values. The United States ranked fifth. Three of the four European countries featuring among the top 10 best connected countries, namely Spain, the Kingdom of the Netherlands, and Belgium, also showed an increase over this period, while the United Kingdom recorded a slight drop.

Most regions recovered well in terms of post-pandemic shipping connectivity and congestion-related disruptions. 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. Contrarily, North America and Europe both recorded downward trends in their average LSCI in 2022, only recording a recovery in the second quarter of 2023 (figure 4.3).

These different trends in different regions reflect the shifts in demand and supply during and after the pandemic (see also chapter 1). Asia in particular has picked up container trade activity, including intraregional traffic. In Europe and North America on the other hand, there was a boom in demand and fleet deployment during the pandemic which was not sustained in the post-pandemic downturn. Africa lies in between, with neither a post-COVID-19 boom, nor a post-COVID-19 downturn.

Figure 4.3 Liner shipping connectivity index, world and regional average, 2006 Q1–2023 Q2



Source: UNCTAD, based on data provided by MDS Transmodal.

Note: Index is based on 2006 Q1 = 100 in China as the highest value for this period. For countries with no liner shipping connections, their values are assumed to be zero. Countries with no liner shipping connections for the entire period are excluded from the averages.

Small island developing states (SIDS), although showing some early signs of a rebound, are yet to return to pre-pandemic levels in terms of the LSCI. This is linked to a reduced number of direct calls. Starting from already low levels of connectivity, the LSCIs of African and Indian Ocean SIDS and Caribbean SIDS declined during the COVID-19 pandemic. Among the SIDS that had gained a position as a regional trans-shipment centre, Jamaica and the Dominican Republic have resumed long-term growth trajectories, while the Bahamas and Mauritius have not yet recovered from the decline experienced during the pandemic (figure 4.4).

Bigger ships and fewer companies – two sides of the same coin

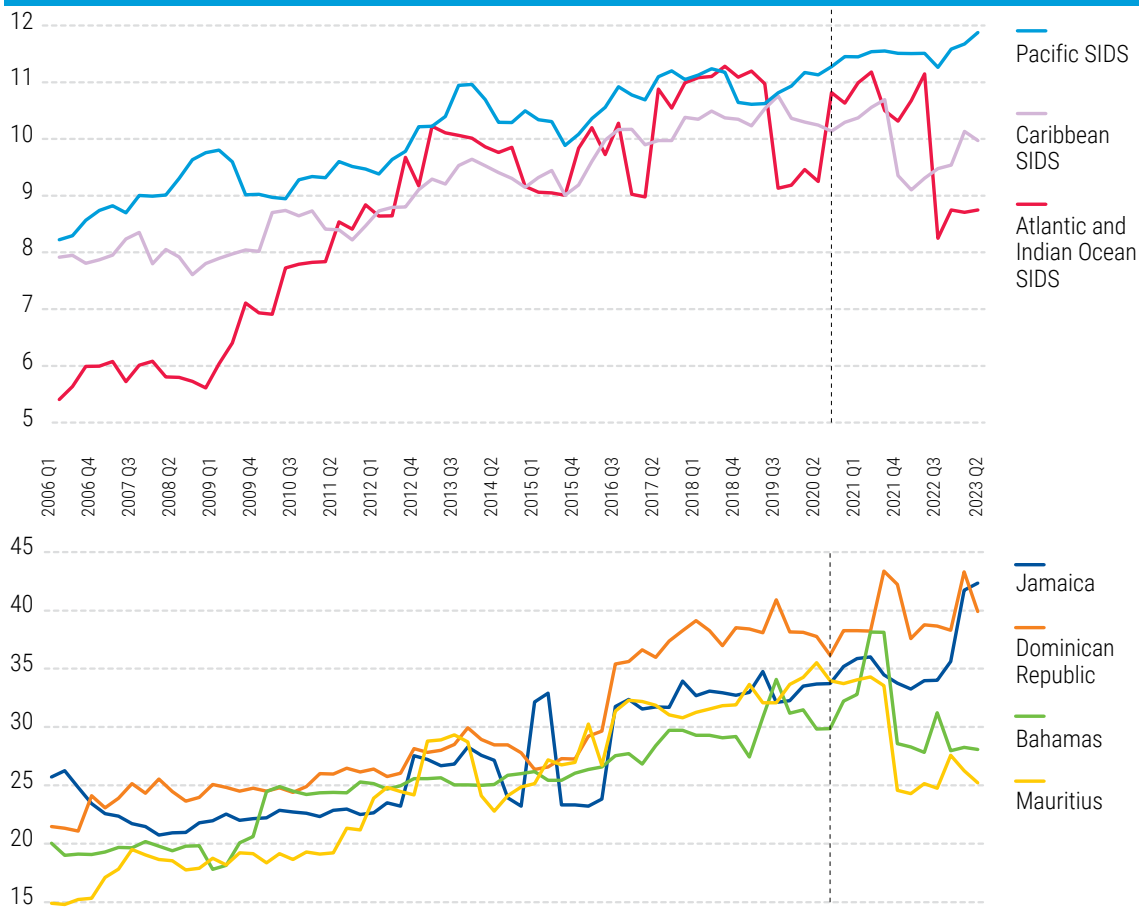
The LSCI is based on six components.[1] Figure 4.5 depicts the trend in two of them, notably the size of the largest ship (over all countries), and the number of companies providing services per country (average per country).

As container ships have increased in size, the number of companies providing services has trended downward. This trend seems to have been interrupted, or even reversed, over the past three years. Since the end of 2019, ship sizes have only minimally increased, and since mid-2022, liner shipping companies have been expanding into new markets with the average number of carriers providing services per country increasing.

With regards to ship sizes, the current maximum container ship sizes are comparable to the largest bulk carriers and tankers. Further increases in size would require significant investments in ports and channels, and in hinterland logistics. Further ship size increases may lead to dis-economies of scale. While there are container ships on the drawing board of around 28,000 20-foot equivalent units (TEU), it may well be that for the foreseeable future, ship sizes will not increase further.

As for the recent increase in the number of companies providing services to the average country, this is mostly linked to the expansion of networks within Asia. Soaring freight rates that prevailed in 2021 and early 2022 had encouraged smaller companies to enter or expand into new markets including trade to North America (see also chapter 2). However, although the number of carriers offering services from and to North America has since declined, it has surged in Asia (figure 4.6), notably in China, India, Qatar and Viet Nam.

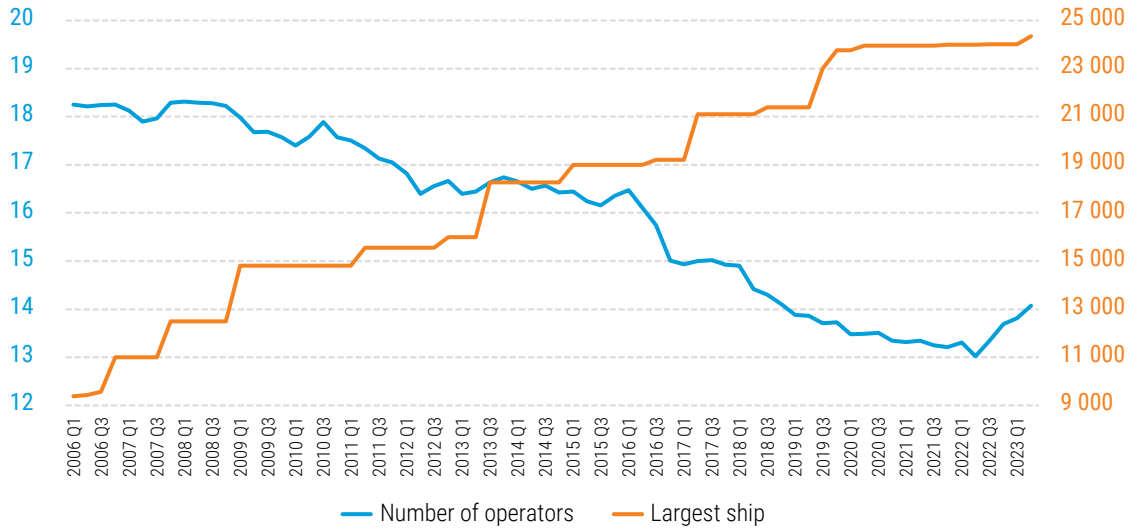
Figure 4.4 Liner shipping connectivity index, selected countries and groupings averages, 2006 Q1–2023 Q2



Source: UNCTAD, based on data provided by MDS Transmodal.

Note: Index is based on 2006 Q1 = 100 in China as the highest value for this period. For countries with no liner shipping connections, their values are assumed to be zero. Countries with no liner shipping connections for the entire period are excluded from the averages. "AIO SIDS" stands for African and Indian Ocean small island developing States.

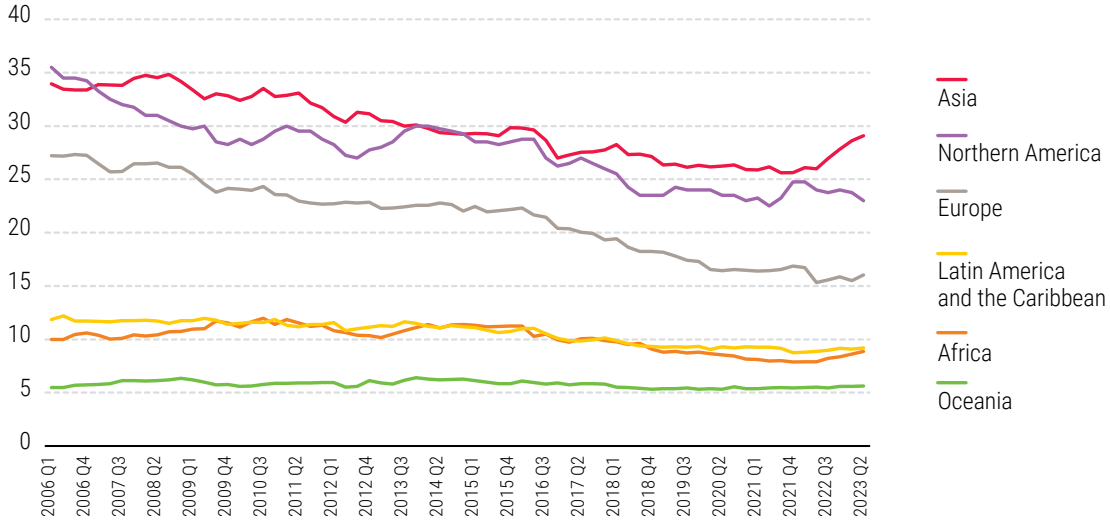
Figure 4.5 Number of operators and largest ships, average per country, 2006 Q1–2023 Q2



Source: UNCTAD, based on data provided by MDS Transmodal.

Note: Average number of operators is calculated from the country data. For countries with no liner shipping connections, their values are assumed to be zero. Countries with no liner shipping connections for the entire period are excluded from the averages. Largest ship reflects the largest ship being serviced globally.

Figure 4.6 Average number of operators, regional average, 2006 Q1–2023 Q2



Source: UNCTAD, based on data provided by MDS Transmodal.

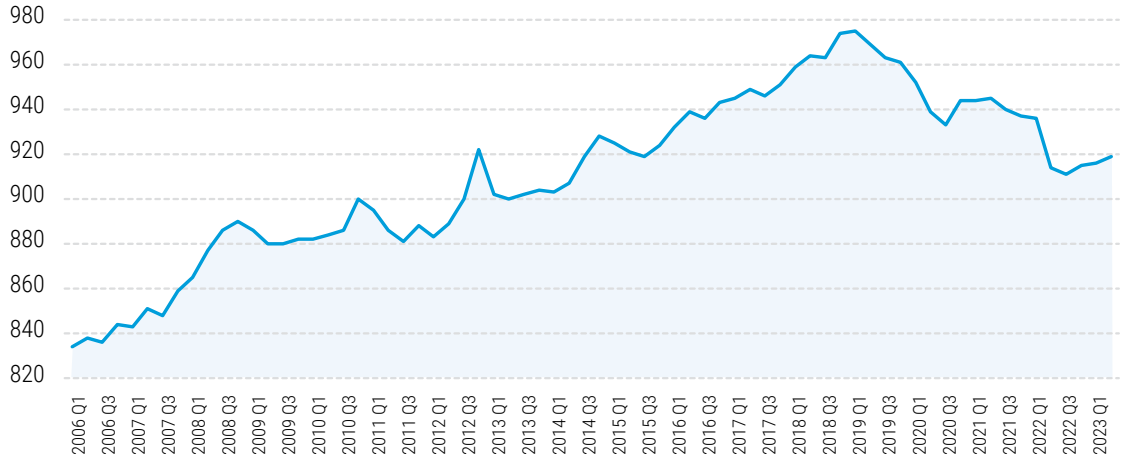
Note: Average number of operators is calculated from the country data. For countries with no liner shipping connections, their values are assumed to be zero. Countries with no liner shipping connections for the entire period are excluded from the averages.

Possible return to global liner shipping network growth

After decades of growth, the number of active container ports in the global liner shipping network had been decreasing since early 2019, with significant drops recorded in the second quarter of 2020, including in response to pandemic restrictions. The second quarter of 2022 also saw decreases, linked to the war in Ukraine.

Most recently, however, the number of container ports included in the global network has increased again, from 911 to 919 between the second quarters of 2022 and 2023. When looking at the number of active container ports in different regions, Asia has recorded the strongest growth over the last years, while Europe and North America have seen declines (figures 4.7 and 4.8).

Figure 4.7 Number of active container ports, world total, 2006 Q1–2023 Q2



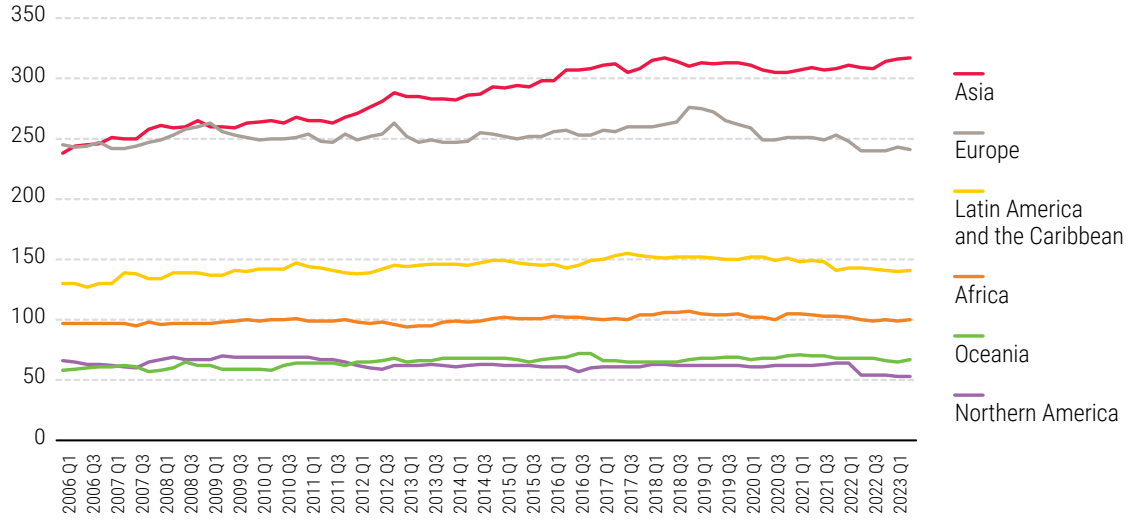
Source: UNCTAD, based on data provided by MDS Transmodal.

3. Asian countries continue to lead in cargo handling performance

Asian container ports excel

The Container Port Performance Index (CPPI) is produced jointly by the World Bank and S&P Global Market Intelligence. It is based on available data pertaining to the time a vessel spends in port, combined

Figure 4.8 Number of active container ports, regional totals, 2006 Q1–2023 Q2



Source: UNCTAD, based on data provided by MDS Transmodal.

with container handling; it should be interpreted as an indicative measure of waterside container port performance (World Bank, 2023a). Amongst the top 25 ports globally, 18 are in Asia, including 11 in Eastern Asia and four in Western Asia (table 4.1).

Table 4.1 Top 25 ports under the Container Port Performance Index 2022

Port name	Country	2022 rank	Index points	2021 rank	Change
Yangshan	China	1	215.0	4	3
Salalah	Oman	2	212.3	2	0
Khalifa Port	United Arab Emirates	3	199.5	5	2
Cartagena	Colombia	4	197.5	12	8
Tanger-Mediterranean	Morocco	5	193.5	6	1
Tanjung Pelepas	Malaysia	6	188.2	18	12
Ningbo	China	7	184.5	7	0
Hamad Port	Qatar	8	182.6	3	-5
Guangzhou	China	9	181.2	9	0
Honk Kong, China	Hong Kong, China	10	178.1	50	40
Port Said	Egypt	11	177.3	15	4
Yokohama	Japan	12	171.5	10	-2
Cai Mep	Viet Nam	13	170.8	13	0
Shekou	China	14	169.5	16	2
Mawan	China	15	166.3	44	29
King Abdullah Port	Saudi Arabia	16	165.1	1	-15
Posorja	Ecuador	17	163.9	66	49
Algeciras	Spain	18	162.0	11	-7
Singapore	Singapore	19	157.5	31	12
Buenaventura	Colombia	20	149.8	20	0
Yeosu	Republic of Korea	21	149.6	33	12
Busan	Republic of Korea	22	148.6	25	3
Chiwan	China	23	147.6	17	-6
Djibouti	Djibouti	24	145.9	19	-5
Tianjin	China	25	145.8	27	2

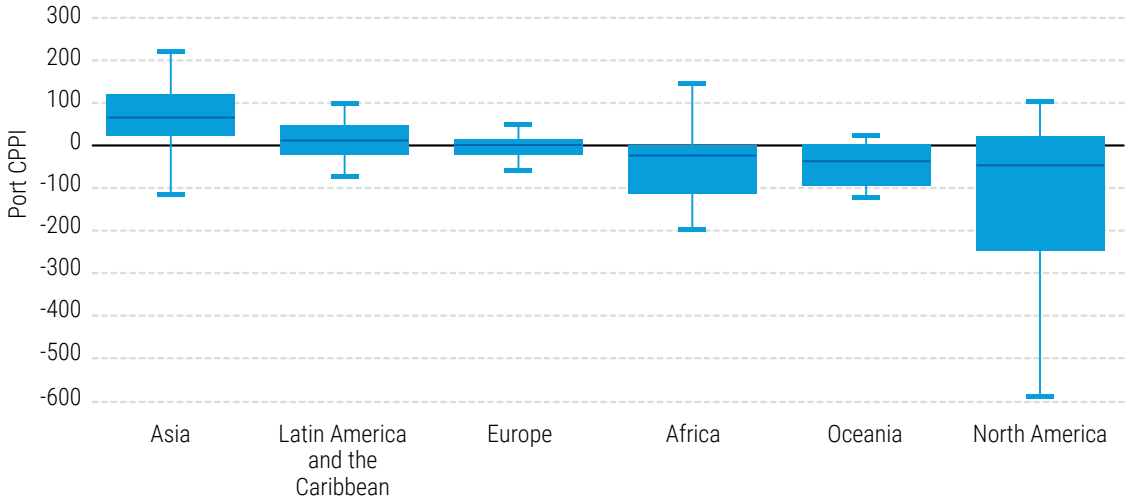
Source: World Bank and S&P Global Port Performance Program.

Note: Ranked by the Administrative Approach scores.

Asian ports dominate the global ranking, with a median index value of +53.6. This is followed by Latin America and the Caribbean (median index of +12.0), Africa (-27.3), Oceania (-33.1), and North America (-42.6) (figure 4.9).

The CPPI reflects a port's capacity to handle containers for export, import and trans-shipment. The top performers on the index are the ports of Yangshan, China, and the port of Salalah, Oman. Both ports have invested in trans-shipment operations, have developed automation and enhanced the interoperability of their systems among border agencies and logistics operators. This investment illustrates the positive relation between the business environment, port facilities, and port performance, ultimately leading to greater efficiency and shorter port calls.

Figure 4.9 Container Port Performance Index values 2022, ports' regional distributions



Source: World Bank and S&P Global Port Performance Program.

Note: Ranked by the Administrative Approach scores. The middle line represents the median, the top and bottom lines of the boxes represent the first and third quartile, and the top and the bottom lines (the whiskers) represent the minimum and the maximum values (excluding outliers).

Trans-shipment does not normally involve customs clearance, hence it leads to reduced dwell times at port compared to export and import operations, which require regulatory interventions of border agencies and often necessitate additional container movements inside the port. A port's specialization in import, export, or trans-shipment operations explains some of the differences in the CPPI rankings. The ports at the bottom of the CPPI list mainly focus on imports.

Box 4.1 discusses developments in the Arab region, home to ports specializing in trans-shipment, notably King Abdullah Port in Saudi Arabia, Port Salalah in Oman, Hamad Port in Qatar, and Khalifa Port in Abu Dhabi, that record the highest indices.

Box 4.1 Container port efficiency in the Arab region

Arab countries are striving to position themselves as hubs for international trade and take advantage of the strategic location of the region, which sits astride three continents. To reach this goal, countries in the region have invested extensively in building ports and facilities, to gain a competitive edge. Current port development plans show a strong desire to expand capacities. The plans also aim to improve current infrastructure usage and modernize port operations through streamlined procedures and automation, among other changes.

Ports in the region secured four of the top five positions on the Container Port Performance Index (CPPI) of 2021.[2] King Abdullah Port in Saudi Arabia, Port Salalah in Oman, Hamad Port in Qatar, and Khalifa Port in Abu Dhabi make up the top four regional ports.

Key port performance metrics reveal significant differences in global port efficiency in 2021, with top performers like King Abdullah Port averaging 97 container moves per hour compared to just 26 container moves per hour at the major ports on the West Coast of North America.[3]

Box 4.1 Container port efficiency in the Arab region *(cont.)*

In 2022, only three ports—Salalah, Khalifa, and Tanger-Med—were able to maintain spots in the top five positions as regards the CPPI, with Hamad Port dropping to 8th and King Abdullah Port to 17th. The Tanger Med port strengthened its position as an important port in the Mediterranean in 2022 by handling 7.5 million containers, an increase of 6 per cent from 2021, owing to its increased role as hub for African trade. An estimated 35 per cent of African trade with the rest of the world is currently transiting Tanger Med, which is connected to about 40 African ports.[4]

It is critical to consider that the closer ports come to reaching their full capacity, the slower the container moves become. In 2022, container throughput in Salalah Port reached 4.5 million TEUs, below its capacity of 5 million TEUs yearly. Port efficiency is really tested when large container volumes are handled yearly, and ports still manage to secure top places. For example, Shanghai Port is considered to be the world's largest container port, exceeding 47.4 million TEUs,[5] with one of its most efficient terminals handling almost 22.9 million TEUs (Yangshan), ranked as the most efficient port in 2022. The port managed to reduce ship waiting time by a sizeable three hours per call in 2022 compared with 2021, and berth hours also improved over most call size ranges.[6]

At country level, only Morocco and the United Arab Emirates have secured positions in the top countries for vessel turnaround time in 2021. Morocco registered a median vessel turnaround time of .76 days while the United Arab Emirates registered a median of 1 day compared to .36 days for Japan, the best performer.[7] The two countries are also leading the region in terms of their scores in the LSCI of 2022 with the United Arab Emirates ranked 1st regionally and Morocco 2nd, while the Kingdom of Saudi Arabia ranks 3rd followed by Egypt and Oman.

Trade facilitation implementation is an important factor for reducing total time spent at ports, not only for time spent loading and unloading vessels but also the time of clearing goods and turnaround times for trucks inside the port, which could nullify the gain from reducing vessel turnaround times.

Reducing waiting times for vessels and trucks in ports not only saves time and money, thus reducing trade costs, but also contributes to reducing CO_2 emissions produced by vessels while waiting at ports.

Source: UN-ESCWA.

Table 4.2 presents port performance measured in minutes per container move at the country level.[8] Among the top 25 countries by port calls, the more containers are moved per port call (i.e., the bigger the call size), the faster the loading and unloading. For call sizes of 4001 moves and above, it takes on average less than one minute to load or unload per container. The underlying reason is the deployment of more port cranes per ship, which allows for parallel operations. Larger port calls also tend to involve the use of more automation across cranes and yards.

Hong Kong, China, was the fastest across five categories of call sizes. It was followed by Japan, the United Arab Emirates and Viet Nam, which recorded the fastest container handling speeds in three categories each. Malaysia and Viet Nam reached top speeds in two categories, and China, India, the Republic of Korea, Türkiye and Taiwan Province of China recorded top speeds in one call size category each.

Table 4.2 Minutes per container move, 2022, by range of call size, top 25 countries by port calls

Country	<500	501–1000	1001–1500	1501–2000	2001–2500	2501–3000	3001–4000	4001–6000	>6000
China	3.7	2.2	1.5	1.1	0.9	0.8	0.7	0.5	0.4
United States	3.7	2.6	2.4	2.2	2.1	2.0	2.2	1.9	1.2
Singapore	3.5	1.9	1.3	1.0	0.9	0.8	0.6	0.5	0.4
Republic of Korea	2.5	1.7	1.2	0.9	0.8	0.8	0.7	0.6	0.5
Malaysia	3.6	2.0	1.4	1.1	0.9	0.8	0.6	0.5	0.4
Brazil	3.3	2.2	1.6	1.4	1.2	1.1	1.0	0.7	-
Spain	3.7	2.2	1.5	1.1	1.0	0.8	0.8	0.8	0.7
Germany	4.4	2.5	1.8	1.7	1.4	1.4	1.3	1.3	1.2
Belgium	3.7	2.2	1.5	1.3	1.1	1.0	1.0	0.9	0.8
Honk Kong, China	2.8	1.7	1.2	0.9	0.7	0.7	0.6	0.5	0.3

Table 4.2 Minutes per container move, 2022, by range of call size, top 25 countries by port calls *(cont.)*

Country	<500	501–1000	1001–1500	1501–2000	2001–2500	2501–3000	3001–4000	4001–6000	>6000
United Arab Emirates	4.2	2.0	1.3	0.9	0.8	0.7	0.7	0.5	0.5
Japan	2.2	1.4	1.1	1.0	0.9	0.8	0.8	0.6	-
Kingdom of the Netherlands	6.6	3.2	2.1	1.8	1.5	1.5	1.1	0.9	0.8
United Kingdom	4.0	2.5	1.9	1.6	1.9	1.4	1.3	1.1	0.8
Panama	3.5	2.3	1.6	1.3	1.1	1.0	0.9	1.4	1.7
Türkiye	3.8	2.6	1.8	1.4	1.4	1.3	1.2	0.8	0.2
Taiwan Province of China	3.3	2.0	1.3	1.0	0.9	0.7	0.7	0.7	0.8
Australia	3.8	2.9	2.3	1.9	1.7	1.5	1.3	1.2	1.4
India	2.8	1.7	1.2	0.9	0.8	0.8	0.7	0.6	-
Italy	4.1	3.1	2.1	1.7	1.8	1.8	1.7	1.6	1.4
Viet Nam	2.6	1.7	1.4	1.0	0.7	0.7	0.6	0.6	0.5
France	3.5	2.8	2.0	1.9	1.8	1.9	1.5	1.1	1.1
Thailand	2.6	2.5	1.3	1.0	0.9	0.8	0.7	0.7	0.6
Indonesia	3.6	2.3	1.8	1.4	1.2	1.1	0.9	0.8	-
Philippines	5.8	5.2	3.9	3.8	2.4	1.6	1.6	-	-
Average	**3.7**	**2.4**	**1.7**	**1.4**	**1.2**	**1.1**	**1.0**	**0.9**	**0.8**
Per cent change from 2021	**1.8**	**4.8**	**4.7**	**6.0**	**3.4**	**5.7**	**3.7**	**5.1**	**1.3**

Source: S&P Global Port Performance Program.

Improvements in the performance of bulk shipping

Integrating Automatic Identification System (AIS) data on ship movements with information about cargo transfers generates performance indicators for dry and liquid bulk cargo. Table 4.3 summarizes cargo and vessel handling performance of bulk carriers for the top 30 countries in terms of ship arrivals.

Australia recorded the highest average loading speed, at 48 tons per minute, while Oman was fastest when it comes to unloading dry bulk cargo, at 34 tons per minute. All four indicators covered in the table saw improvements over the last year, i.e. average loading and unloading speeds increased, while average waiting times decreased. This reflects a combination of long-term technological progress and a recovery from pandemic disruptions.

Table 4.3 Cargo and vessel handling performance for dry bulk carriers, top 30 economies by vessel arrivals, average values for the first four months of 2023 and changes from 2022

Country	Ton per minute (loading)		Ton per minute (discharge)		Average waiting time to load (hours)		Average waiting time to discharge (hours)	
	2023	% change from 2022 to 2023	2023	% change from 2022 to 2023	2023	% change from 2022 to 2023	2023	% change from 2022 to 2023
China	22.5	17.3	28.3	14.6	61.5	-20.8	39.0	-19.1
Australia	48.4	2.6	10.4	6.3	105.7	-9.2	53.1	-8.7
United States	15.1	1.8	9.2	-3.8	91.1	-17.9	41.6	-30.0
Brazil	23.7	-2.9	9.9	1.2	217.9	16.8	98.8	-35.1
Russian Federation	12.8	-2.4	4.4	15.7	45.1	-7.5	28.6	-75.9
Canada	17.2	1.9	7.0	-27.6	107.3	1.7	35.5	-37.5
Argentina	16.3	-27.3	8.1	-6.8	36.0	-5.5	23.8	-0.1
Indonesia	17.7	2.9	11.3	1.0	76.2	-5.5	54.2	22.8
South Africa	16.6	3.0	9.2	8.6	98.9	-24.4	55.1	-31.8

Table 4.3 Cargo and vessel handling performance for dry bulk carriers, top 30 economies by vessel arrivals, average values for the first four months of 2023 and changes from 2022 *(cont.)*

Country	Ton per minute (loading)"		Ton per minute (discharge)		Average waiting time to load (hours)		Average waiting time to discharge (hours)	
	2023	% change from 2022 to 2023	2023	% change from 2022 to 2023	2023	% change from 2022 to 2023	2023	% change from 2022 to 2023
India	17.5	17.0	20.7	10.7	55.2	-19.5	35.3	-30.8
Japan	7.9	0.1	19.3	5.0	37.5	4.9	36.5	-8.8
Viet Nam	8.6	2.7	14.1	10.6	71.6	43.8	27.7	-27.4
United Arab Emirates	21.3	10.0	11.7	14.7	35.5	-1.3	27.4	23.1
Republic of Korea	9.8	-0.1	14.7	2.4	32.4	-9.9	72.9	1.2
New Zealand	9.6	1.4	7.5	1.4	68.8	-1.6	44.4	47.0
Chile	15.4	14.1	10.0	12.1	88.3	5.9	124.3	-2.3
Norway	24.6	-2.0	6.3	-2.3	56.0	-31.1	80.9	28.7
Ukraine	7.7	102.8	1.0	-84.0	10.8	-65.3	1.0	-97.2
Türkiye	7.7	9.0	9.0	0.7	46.1	-21.0	64.5	4.8
Colombia	22.6	0.8	8.7	29.5	40.9	-55.1	31.5	-27.6
Oman	15.5	0.7	33.6	37.4	45.9	-29.8	36.7	-56.4
Romania	6.4	-18.4	7.2	-19.2	95.1	30.1	41.0	-28.1
Peru	31.2	8.4	11.9	20.3	95.2	14.5	41.3	-36.0
Saudi Arabia	9.4	12.8	7.1	27.1	57.3	-8.9	58.3	-14.9
France	10.2	-3.2	8.1	-23.3	46.8	10.4	58.9	-6.4
Malaysia	9.9	-0.5	11.2	-3.1	48.6	-28.8	53.0	-48.8
Mozambique	13.8	-19.5	7.0	13.2	171.8	22.4	154.4	-20.5
Spain	15.3	11.0	10.1	-0.1	61.2	12.2	42.3	-23.8
Taiwan Province of China	9.9	-6.1	15.0	-6.1	27.3	-11.3	65.8	20.2
Germany	9.0	23.3	19.0	29.0	46.5	-32.3	45.9	-19.5
Average	**15.8**	**5.4**	**11.7**	**2.8**	**69.3**	**-8.1**	**52.5**	**-18.0**

Source: UNCTAD, based on data provided by VesselsValue (http://vesselsvalue.com/).

Note: Ranked by number of dry bulk carrier arrivals for loading. Data for ton per minute calculated as total dead weight tons per total time in minutes for loading/discharging. The data for 2023 is the average from January 2023–April 2023.

Table 4.4 presents tanker cargo and vessel handling performance for the top 30 countries in terms of ship arrivals. Here again, cargo handling performance improved for both loading and discharge. Similarly to dry bulk carriers, tankers observed improved average waiting times for loading, but the average increased for discharge, mainly due to significant increases in Qatar (six-fold) and Angola (two-fold), resulting from tanker port congestion in these two countries in 2022. The fastest loading times are recorded for Angola, at 98 tons per minute, while Kuwait had the fastest unloading times, at 169 tons per minute.

Table 4.4 Cargo and vessel handling performance for tankers, top 30 economies by vessel arrivals, average values for the first four months of 2023 and changes from 2022

Country	Ton per minute (loading)		Ton per minute (discharge)		Average waiting time to load (hours)		Average waiting time to discharge (hours)	
	2023	% change from 2022 to 2023	2023	% change from 2022 to 2023	2023	% change from 2022 to 2023	2023	% change from 2022 to 2023
United States	26.4	6.6	32.9	0.9	49.1	0.8	56.2	-1.0
Russian Federation	38.1	1.9	28.2	20.7	31.5	-19.1	36.4	25.0
Saudi Arabia	77.3	0.4	26.5	4.1	37.7	1.3	49.7	16.6

Table 4.4 Cargo and vessel handling performance for tankers, top 30 economies by vessel arrivals, average values for the first four months of 2023 and changes from 2022 *(cont.)*

Country	Ton per minute (loading)		Ton per minute (discharge)		Average waiting time to load (hours)		Average waiting time to discharge (hours)	
	2023	% change from 2022 to 2023	2023	% change from 2022 to 2023	2023	% change from 2022 to 2023	2023	% change from 2022 to 2023
Brazil	54.5	-4.5	31.1	3.1	38.9	-12.1	72.9	-1.3
China	28.0	13.1	45.0	3.0	37.9	-10.3	56.3	-18.5
United Arab Emirates	67.2	1.0	25.1	-8.9	49.3	-20.8	51.8	-49.1
India	32.5	26.1	50.1	-0.9	41.5	-19.8	45.2	-20.5
Republic of Korea	27.4	-1.1	79.2	9.9	47.0	-14.8	37.8	-10.8
Malaysia	27.8	1.2	37.3	1.9	48.0	-12.7	48.6	-17.9
Singapore	30.2	6.7	38.9	-4.1	44.2	0.3	30.1	-34.3
Indonesia	17.8	9.8	25.3	-3.2	44.8	-7.6	41.7	-2.2
Mexico	25.2	-1.5	21.2	-2.5	84.5	14.5	89.3	-22.2
Italy	18.0	4.4	39.9	4.4	53.6	8.8	55.0	10.1
Kingdom of the Netherlands	18.1	22.4	35.9	18.7	61.7	2.5	49.8	0.1
Iraq	54.8	17.7	7.7	-16.6	34.8	-9.9	79.0	-24.6
Kuwait	87.3	7.4	169.3	282.2	32.8	-25.9	62.5	16.7
Türkiye	50.2	-1.3	27.8	-5.9	30.1	-11.8	56.5	45.0
Nigeria	42.8	9.2	8.0	-9.9	26.7	-16.5	79.2	-5.7
Norway	68.0	5.4	21.4	10.1	27.4	-28.3	32.0	-31.6
Canada	34.8	-7.8	49.1	7.7	35.8	3.4	57.0	-8.8
Egypt	69.5	17.7	57.4	27.0	27.0	-14.9	92.2	43.7
United Kingdom	39.9	11.7	33.4	26.6	44.8	-7.2	55.3	-2.3
Spain	13.4	-13.7	34.5	0.0	38.8	5.2	41.0	-10.4
Qatar	91.3	12.5	62.5	-4.3	23.4	4.3	58.2	492.4
Angola	97.7	-9.9	17.8	8.0	21.8	-17.2	40.7	106.6
Argentina	26.0	7.6	18.3	12.6	39.8	0.9	38.0	44.8
Oman	39.0	-1.5	20.4	142.2	44.1	-34.6	65.5	6.1
Libya	59.5	2.1	9.5	11.8	22.6	-6.3	111.6	20.6
Algeria	44.1	6.4	10.3	13.4	27.6	-21.9	19.6	-35.3
Belgium	11.0	7.9	15.8	8.2	53.5	19.0	32.3	-31.7
Average	**43.9**	**5.3**	**36.0**	**18.7**	**40.0**	**-8.4**	**54.7**	**16.7**

Source: UNCTAD, based on data provided by VesselsValue (http://vesselsvalue.com/).

Note: Ranked by number of dry bulk carrier arrivals for loading. Data for ton per minute calculated as a total dead weight tons per total time in minutes for loading/discharging. The data for 2023 is the average from January 2023–April 2023.

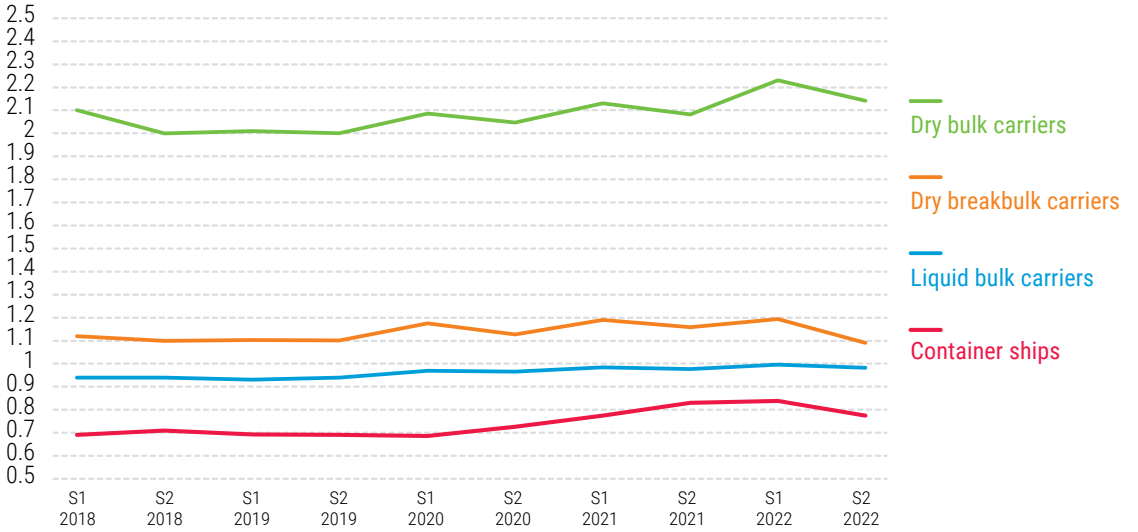
4. Time in port and congestion recovering from pandemic disruptions

Improved time in port since mid-2022

Over the years, the time that ships spend in ports has been slowly but steadily improving. However, during the COVID-19 pandemic, progress was lost, and all vessel types saw an increase in port times. As the pandemic and related disruptions fade, ship turnaround times improved in the second semester of 2022, albeit still remaining above pre-pandemic levels (figure 4.10).

A typical dry bulk carrier spends about three times longer in port than a container ship. Cargo tends to be less valuable, and speed is less important. Also, normally the full load tends to be loaded or unloaded, while a container ship calls at a series of ports and in each port only a portion of the cargo is loaded or unloaded.

Figure 4.10 Time in port, world median, in days, 2018 S1–2022 S2



Source: UNCTAD, based on data provided by MarineTraffic.

Note: Ships of 1 000 GT and above.

Congestion reduced for containerships

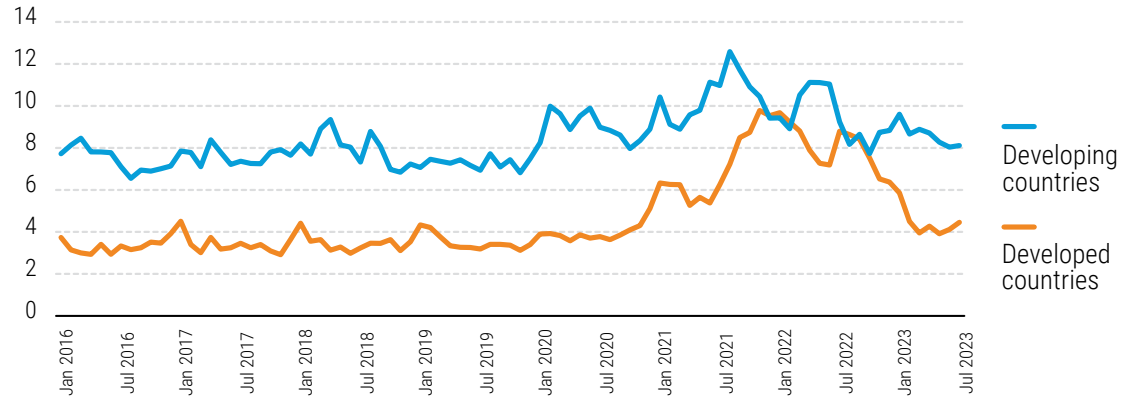
Vessel waiting times before tying up at a berth are an indicator of possible port congestion. Container ships tend to spend more time in port in developing countries than in developed countries (figure 4.11). These averages can be explained by a combination of faster clearance times, better infrastructure, and higher labour productivity. During the COVID-19 pandemic, however, waiting times surged in developed countries more than in developing countries, even exceeding those of the latter in early 2022. As demand for manufactured imports went up, especially during periods of lock-downs combined with economic stimulus packages, ports could not cope with the surge in volumes and experienced serious congestion, especially in North America and some European ports.

Figure 4.12 shows the fleet capacity held up at an anchorage or in port. This indictor can serve as a proxy to infer port productivity and congestion trends. From July 2022 to April 2023, the proportion of the global containership fleet capacity in port decreased from 37.1 per cent to 32 per cent. For bulk carriers, after a significant drop from 35.4 to 30.9 per cent between April and August 2022, the share of capacity in port slightly increased to 32.7 per cent in April 2023.

The share of the chemical tanker fleet capacity in ports remains at the elevated levels of about 46 per cent since late 2021, compared to an average of about 42 per cent before the outbreak of COVID-19. Chemical tanker congestion has gradually risen since the end of 2020, with increased congestion in East Asia and Europe as key drivers. Meanwhile, disruption from the war in Ukraine has driven up congestion in the Mediterranean and Black Sea. In Northwestern Europe, terminal capacity has struggled to accommodate the recent increase in shipments as land-borne Russian volumes have begun to be phased out.

Interestingly, the proportion of container ship and bulk carrier capacity in ports are comparable, even though container ships tend to benefit from faster cargo handling work. The reason for this is that container ships are faster at sea, normally with higher voyage speeds than bulk carriers, but they also call at a larger number of ports while providing a liner shipping service. Both vessel types saw a surge in the share of fleet capacity in port during the pandemic, and both saw an improvement since early 2022.

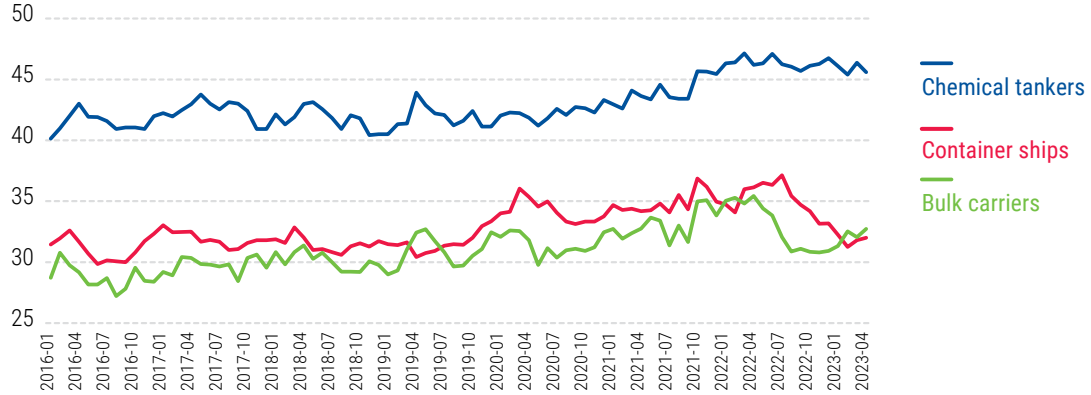
Figure 4.11 Average waiting times of container ships at port in hours, monthly, January 2016–July 2023



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

Notes: Waiting time estimated based on the time between vessel first entering an anchorage associated with a port group (or port where vessel has not been seen in an anchorage shape), and first entering a berth within a port.

Figure 4.12 Per cent of fleet capacity at anchorage or in the port, by vessel type, January 2016–April 2023



Source: UNCTAD, based on Clarksons Research, Shipping Intelligence Network timeseries.

Note: Based on seven-days moving average. Data based on the proportion of vessels (in terms of dead weight tons) in the fleet in a defined port or anchorage location. Container ships of 8 000 TEU and above. Bulk carriers consist of Capesize and Panamax. Chemical tankers of 100 GT and above.

B. FACILITATING MARITIME TRADE AND TRANSPORT

1. Maritime trade facilitation and port performances

Progress made

While the year 2022 was challenging for maritime transport with congestion and long dwell times for goods moving through ports, the situation improved in early 2023 with a reduction in both congestion and release times.

The 2023 World Bank Logistics Performance Index (LPI), covering 2022 data, suggests robustness of the maritime supply chains with adaptability to the recent shocks (World Bank, 2023a). Yet major challenges remain in many ports, with significant dwell times offshore and while vessels are docked. Port time is still above pre-pandemic levels with a median time in port of 1.04 days for all ships in 2022. This contributes to the total time it takes for goods to be cleared before their release in the importing seaport.[9] These developments impact the efficiency of port performance and, therefore, global supply chains.

Among the ports which reduced the most the average arrival times[10] during 2021–2022, Dar es Salaam port comes first on the Container Port Performance Index (CPPI) 2022 (World Bank, 2023a). The improved performances of some African and Asian ports have benefited from expanding port capacity and upgrading technology, including investments in trade facilitation reforms. As an example, the government of United Republic of Tanzania has invested heavily in the Dar es Salaam port facilities. It improved clearance procedures with the goal of making the port the entry point of the Central Corridor and the route to Southern Africa. As a result, port performance has improved not only regarding container capacity but also the overall position of Dar es Salaam in maritime transport networks, with an increase on the LSCI of 50 per cent since 2006.

Trade facilitation most relevant for import cargo

Cargo traffic in seaports can be categorized into export, import, transit and trans-shipment operations. Border agencies are required to intervene to ensure compliance with the regulations and clearance of consignments, especially for imports, exports and transit, less so for trans-shipment.

According to the World Bank Logistics Performance Index 2023, export and import dwell time of container ports evolve similarly. However, more customs and compliance controls are linked to imports than exports. This means that dwell time is higher for imports due to border agencies needing to intervene to clear consignments. Import lead time was the highest driver of variability in international trade in 2022 (World Bank, 2023b).

2. Factors that impact port performance

Trade facilitation measures and port performance

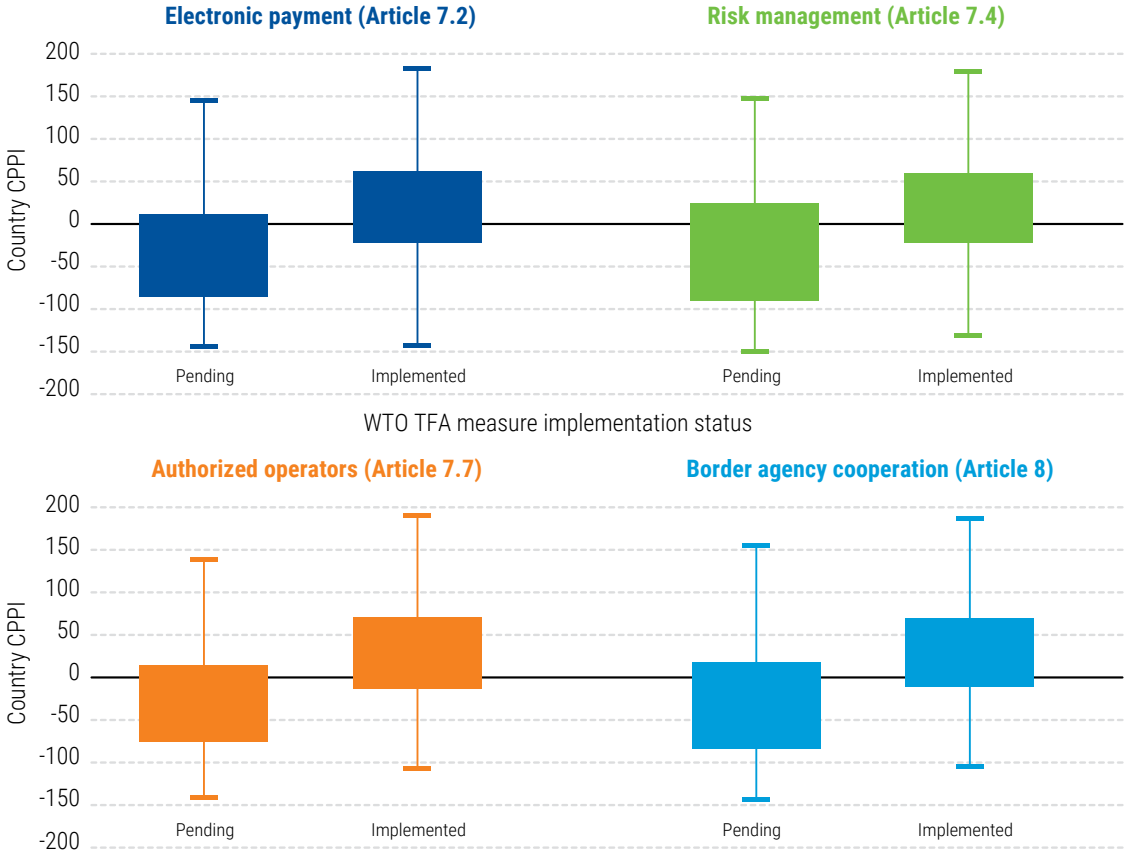
Delays occur when vessels, containers, or goods are not moving. The lack of movement points to inefficiencies in ports, including complexity regarding the administrative or institutional requirements for the clearance of goods. It is important to invest in digitalization and technology, which can help increase the predictability and reliability of global supply chains, to achieve greater clearance efficiency and reduce delays - a defining factor of port performance.

Looking into the connections between the CPPI and regulatory processes, figure 4.13 correlates the distributions of the CPPI by country according to their implementation status for selected measures under the WTO Agreement on Trade Facilitation. There are positive linkages for certain measures such as Electronic Payment (article 7.2), Risk management (article 7.4), Authorized Operators (article 7.7), and Border Agency Cooperation (article 8). Interestingly, these articles are also among the measures with the lowest implementation rate by least developed countries (LDCs) and developing countries.

Digital solutions and interoperability

Digitalization is key to port efficiency. Investing in new technology such as interactive data exchange, artificial intelligence and other new processes allows for increased efficiency and agility in global supply chains. This also relates to governments which invest in these systems to improve the efficiency of their regulatory procedures, thereby improving their trading environment and trade efficiency.

Figure 4.13 Country Container Port Performance Index values 2022 by implementation status of selected measures under the WTO Trade Facilitation Agreement



Source: UNCTAD, based on data from the Container Port Performance Index 2022 and the WTO Trade Facilitation Agreement Facility.

Note: Country grouping implementation status based on the WTO TFA articles. Distributions showing port efficiency according to the 2022 Container Port Performance Index of the World Bank and S&P Global using the Administrative Approach scores. The middle line represents the median, the top and bottom lines of the boxes represent the first and third quartile, and the top and the bottom lines (the whiskers) represent the minimum and the maximum values (excluding outliers).

The decision of IMO for compulsory Maritime electronic Single Windows (MSWs) from 1st January 2024 will further promote digital port infrastructure. This will increase the need for interoperability and coordination of port agencies while requiring the exchange of information.

Port efficiency is also based on predictability and reliability of data exchange linked to pre-arrival processing which allows for "just-in-time" arrivals at the port. By way of example, successful experiences in various ports of the United Arab Emirates in data exchange to better manage the flows of vessels arriving at ports show the benefits of investments in digital port systems and interconnectivity (AD Ports Group, 2023). Another example is Finland, where a digital platform with smartphone applications enables ships to view the current condition at ports and just-in-time arrival. Port community systems are another example of digital solutions that facilitate maritime trade and serve as platforms to coordinate stakeholders in a port community and enable seamless information exchange. By streamlining communication and automating data, they enhance efficiency, transparency, and security. The integration of port community systems with the port digitalization agenda can help in this regard (World Bank, 2023c).

The role of border agencies

Technology not only increases port efficiency and maritime supply chains but can enhance public-private collaboration and trust between partners. Thus, digitalization requires both political will and dedicated engagement from border agencies, in collaboration with the private sector, to build an organized ecosystem in which data flows are clearly identified and secured.

Customs and other border agencies are often identified among the underperforming stakeholders in the World Bank Logistics Performance Index, with at times extremely low scores, in particular in least developed countries. While trade facilitation is not the only factor impacting port performance, efficient and agile border agencies, including for instance their pre-arrival procedures for cargo and vessels, will positively impact the handling and flow of the consignment through the port and up to the goods' final destination. In this respect, the more digitalized and interconnected border agencies are, and the better public-private partnerships are integrated, the higher the port performance.

3. Trade facilitation and hinterland connectivity

Congestion frequently occurs both inside and outside seaports and hampers the flow of goods. Hinterland activities can be as important as port activities, especially for the international trade of Landlocked Developing Countries (LLDCs). The cost of hinterland transport is about 40 per cent of total container transport cost.

Elements such as corridors and dry ports, as well as efficient integrated border management and transit procedures are all important to create an efficient intermodal transport environment. In this regard, transit regimes can assist in lowering the time and costs of LLDC overseas trade. They also contribute to reducing port congestion if they help speed up the release of transit goods.

Transit trade benefits from mutually recognized regional or international transit regimes. Ideally, they are combined with transit guarantee, and digital solutions such as the SIGMAT solutions developed by UNCTAD, which establish interconnectivity between national customs management systems in West Africa. In addition, transit regimes should be combined with other harmonized trade and transport regimes accepted by customs administrations and other border agencies, to ensure that transit trade can be efficiently facilitated from the seaports to landlocked countries and other inland destinations.

A good example of an efficient regional transit solution is the East African Community (EAC), a Customs union, with two main corridors linking LLDC members to the Mombasa and Dar es Salaam ports. Policy reforms adopted by the EAC Partner States to implement a customs transit system, the Regional Electronic Cargo Tracking System (RECTS), One-Stop Border Posts (OSBPs) and setting up the institutional ecosystem on the Northern and Central Corridors have helped increase intraregional trade. They have also contributed to connecting the landlocked countries of Burundi, Rwanda and Uganda to regional and global supply chains. As a result, the time to move cargo from Mombasa to Kampala has been reduced from 18 days to three days, and from Mombasa to Kigali from 21 days to six days. The cost of transport from Mombasa to Nairobi has also been reduced by 56 per cent, by 26 per cent to Kampala (Uganda) and by 28 per cent to Kigali (Rwanda).

International standards are key to facilitating international intermodal connectivity. There is an important role for international bodies to develop such standards, and for countries to apply them. By way of example, standardizing the packing of intermodal shipping containers can be a practical way of facilitating intermodal transport (box 4.2).

Box 4.2 Code of Practice for Packing of Cargo Transport Units

Poor practices related to packing cargo in containers, in particular regarding load distribution and securing cargo, but also regarding classification and declaration of cargo, are estimated to cost the worldwide transport and logistics sector more than $6 billion every year. They can be the cause of incidents, in which people, whether supply chain workers or the general public, can be injured or lose their lives. Poor practices must therefore be eliminated, and the right code of practice should be applied for handling and packing containers and other cargo transport units for transport by sea and land.

Such is the Code of Practice for Packing of Cargo Transport Units (CTU Code), a joint publication of the International Maritime Organisation (IMO), the International Labour Organisation (ILO) and the United Nations Economic Commission for Europe (UNECE), which provides comprehensive information and references all aspects of loading and securing cargo in containers and other cargo transport units and takes into account the requirements of all sea and land transport modes.

The CTU Code applies to transport operations throughout the entire intermodal transport chain and provides guidance to those responsible for cargo packing and securing as well as to all parties involved in the supply chain.

Box 4.2 Code of Practice for Packing of Cargo Transport Units *(cont.)*

The CTU Code is currently being reviewed and updated, taking into account the latest developments in the freight transport sector. Updates are proposed to practices concerning issues such as transporting solid bulk cargos in cargo transport units, transporting liquids in flexitanks, blocking material and arrangements, package stability and bedding arrangements, as well as preventing pest contamination.

Further information about the UNECE Working Party on Intermodal Transport and Logistics is available under https://unece.org/transport/intermodal-transport.

Source: UN-ECE.

Another development towards improved hinterland connectivity lies in 'port regionalization' (Notteboom and Rodrigue, 2005). The concept describes the emergence of hub-and-spoke networks to help reduce the pressure on port terminals and facilitate border clearance. Spokes are the physical infrastructure, such as inland container terminals or dry ports that serve as extended gates of the seaport (hub) where consolidation and distribution of goods take place. The hub and spoke requires interdependency of public and private stakeholders, with clearly identified processes and regulatory frameworks, achieved by establishing Special Trade Regimes (STRs) and Export Processing Zones (EPZs).

4. Trade facilitation is essential to respond to new requirements emerging from environmental and climate policies

New legal requirements in relation to environmental protection will lead to additional needs for controls when importing goods. This could create new obstacles to trade if it leads to additional red tape. For instance, the Carbon Border Adjustments Mechanism (CBAM) is an instrument of the European Green Deal within the overall strategy to mobilize funding for all sectors related to climate change. As of 1 October 2023, the mechanism will be an import tariff on carbon-intensive goods from abroad paid by the importer when products enter the European Union.

The role of border agencies will be to report the carbon emissions verified by an accreditation authority in charge of issuing the CBAM certificate. The certificate is equivalent to one ton of carbon dioxide emissions. One administrative burden of the CBAM will be at certification level prior to the border crossing. As a result, these new carbon mechanisms will potentially change the trade facilitation process in terms of certification and compliance before customs clearance.

Finally, trade facilitation itself can help to lower emissions by reducing congestion and the use of paper. Consequently, climate-smart trade facilitation has emerged as a new relevant concept, reflecting the need for sustainable and green supply chains, in view of reducing carbon emissions.

C. LESSONS LEARNED FROM THE TRAINFORTRADE PORT MANAGEMENT PROGRAMME

1. Port performance trends and insights from the TrainForTrade programme

The UNCTAD TrainForTrade Port Management Programme helps ports deliver more efficient and competitive services, impacting port performance and efficiency. Since 2012, TrainForTrade's network members have completed an annual survey which collects data in a secure and confidential manner to produce a Port Performance Scorecard (PPS), enabling port managers to benchmark their performances and provide evidence for policy analysis at global, regional, and state levels. A total of 37 port entities contributed data from which the PPS derived 26 indicators under the following categories: finance, human resources, gender, vessel operations, cargo operations, and environment. The outcomes of these activities provide interesting insights that help inform this section of the Review (UNCTAD, 2023a, 2023b, and 2023c).

The ports in the survey are typically small and medium in size, with the median sized port handling just above 10 million tons per annum and generating median annual revenue of under $60 million. These are more than 80 per cent state owned, with most operating as corporate entities.

The infrastructure and port services mix varies across the group in terms of vessel and cargo types. The median port will have 20 per cent of arrivals by container vessels, 27 per cent as general cargo and 15 per cent in bulk carriers and tankers. Other vessel calls, such as passenger vessels and cruise vessels, make up the balance (table 4.5).

Table 4.5 Port Performance Scorecard, 2016–2022

	Indicator	Number of port entities reporting	2016	2017	2018	2019	2020	2021	2022
Finance	EBITDA/revenue (operating margin)	31	34.4%	36.7%	44.6%	40.9%	33.7%	40.4%	43.8%
	Labour/revenue	31	14.9%	19.0%	16.8%	18.0%	20.5%	16.4%	16.8%
	Vessel dues/revenue	30	15.4%	16.4%	19.2%	14.9%	14.8%	15.8%	12.7%
	Cargo dues/revenue	30	36.3%	34.1%	26.7%	31.6%	35.7%	32.6%	27.6%
	Concession fees/revenue	28	2.0%	6.6%	14.3%	13.3%	10.2%	21.2%	16.5%
	Rents/Revenue	31	3.1%	2.7%	3.3%	3.3%	3.6%	2.7%	0.6%
Human resources	Tons/employee	28	14 091 t	15 500 t	36 288 t	34 647 t	27 265 t	35 018 t	32 331 t
	Revenue/employee	27	129 813 USD	112 527 USD	143 113 USD	169 912 USD	162 933 USD	268 501 USD	226 522 USD
	EBITDA/employee	27	46 411 USD	41 851 USD	59 844 USD	74 174 USD	52 835 USD	61 898 USD	88 035 USD
	Labour cost/employee	27	23 231 USD	21 753 USD	21 355 USD	25 074 USD	25 938 USD	23 370 USD	19 573 USD
	Training cost/wages	28	0.9%	1.0%	1.1%	0.7%	0.3%	0.3%	0.3%
Gender	Female Participation Rate - All categories	22	13.7%	14.5%	15.7%	16.2%	16.9%	15.4%	16.1%
	Female Participation Rate - Management	31	34.0%	35.0%	40.7%	38.8%	42.9%	40.1%	40.7%
	Female Participation Rate - Operations	28	23.8%	21.1%	6.4%	7.4%	10.7%	6.4%	10.5%
	Female Participation Rate - Cargo Handling	18	0.0%	3.1%	5.9%	4.4%	2.3%	4.5%	0.5%
	Female Participation Rate - Other employees	19	28.6%	24.8%	26.9%	31.2%	29.3%	26.1%	23.7%
Vessel operations	Average waiting time	30	4 h	8 h	14 h	5 h	8 h	7 h	10 h
	Average gross tonnage per vessel	34	16 163 GT	14 952 GT	16 759 GT	16 298 GT	16 525 GT	16 322 GT	22 543 GT
	Average of Oil Tankers arrivals	32	4.0%	4.7%	7.7%	9.6%	6.4%	6.6%	6.3%
	Average of Bulk Carrier arrivals	32	5.4%	6.1%	5.0%	6.6%	7.6%	8.3%	5.8%
	Average of Container Ship arrivals	32	35.6%	40.9%	26.7%	26.8%	28.2%	24.2%	20.8%
	Average of Cruise Ship	32	0.3%	0.3%	0.2%	0.3%	0.0%	0.0%	0.0%
	Average of General Cargo Ship	32	15.4%	15.8%	21.3%	22.0%	20.6%	24.6%	26.8%
	Average of Other Ship	32	13.0%	11.8%	12.9%	8.8%	14.6%	6.2%	13.9%

Table 4.5 Port Performance Scorecard, 2016–2022 *(cont.)*

	Indicator	Number of port entities reporting	2016	2017	2018	2019	2020	2021	2022
Cargo operations	Average tonnage per arrival (all)	32	5 360 t	7 945 t	7 008 t	7 190 t	5 469 t	5 253 t	5 623 t
	Tons per working hour, dry or solid bulk	29	244 t	219 t	261 t	191 t	229 t	147 t	95 t
	Tons per hour, liquid bulk	26	737 t	222 t	186 t	201 t	166 t	140 t	120 t
	Containers Lift Per Ship Hour at Berth	27	22	26	18	20	22	21	18
	Average container dwell time in days	23	5	4	5	5	5	5	3
	Tons per hectare (all)	29	141 091 t	109 608 t	94 226 t	93 205 t	86 171 t	94 271 t	95 563 t
	Tons per berth meter (all)	33	3 071 t	3 125 t	3 325 t	2 990 t	2 833 t	2 905 t	2 796 t
	Total Passengers on Ferries	18	1211 915	1396 864	1172 711	1145 084	302 213	147 170	1055 517
	Total Passengers on Cruise	20	32 700	23 880	32 054	25 585	1 275	0	5 470
Environment	Investment in Environmental Projects/ Total CAPEX	20	0.0%	1.3%	1.2%	0.9%	0.1%	0.2%	0.3%
	Environmental expenditures/Revenue	24	0.0%	0.2%	0.2%	0.8%	0.3%	0.2%	0.2%

Source: UNCTAD calculations based on data from port entities reporting to the TrainForTrade Port Performance Scorecard.

Note: EBITDA, earnings before interest, taxes, depreciation, and amortization; CAPEX, capital expenditure. Data summarized without applying any methodologies for handling missing data.

2. Trends in traffic, income, employment, and digitalization

Post-pandemic recovery hampered

Data from members of the TrainForTrade port management programme for 2019 to 2022 reflects the impact of disruption on port volumes and revenue growth rates (figure 4.14). Median growth rates of both volume and revenue fell in 2019 and 2020 for ports in the network. There was a strong recovery in 2021 with a subsequent fall in 2022. This might be explained by trade flow disruptions linked to the war in Ukraine, port congestion and other factors, although the impacts vary by cargo or commodity across the group of ports.

Financial performance levels (measured by earnings before interest, tax, depreciation, and amortization (EBITDA) vs total revenue) showed a fall in 2020 with profit levels for the median port falling to levels that would, if sustained, impact the longer-term capacity of ports to invest in port infrastructure. The reports for 2021 and 2022 showed a return to levels above 40 per cent, consistent with levels required of infrastructure utilities.

Passenger traffic rebounds after the pandemic

The cruise operations across the network vary greatly in type and scale. In March 2020, the entire world cruise fleet came to a near total stop. This is visible in figure 4.15, showing a significant drop in cruise passenger numbers in 2020 and 2021. The situation slightly improved in 2022 but is still far from pre-2020 levels. Local passenger traffic turned out to be more resilient, reaching pre-pandemic values in 2022.

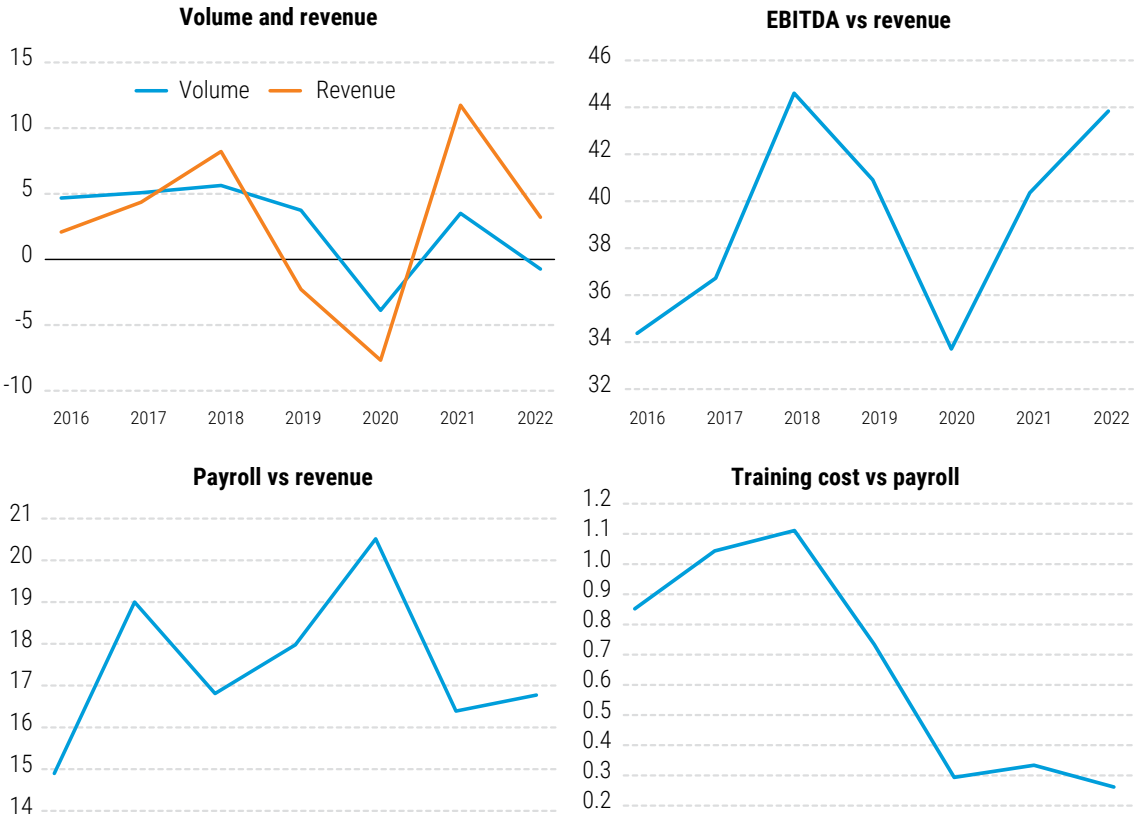
Growth in concession and property income share

Revenue across ports varies, and partly depends on the extent to which the port has privatized service provisions within the port, and the extent of a landbank under management. Ports in the UNCTAD TrainForTrade network recorded a growth in concession and property income. Larger container ports in particular, may see a shift over time, reflecting revenues from privatised container terminals.

Investing in decarbonization

The environmental performance debate has moved on from management systems and monitoring data to the decarbonization of maritime transport in ports and at sea (see also chapter 3). Strategically, ports in the UNCTAD TrainForTrade network are increasingly looking at performance in terms of carbon reduction, provision of alternative fuels to vessels, and onshore power supply by green energy. Other port feedback includes integrating technology into all port activities, and digitalization, which will in turn transform performance appraisal in terms of metrics and data access.

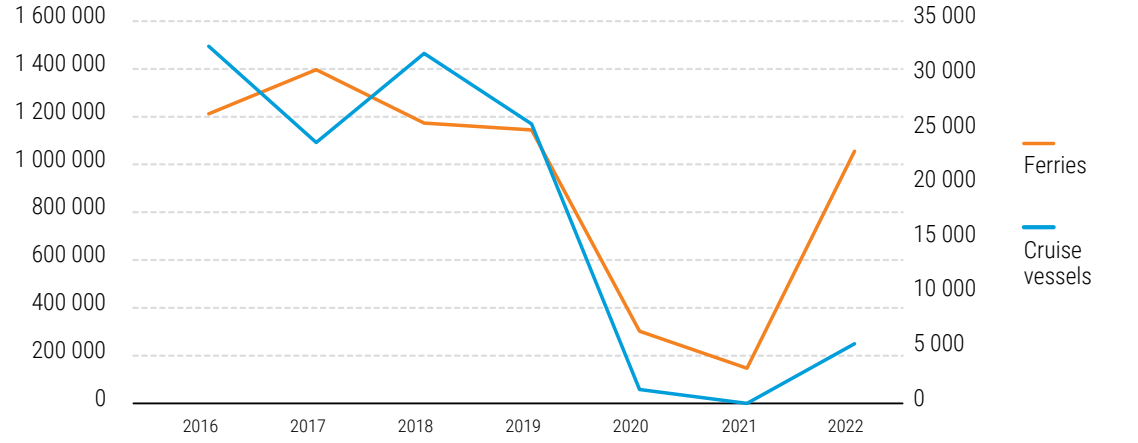
Figure 4.14 Selected port performance indicators, median value across all port members of the TrainForTrade Port Management programme, 2016–2022



Source: UNCTAD calculations based on data from port entities reporting to the TrainForTrade Port Performance Scorecard.

Note: Volume and revenue values calculated as median year-to-year percentage change across all ports to minimize the bias due to data availability from reporting port entities. EBITDA, earnings before interest, taxes, depreciation, and amortization. Data summarized without applying any methodologies for handling missing data.

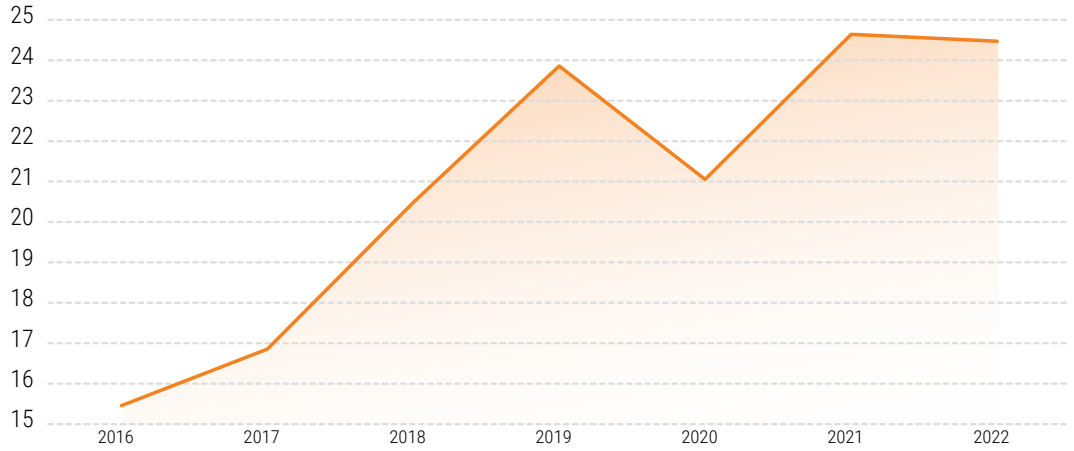
Figure 4.15 Cruise and ferry passenger, median value across all ports, 2016–2022



Source: UNCTAD calculations based on data from port entities reporting to the TrainForTrade Port Performance Scorecard.

Note: Passengers on cruise vessels comprise of in, out and remain on board passengers. Passengers on ferries comprise of in and out passengers. Data summarized without applying any methodology for handling missing data.

Figure 4.16 Port authority revenue profile, median share of concession and property dues, members of the TrainForTrade Port Management Programme, 2016–2022



Source: UNCTAD calculations based on data from port entities reporting to the TrainForTrade Port Performance Scorecard.
Note: Data summarized without applying any methodology for handling missing data.

Limited spending on training

Payroll as a proportion of total revenue showed a decline, which may indicate disruption to wage increases and caution in recruitment plans. Also of note is the low level of median spending reported as committed to training as a proportion of payroll cost over the period 2016 to 2022 – ranging from 0.3 per cent to 1.1 per cent. The lowest value was recorded in 2022 reflecting a falling rate since 2018. While there is evidence of training programmes going online – a cost reduction – the overall level is arguably too low in the context of the transformative trends in the industry.

Digital transformation helps improve port performance

The following case presents interesting perspectives from a long-standing partner of the TrainForTrade Port Management Programme network: the Port Authority of Valencia (box 4.3). The case illustrates how the digital transformation journey related to Valencia's Port Community System helps with monitoring, benchmarking and planning activities through the use of standardized scorecards. It underlines that measuring performance is among the requirements to ensure good port management. In this case, the project and participation in the UNCTAD Port Performance Scorecard programme were essential in achieving the port's strategic vision.

Box 4.3 Digital transformation and scorecards – the Port Authority of Valencia

The success of the digital transformation in logistics chains greatly depends on the ability of various actors, including ports, to collect, aggregate, store, and distribute information. The Port Authority of Valencia's port data management project coordinates the entire data management process in the ports it operates. Its objective is to make the data available to internal processes and third parties. The port data management project lays the foundation for a new value proposition based on data. It incorporates governance mechanisms to ensure a smooth transition towards advanced analytics models and solutions such as Artificial Intelligence and Digital Twins in ports.

Externally, the Port Authority of Valencia manages the port community system (PCS) which provides information connectivity services to around 1,100 companies in the port community. The PCS, key to the competitiveness of the services offered, is a powerful digital platform that transmits information and plays a central role in the digitization process. The PCS is currently evolving to allow its users to share information to different members along the logistics chain.

Internally, implementing a new port management and information system and port collaborative decision making tools will provide comprehensive information about operations and management. It will be further enriched with information from the network of sensors deployed throughout the port (environmental control systems, cameras, etc.) contextualizing port operations.

Measuring performance and following up on strategic plans are fundamental to good port management. The port data management project automates the management of information needed for strategic monitoring.

Box 4.3 Digital transformation and scorecards – the Port Authority of Valencia *(cont.)*

The Port Authority of Valencia has been participating in UNCTAD's Port Performance Scorecard since its inception, as its objectives are aligned with the port authority's vision of the need to monitor its policies and strategies. The Port Performance Scorecard enables ports to bench themselves against other ports and compare performance with international standards. UNCTAD ensures independence and quality for the Port Performance Scorecard programme, making it a key external reference in port monitoring.

The port data management project and participation in the Port Performance Scorecard programme are essential for achieving the strategic vision for 2030, incorporating digitalization and excellence in management.

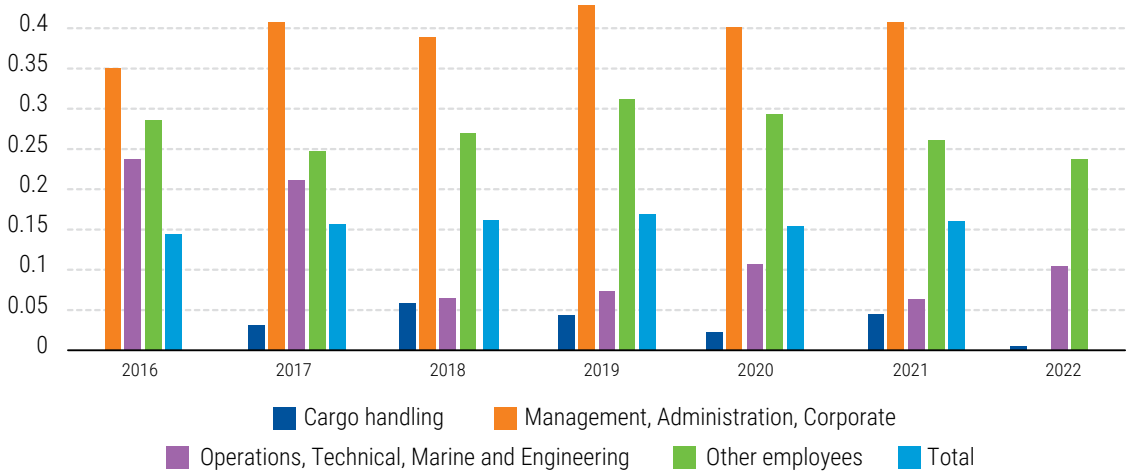
Source: Port Authority of Valencia, June 2023. See also https://www.valenciaport.com.

The need to further promote women in ports

The participation of women in the port industry remains low and little changed year on year. There remains a marked difference between those engaged in management or administrative grades and those more broadly defined as engaged in operations. These median values in figure 4.17 show that participation rates have at best increased by small single percentage points.

There are cases of individual ports and terminals where participation rates are considerably higher, and the range of data points is very large. From a policy perspective, there is a need for actions which support women in the port industry.

Figure 4.17 Women's participation in port workforces, median across all ports, 2016–2022



Source: UNCTAD calculations based on data from port entities reporting to the TrainForTrade Port Performance Scorecard.
Note: Data summarized without applying any methodology for handling missing data.

D. OUTLOOK AND POLICY RECOMMENDATIONS

Outlook

Following decades of long-term positive developments in port performance, the pandemic resulted in a decline in numerous port performance indicators. In response to the logistics challenges, during the pandemic, new initiatives towards digitalization and trade facilitation reforms were introduced, and these seem to be bearing fruit. As the pandemic ended, late 2022 saw many port performance indicators return to a positive trajectory.

Policy recommendations

Port performance

Port performance indicators contribute to transparency in terms of physical and financial operations, which in turn helps policy development and regulation. By providing a standardized framework for measuring and monitoring port activities and outputs, port performance indicators help stakeholders compare ports and identify trends and gaps in efficiency, leading to reliable assessments of how ports may stay competitive and improve performance over time.

- Port communities should improve their data acquisition and management and use port performance indicators, with benchmarks from the entire industry, to gauge where they stand and where there is potential for improvement.

Knowledge and skills

The challenges ports face, especially in the areas of digitalization and decarbonization lead to new demands for capacity building.

- Port managers should receive specialized training to enhance their knowledge and leadership skills, driving digital and decarbonization transformations. This capacity building requires matching budget and resources.

Public-private collaboration

National Trade Facilitation Committees (NTFC), as stipulated in the WTO Trade Facilitation Agreement, and National Maritime Transport Facilitation Committees, as recommended by the IMO Convention on Facilitation of International Maritime Traffic (FAL), represent important public-private-partnership platforms for coordinating and implementing policy reforms to facilitate exports, imports and transit.

- Policy reforms should be based on a close dialogue with the business community and maritime shipping stakeholders, including through national trade facilitation bodies. In countries with both NTFCs and FAL Committees, these should collaborate and coordinate their activities.

Hinterland connectivity

Port performance and throughput are closely linked to hinterland connectivity. Ports and transit countries play an essential role in improving access and connectivity for the trade of landlocked countries, which suffer from geographical and administrative barriers.

- Implementing and establishing transit regimes, corridors, dry ports and other hinterland facilitating measures are crucial to improving port performance, thus further enhancing the attractiveness of ports' connectivity and intermodal potential, both in relation to trans-shipment and transit.

Digitalization and modernization of trade procedures

New technologies provide opportunities for border agencies to simplify and expedite international cross-border trade, while at the same time controlling and securing international trade compliance related to the clearance and release of goods.

- There is a need for activities to promote trust and transparency between involved stakeholders to enable secure and efficient data exchange.
- Cross-border data exchange needs to be interconnected and facilitated between border agencies, with direct input from the private sector. Real-time data platforms need to be established, including trade and maritime Single Windows, as stipulated in the WTO Trade Facilitation Agreement and the IMO FAL Convention.

- Latest technologies and artificial intelligence can help predict and better manage the flows of goods through ports, manage risks and reduce waiting time, hence facilitate trade, increase port performance and reduce its carbon footprint.
- Special attention has to be attached to cybersecurity and business continuity plans in order to minimize risks related to increasing digitalization.

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END NOTES

1 Six components of the LSCI are:

a. The number of scheduled ship calls per week in the country.

b. Deployed annual capacity in 20-foot equivalent units (TEU).

c. The number of regular liner shipping services from and to the country.

d. The number of liner shipping companies that provide services from and to the country.

e. The size in TEU of the largest ships deployed by the scheduled service.

f. The number of other countries that are connected to the country through direct liner shipping services.

2 The index focuses on the elapsed time from when a ship reaches a port to its departure from the berth after having completed its cargo exchange.

3 https://www.worldbank.org/en/news/press-release/2022/05/25/middle-east-container-ports-are-the-most-efficient-in-the-world.

4 https://www.africanews.com/2022/02/17/throughput-growth-in-moroccan-port-tanger-med//.

5 https://www.seatrade-maritime.com/ports/shanghai-retains-worlds-top-container-port-crown-marginal-growth#:~:text=The%20port%20of%20Shanghai%20retains,largest%20container%20port%20in%202022.&text=Last%20year%2C%20container%20volume%20at,port%20for%2014%20consecutive%20years.

6 https://press.spglobal.com/2023-05-18-Chinas-Yangshan-Port-Tops-New-Container-Port-Performance-Index.

7 https://www.statista.com/statistics/1101596/port-turnaround-times-by-country/.

8 The underlying data are provided by S&P Global Market Intelligence. It is the same underlying data that are used by the World Bank to generate the CCPI index on the port level. At UNCTAD, for this *Review*, selected country averages are presented, but without transforming the data into an index.

9 For global time-in-port statistics see UNCTAD stat at http://stats.unctad.org/maritime.

10 Arrival time: The total elapsed time between the vessel's automatic identification system (AIS) recorded arrival at the actual port limit or anchorage (whichever recorded time is the earlier) and all lines fast at the berth (World Bank, 2023a).

5

LEGAL ISSUES AND REGULATORY DEVELOPMENTS

Important legal issues affecting international maritime transport and trade include regulatory developments to facilitate the use of electronic bills of lading and regulatory responses to environmental challenges - notably air pollution from shipping, plastic pollution, marine litter, protecting the marine environment, and biodiversity. In addition, regulatory developments also include adopting a new international convention on the judicial sale of ships and an agreement on the conservation and sustainable use of marine biological diversity in areas beyond national jurisdiction. Also relevant are some developments and considerations relating to liability and compensation for bunker oil pollution from ships. Key ongoing developments under the auspices of IMO and the European Union regarding measures to reduce greenhouse gas emissions from ships, are covered in chapter 3.

A. REGULATORY DEVELOPMENTS MAY FACILITATE THE FUTURE USE OF ELECTRONIC BILLS OF LADING

The use of electronic trade documents, including electronic bills of lading, is increasing and expected to bring a number of benefits. These include faster transactions, lower costs, better financing, cargo holding and document processing, as well as potentially reduced fraud risks due to digital authentication. At the same time, with greater reliance on electronic interactions, stakeholders will also have to manage any associated cyber-risks, an important set of issues which is likely to demand greater attention by policymakers and trade and industry alike, given the increasingly rapid pace at which technology is evolving (see e.g. Thetius, 2022).

The advantages of using electronic equivalents to traditional paper-based documents were highlighted during the COVID-19 pandemic, when traders across jurisdictions experienced extensive legal problems due to delays in the transmission and presentation of paper documents (UNCTAD, 2023a; 2022a; 2022b). To address this issue and avoid the incidence and costly resolution of related legal disputes, the widespread use of electronic alternatives to paper documentation could play a major role. However, any remaining legal and regulatory obstacles to the use of electronic documents in international trade need to be removed.

While progress has been made with the recognition of electronic documentation used for the carriage of goods by air and road (UNCTAD, 2022c), more work remains to be done in the area of electronic alternatives to sea transport documents, particularly the negotiable bill of lading. This key document in international trade is used for the carriage of goods by sea, in particular by containerships (liner transportation), as well as for the international sale of commodities and of containerized goods on CIF (cost, insurance, freight) and FOB (free on board) terms (UNCTAD, 2023a).

Unlike other transport documents, the marine negotiable bill of lading is universally recognized as a *document of title* which provides any lawful holder of the document with the exclusive right to demand delivery of the goods from the carrier in exchange for the original document. As such, it provides traders and banks with independent documentary security and can be traded along a chain of contracts (string sales), enabling the sale of goods in transit (see further UNCTAD, 2003a). Although electronic equivalents to the negotiable bill of lading are increasingly being developed to facilitate paperless trading (UNCTAD, 2023a),[1] in many jurisdictions these do not yet benefit from full legal recognition as equivalent to traditional paper-based documents.[2]

In a major recent development, in July 2023, an important piece of legislation was adopted in the United Kingdom to ensure that electronic trade documents, including electronic equivalents to negotiable bills of lading, are *possessable* and enjoy the same legal status as traditional paper-based documents. With international contracts often subject to English law, by agreement of the parties, the new Electronic Trade Documents Act, 2023 (United Kingdom Parliament, 2023), which received royal assent on 20 July 2023, is expected to significantly boost the use of electronic bills of lading in global trade and reduce delays across global trading networks. In some other jurisdictions (e.g., Singapore, 2021)[3], relevant laws have also been passed based on the UNCITRAL Model Law on Electronic Transferable Records (MLETR), 2017[4] and national policymakers are encouraged to consider relevant adjustments to national legislation, where necessary.

In the meantime, industry associations have been collaborating on developing and adopting relevant standards to facilitate the use of electronic bills of lading. Of interest is also the recent commitment by some of the leading container lines to the exclusive use of electronic bills of lading by 2030 (DCSA, 2023a, 2023b, and 2023c). Electronic bills of lading currently account for only 1.2 per cent of the 45 million bills of lading issued each year by ocean carriers (DCSA, 2023c). Among the reasons for the low usage to date are both legal uncertainties as well as potentially other factors, such as additional costs, concerns by some stakeholders about data confidentiality and limited benefits for some data providers. Switching from the transfer of paper bills of lading has been estimated to potentially save up to $6.5 billion in direct costs for stakeholders and enable $30–40 billion in annual global trade growth (McKinsey, 2022).[5] Depending on the system used, it could also improve environmental sustainability and assist in efforts to reduce greenhouse gas (GHG) emissions, primarily by eliminating the use of paper and avoid delays at ports associated with the late arrival of documents (see chapter 4).

In a related legal development, starting in 2022, work has commenced under the auspices of UNCITRAL Working Group VI on the preparation of a new legal instrument on 'Negotiable Multimodal Transport Documents'. The instrument aims to address the expanding needs of financing in international trade by

establishing the legal recognition of negotiable multimodal transport documents (and relevant electronic records) as documents of title, similar to marine negotiable bills of lading. To achieve that goal, such a document should (a) allow a third party in good faith to rely on all information contained therein, (b) grant the right of control over goods in transit to the holder of such document, and (c) function as the key document for delivery at destination. As to the form of the instrument, the Working Group noted a prevailing preference in favour of an international convention so as to ensure a high degree of uniformity. It was, however, emphasized that a new instrument would need to avoid conflicts with existing international conventions governing carriage of goods (UNCITRAL, 2022). For an overview of the latest discussions in May 2023, see UNCITRAL, 2023.

As part of the preparatory work, concerns were raised by UNCTAD about the need to address any potential implications that may arise in relation to liability issues, given that no international mandatory liability regime is in force for multimodal transport to protect the rights of cargo claimants (see UNCTAD, 2003b). If, as intended, the new legal instrument would ensure full legal recognition of multimodal transport documents (and any electronic equivalents) as negotiable documents of title, these documents could be traded and used for sale of goods in transit under a string of contracts, similar to negotiable bills of lading, with the buyer bearing the risk of loss of or damage to the goods in transit and left to seek redress, if any, from the carrier. Against this background, it will be important to ensure that a final consignee in any cargo claim against the 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 one of the mandatory sea-carriage conventions which are in force internationally (Hague Rules 1924, Hague-Visby Rules 1968/1979, and Hamburg Rules 1978). However, at present, it is not envisaged that liability issues will be addressed as part of the new legal instrument. Organizations representing shippers, consignees and other cargo interests, particularly small and medium-sized enterprises (SMEs) in developing countries, are encouraged to take an active role in the deliberations of UNCITRAL Working Group to make sure their legitimate interests are appropriately reflected and taken into consideration.

B. GROWING IMPORTANCE OF REGULATORY MEASURES UNDER THE AUSPICES OF THE INTERNATIONAL MARITIME ORGANISATION TO COMBAT POLLUTION FROM SHIPS IN THE CONTEXT OF THE 2030 AGENDA

1. MARPOL 1973/1978 – the International Convention for the Prevention of Pollution from Ships is in the spotlight

A robust regulatory framework to protect the environment from the impact of shipping is critical for the effective implementation of the 2030 Agenda for Sustainable Development and its 17 interconnected Sustainable Development Goals, in particular affordable and clean energy (Goal 7); industry, innovation and infrastructure (Goal 9); climate action (Goal 13); sustainable use of the oceans, seas and marine resources (Goal 14); and related partnerships (Goal 17). This is reflected in the theme of the International Maritime Organization's 2023 World Maritime Day, *MARPOL at 50 – Our commitment goes on*. It spotlights the International Convention for the Prevention of Pollution from Ships (MARPOL 73/78), which covers prevention of pollution of the marine environment by ships from operational or accidental causes.

MARPOL is considered one of the most important legal instruments relating to international shipping, complementing SOLAS 1974, STCW 1978 and MLC 2006. MARPOL Technical Annexes I and II, which address pollution by oil and noxious liquid substances in bulk are mandatory for all Contracting States to MARPOL, covering 98.89 per cent of the global fleet. Four further technical Annexes to MARPOL addressing pollution by harmful substances in packaged form carried by sea (Annex III), sewage (Annex IV), garbage (Annex V) and air pollution from ships (Annex VI) also apply to the vast majority of the world's fleet (respectively 98.54, 96.66, 98.6 and 96.81 per cent of the global fleet, as of 31 July 2023).[6] Given the growing urgency of the climate crisis, key ongoing developments under the auspices of IMO include measures to reduce GHG emissions from ships and increase energy efficiency, a set of issues which is also at the heart of some regulatory developments at the European Union level, that may have implications for extra-European trade. Relevant regulatory developments are covered in chapter 3.

2. International Maritime Organisation adopts additional measures to reduce air pollution from ships – MARPOL Annex VI

a) Sulphur oxides (SOx) – Regulation 14

Limiting SOx emissions from ships is important for improving air quality and protecting human health and life as well as the environment. In December 2022, amendments to MARPOL Annex VI were adopted, which designate the whole of the Mediterranean Sea as a new Emission Control Area for Sulphur Oxides (SOx-ECA) and particulate matter (IMO, 2022a, Annex 3). The other four designated SOx-ECAs are: the Baltic Sea area; the North Sea area; the North American area (covering designated coastal areas off Canada and the United States); and the Caribbean Sea area around Puerto Rico and the United States Virgin Islands. The latest amendments will enter into force on 1 May 2024, with the new sulphur limit taking effect from 1 May 2025. As from that date, ships entering the Mediterranean will have to comply with more stringent controls on SOx emissions – with a limit for sulphur in fuel oil used on board ships of 0.10 per cent, while outside these areas the limit is 0.50 per cent (see also Safety4Sea, 2023).

To conform with the regulation, three major options are available: a) Switching to fuels with low or no sulphur content, such as low sulphur fuel oil (LSFO) and liquefied natural gas (LNG); b) Installing exhaust gas treatment systems (scrubbers) and continuing to use conventional high sulphur fuel; and c) Consuming less fuel, for example by improved energy efficiency, and consequently, emitting less SOx. For information on the implementation of the global 0.50 per cent sulphur limit, see IMO, 2023a.

b) Nitrogen oxides (NOx) – Regulation 13

Nitrogen oxides are produced from fuel combustion and can be harmful to human health, in particular the respiratory system. The NOx emissions control requirements under MARPOL Annex VI have become steadily stricter over the last two decades (IMO, 2021a). Different levels (Tiers) of control apply based on the ship construction date. The strictest regulation, Tier III entered into force in 2016, but only applies for designated emission control areas. Outside such areas, the Tier II controls apply.

Proposals have been recently considered at IMO regarding the use of biofuels and biofuel blends and compliance with NOx regulations. Following approval in June 2022 of a unified interpretation of regulation 18.3 of MARPOL Annex VI facilitating a NOx compliance process for blends up to 30 per cent of biofuels, in December 2022 the Marine Environment Protection Committee (MEPC) agreed to expand this approach to synthetic drop-in fuels (e.g. e-methanol, e-ammonia, etc.), thus facilitating their use as low and zero carbon fuels (IMO, 2022a).

3. Other measures to protect the marine environment and biodiversity focus on marine litter and plastics, ballast water and anti-fouling paints

a) Marine litter and plastic pollution

Other amendments to MARPOL Annex V adopted in December 2022 make the Garbage Record Book a mandatory requirement for ships of 100 gross tonnage (GT) and above but less than 400 GT (IMO, 2022a, Annex 2). This supports the achievemen of Goal 14 on the oceans, by facilitating enforcement, and the IMO strategy to address marine plastic litter from ships (IMO 2021b, Annex 2), which sets out a number of outcomes as key goals: reduction of marine plastic litter generated from, and retrieved by, fishing vessels; reduction of shipping's contribution to marine plastic litter; and improvement of the effectiveness of port reception and facilities and treatment in reducing marine plastic litter. In July 2023, MEPC also considered options for reducing the environmental risk associated with the maritime transport of plastic pellets, with a view to developing amendments to appropriate mandatory instruments at future sessions. This risk has been highlighted by incidents, including that of the container ship, *X-Press Pearl* in 2021, during which 11,000 tons of plastic pellets were spilled off the shore of Sri Lanka, when the ship caught fire. MEPC also considered draft amendments to MARPOL Annex V to facilitate and enhance reporting of the accidental loss or discharge of fishing gear (IMO, 2023b).

b) Ballast water management

Among the greatest threats to the world's oceans is the discharge of untreated ballast water by ships. This is associated with the introduction of invasive species, with important repercussions for public health, marine ecosystems, biodiversity, fisheries and the conservation and sustainable use of marine genetic resources. In December 2022, MEPC considered various proposals for amendments, unified interpretations of, and operational measures affecting the implementation of the International Convention for the Control and Management of Ships' Ballast Water and Sediments 2004,[7] as well as approval of ballast water management systems (IMO, 2022a, Annex 6 and 7). Draft amendments to Appendix II of the Ballast Water Management Convention concerning the form of the Ballast Water Record Book, which are expected to enter into force on 1 February 2025 were also adopted (IMO, 2023b, Annex 2). It also discussed a number of matters relating to the implementation of the Convention, with the main outcomes reflected in IMO, 2023b, Annex 3–7.

c) Revision of the Anti-fouling Systems Convention

To support the implementation of the International Convention on the Control of Harmful Anti-fouling Systems on Ships 2001,[8] which prohibits the use of harmful organotins in anti-fouling paints used on ships and establishes a mechanism to prevent the potential future use of other harmful substances in anti-fouling systems, in June 2022, revised guidelines were adopted that relate to brief sampling, inspection, survey and certification of anti-fouling systems on ships (IMO, 2022b, Annex 19–21). This follows earlier amendments in June 2022, to include controls on the biocide cybutryne, which entered into force on 1 January 2023. In July 2023, MEPC adopted the revised Guidelines for the control and management of ships' biofouling to minimize the transfer of invasive aquatic species (IMO, 2023b, Annex 17). This followed a comprehensive review of the existing guidelines initially adopted in 2011, with the aim of expanding and updating the previous version, taking into account best practices and experience as well as the latest research.

C. OTHER LEGAL AND REGULATORY DEVELOPMENTS AFFECTING TRANSPORTATION IN 2023 AND BEYOND

1. Liability and compensation for bunker oil pollution from ships – new claims manual omits information which is critical for claimants

The availability of adequate liability and compensation for oil pollution from ships' bunkers (i.e. fuel oil) is important from a public policy perspective and critical for those affected by the devastating environmental and economic impacts of bunker oil pollution, in particular vulnerable small island developing States (SIDS) (see UNCTAD, 2020a; Maritime Executive, 2022). With a growing number of ship-to-ship oil transfers, a practice which increases the risk of maritime accidents and was raised as a matter of concern at the IMO Legal Committee and MEPC (IMO, 2023c, 2023d), and with ever larger vessel sizes, global risks of bunker oil pollution are on the rise. However, liability and compensation under the main international legal regime, the International Convention on Civil Liability for Bunker Oil Pollution Damage, 2001,[9] may be limited in accordance with "any applicable national or international regime, such as the Convention on Limitation of Liability for Maritime Claims (LLMC), 1976, as amended" (art. 6). Liability limits under the latest and most modern international limitation of liability regime - the 1996 LLMC Protocol - were last revised more than a decade ago, in 2012. As a result, the overall amount of liability and compensation available for bunker oil pollution damage is low,[10] varies depending on the limitation regime in question, ship size, and competing claims, and is difficult to ascertain for claimants (see UNCTAD, 2022c).

In 2023, the IMO Legal Committee approved a 'Claims Manual for the International Convention on Civil Liability for Bunker Oil Pollution Damage, 2001' (IMO, 2023e; IMO, 2023f), which primarily focuses on the settlement of claims outside a formal legal process, as well as a short informational pamphlet on the Bunkers Convention (IMO, 2023e, Annex 2). Unfortunately, neither the pamphlet nor the 27-page Claims Manual include any references to the Articles of the Convention. These are authoritative in respect of the parties' substantive rights and obligations, with interpretation and application of provisions a matter for the competent national courts. This may give rise to misconceptions regarding key issues which are not detailed in the Manual, such as the various parties covered by the definition of 'shipowner' (art. 1(2)) and their joint and several liability. Moreover, the Claims Manual fails to provide information on a number of critical issues for claimants, some of which had been highlighted earlier by UNCTAD (IMO, 2022c, Annex 5), but were not included. Concerns about the Claims Manual were also expressed by some delegations (IMO, 2023e, at para. 8.7) as well as by a distinguished academic expert, who noted that the Claims Manual "reads like a document saying what insurers and shipowners are prepared to pay".[11]

Critical issues that are not mentioned include the time limits for the institution of legal proceedings (art. 8) and exclusions (art. 4), notably the fact that bunker oil spills from a range of ships constructed or adapted for the carriage of oil as cargo (see IOPC Funds, 2016) are not governed by the Bunkers Convention, but by the much more substantive two-tier liability and compensation regime in the International Convention on Civil Liability for Oil Pollution Damage (CLC) 1992 and the International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage (FUND) 1992 (with claims administered by a statutory body, the IOPC Funds).[12] Of major importance in this context are both the text of the relevant provisions in the different Conventions, as well as highly pertinent case-law, such as the important *Bow Jubail* litigation in the Kingdom of the Netherlands, which is particularly favourable to the rights of claimants,[13] neither of which is reflected in the Claims Manual. Also missing is relevant information about limitation of liability under the LLMC 1976 as amended by its 1996 Protocol, such as the operation of a limitation fund, competing claims, and available limitation amounts, as well as the possibility for Contracting States to the LLMC Protocol 1996 to enter a reservation regarding claims under art. 2(1) (d) and (e) of the LLMC 1976, *at any time* (art. 7), an issue highly pertinent to the final amount of compensation available to claimants.[14]

Significant omissions in the two documents approved by the IMO Legal Committee may potentially result in an incomplete and/or inaccurate understanding by stakeholders with limited specialist legal expertise, particularly as the IMO Conventions texts are not publicly accessible on the IMO website, an issue that is under active consideration by the IMO Council, in its Working Group on Council Reform (IMO, 2023e, para. 17.6 and Annex 10). Against this background, claimants and their legal advisers, as well as judges, should exercise caution in relying on the Claims Manual and are strongly advised to always consult the authoritative text of the Convention[15] as well as any pertinent case-law and academic

writing, as appropriate. Policymakers from coastal developing countries and SIDS, which are at growing risk of bunker oil pollution and particularly vulnerable to its wide-ranging environmental and economic consequences, are encouraged to actively engage in further work on related legal issues at IMO to ensure that compensation for oil pollution damage remains adequate.

2. Combating fraudulent registration and registries of ships is an increasingly urgent issue for the global community

Fraudulent registration and fraudulent registries of ships undermine the very foundation of the overall regulatory regime for shipping and pose major risks in terms of marine pollution, maritime safety, security and claims. A study group including UNCTAD, the World Maritime University (WMU) and the International Marine Law Institute (IMLI) was established by the IMO Legal Committee in March 2022 (for terms of reference, see IMO, 2022c, Annex 2), to prepare a study considering related issues and possible measures to prevent them. An interim report by the study group was considered in March 2023 (IMO, 2023g), and the final findings are expected to be presented in 2024. Given the low rate of participation in a survey as part of the study to date (only 31 registries, accounting for 22.75 per cent of the world fleet, responded), the relevant questionnaire will be recirculated with a number of additional questions and member States are encouraged to take part in the study.

In addition, there was broad support to create a database for flag States and port States to share information on fraudulent registration and fraudulent registries of ships, as well as to develop methods for validating the authenticity of ship certificates. It was also agreed that more information on the fraudulent use of the IMO number scheme, including how widespread the problem was and whether there were loopholes in the system, should be provided (IMO, 2023e).

3. The Beijing Convention on the International Effects of Judicial Sales of Ships – set to enhance legal certainty

The United Nations Convention on the International Effects of Judicial Sales of Ships (United Nations, 2022), negotiated under the auspices of UNCITRAL, was formally adopted by the United Nations General Assembly on 7 December 2022. The Convention will enhance legal certainty by creating a uniform regime for the international effects of judicial sales of ships. Its entry into force is expected to provide legal protection for purchasers of ships sold by judicial sale, while safeguarding the interests of shipowners and creditors. Unlike the International Convention on Maritime Liens and Mortgages, 1993, which deals with judicial sale of ships in its art. 11 and 12,[16] the Convention does not address the question as to whether a judicial sale confers clean title, which is left to the law of the State of judicial sale. However, a key provision is contained in art. 6 of the new Convention, which states: “A judicial sale for which a certificate of judicial sale… has been issued shall have the effect in every other State Party of conferring clean title to the ship on the purchaser.” Thus, a clean title acquired by the purchaser in the ship will be recognized internationally, while a certificate of judicial sale is only to be issued if certain safeguards are met, including notification of the shipowner, creditors, and other interested parties (art. 5).

IMO will serve as the repository for notices and certificates of judicial sales under the Convention (art. 11), using the Global Integrated Shipping Information System (GISIS). The Convention will be opened for signature in Beijing in September 2023 and will enter into force 180 days after the date of the deposit of the third instrument of ratification, acceptance, approval or accession. The Secretary-General of the United Nations is designated as its depositary (art. 16 and 21). All UNCTAD Member States are encouraged to consider early ratification of the Convention to ensure its speedy entry into force.

4. Landmark agreement reached on a legally binding instrument on the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction

The resumed fifth session of the Intergovernmental Conference on an international legally binding instrument under the United Nations Convention on the Law of the Sea on the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction, met from 20 February to 3 March 2023. While a draft was agreed at the session, the Agreement was formally adopted by consensus at a further resumed session, on 19 June 2023, and will be open for signature from September 2023 (United Nations, 2023). It will enter into force 120 days after the date of deposit of the sixtieth instrument of ratification, approval, acceptance or accession.

The Agreement covers and has implications for the following key areas: access and use of marine genetic resources, including benefit sharing aspects (art. 11–16); establishment and implementation of area-based management tools, including marine protected areas (art. 17–26); environmental impact assessments which will allow the identification and evaluation of potential impacts of planned activities (art. 27–39); and capacity-building to develop scientific knowledge and the transfer and sharing of marine technology (art. 40–46).

If and when the Agreement enters into force, it is expected to close an important gap in ocean governance by providing a legal framework to enhance the conservation and sustainable use of marine biodiversity in areas beyond national jurisdiction, and encourage related international cooperation. While shipping is not the main focus of the Agreement, which is primarily aimed at strengthening the regulation of access and use of marine genetic resources, the treaty will bolster efforts to make maritime transport more sustainable, as international shipping is one of the main economic activities on the high seas. Effective implementation and enforcement of the existing international legal framework for controlling pollution from shipping will potentially become more important. Implementation of the Agreement is likely to lead to the establishment of new area-based management tools, including marine protected areas on the high seas and the potential opening of new shipping routes, and may require further regulatory measures to give effect to environmental considerations affecting such routes (UNCTAD, 2023b). Given the large number of ratifications (60) needed to bring the Agreement into force internationally, speedy ratification by all UNCTAD member States is strongly encouraged.

5. Regulation of Maritime Autonomous Surface Ships underway

Building and operating fully autonomous oceangoing ships, which could offer higher levels of safety and efficiency for the maritime sector, are still facing technical, security, cybersecurity, and infrastructure challenges, and have a long way to go. However, increased levels of automation are gradually being achieved by commercial vessels of all sizes. At the international level, work has commenced on the development of a non-mandatory Code, regulating the operation of maritime autonomous surface ships (MASS) to be adopted in the second half of 2024, and to be potentially followed by a mandatory code (IMO, 2022d). The joint IMO Maritime Safety, Legal and Facilitation Committees Working Group, established as a cross-cutting body to address common high-priority issues identified by the regulatory scoping exercises for the use of MASS conducted by the three Committees, held its first two sessions in September 2022 (IMO, 2022e), and April 2023 (IMO, 2023h). The Joint Working Group has developed a table, to be continuously updated, which identifies preferred options for addressing common issues, including: the role, responsibilities and competencies required for MASS master and crew as well as the identification and meaning of the term “remote operator” and their responsibilities (IMO, 2023h). Another session of the Joint Working Group is set to be held later in 2023.

D. STATUS OF CONVENTIONS

A number of international conventions in the field of maritime transport were developed and/or adopted under the auspices of UNCTAD. During the current reporting period, the status of the International Convention on Maritime Liens and Mortgages, 1993 has changed, with two additional accessions (Barbados and Côte d'Ivoire) in February 2023.[17]

E. OUTLOOK AND POLICY RECOMMENDATIONS

Regulatory developments to facilitate the use of electronic bills of lading

Following some jurisdictions where laws have already been passed based on the UNCITRAL Model Law on Electronic Transferable Records (MLETR), legislation has been adopted in the United Kingdom to ensure that electronic trade documents, including electronic equivalents to negotiable bills of lading, are 'possessable' and enjoy the same legal recognition status as traditional paper-based documents. This development is of considerable practical interest, as contracts for the international sale of goods are often subject to English law by agreement of the parties. The legislation could provide a significant boost to the use of electronic equivalents to traditional paper bills of lading and reduce problems related to delay in transmission of documents and associated delays in ports.

- Policymakers are encouraged to take note of recent regulatory developments that ensure the full legal recognition of electronic bill of lading equivalents and, as appropriate, consider relevant changes to their national legislation.
- With greater reliance on electronic interactions, stakeholders will also have to effectively manage any associated cyber-risks, an important set of issues which is likely to demand greater attention by policymakers and trade and industry stakeholders alike, given the increasingly rapid pace at which technology is evolving.

Development of a new legal instrument on 'Negotiable Multimodal Transport Documents' underway under the auspices of UNCITRAL

Work is underway under the auspices of UNCITRAL Working Group VI on the preparation of a new legal instrument on 'Negotiable Multimodal Transport Documents' which aims to address the expanding needs for financing in international trade by establishing the legal recognition of negotiable multimodal transport documents (and electronic records) as documents of title, similar to marine negotiable bills of lading. In this context it will be important to ensure that a final consignee in any cargo claim against the 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 the mandatory sea-carriage conventions which are in force internationally. However, at present, it is not envisaged that liability issues will be addressed as part of the new legal instrument.

- All stakeholders are encouraged to take an active interest in the work under the auspices of UNCITRAL WG VI to ensure the legal instrument currently being developed will be fit for purpose and commercially acceptable.

Liability and compensation for oil pollution damage from bunker oil spills - an issue of particular importance for vulnerable developing coastal States and SIDS

The availability of adequate liability and compensation for ship-source oil pollution is important from a public policy perspective and critical for those affected by the devastating environmental and economic impacts that oil spills can have, including those from a ship's bunkers (i.e. ship fuel). This includes claimants in vulnerable coastal developing States and SIDS. However, limits of liability for bunker oil pollution damage under the LLMC 1976 as amended in 1996 were last revised in 2012 and are much lower than the limits applicable in cases of oil spills from tankers. In 2023, the Legal Committee of IMO adopted a Claims Manual on the Bunkers Convention 2001, the international legal instrument governing liability and compensation for bunker oil pollution, which has been issued as a Circular. However, in the light of concerns highlighted in this chapter, claimants and their legal advisers should exercise caution in relying on the Manual alone and should always consult the authoritative text of the Convention as well as potentially relevant case-law and academic writing.

- Policymakers from coastal developing countries and SIDS, which are at growing risk of bunker oil pollution and particularly vulnerable to its wide-ranging environmental and economic consequences, are encouraged to actively engage in further work on related legal issues at IMO with a view to strengthening the position of claimants and ensuring that these receive adequate compensation for any losses sustained.

- Contracting States to the LLMC Protocol 1996 are encouraged to exercise their right under art. 7 to enter a reservation, at any time, regarding claims under art. 2(1) (d) and (e) of the LLMC 1976, as this may significantly affect the final amount of compensation available to claimants.
- As part of regulatory efforts to implement the internationally agreed policy commitment reflected in Goal 14, policymakers are encouraged to consider the need for a review of the international legal framework for liability and compensation in cases of bunker oil pollution from ships, so as to reduce the incidence of accidental and operational spills and ensure that adequate levels of compensation are available to claimants.

Adoption of the Beijing Convention on the International Effects of Judicial Sales of Ships – set to enhance legal certainty

The United Nations Convention on the International Effects of Judicial Sales of Ships was adopted by the General Assembly in December 2022, and will be opened for signature in September 2023. It is expected to provide legal protection for purchasers of ships sold by judicial sale, while safeguarding the interests of shipowners and creditors. Three ratifications are required for the entry into force of the Convention.

- All UNCTAD member States are encouraged to consider early ratification of the Convention to ensure its speedy entry into force.

Adoption of a landmark agreement on the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction

Following many years of negotiations, on 19 June 2023, the Agreement under the United Nations Convention on the Law of the Sea on the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction was adopted by consensus. The Agreement will be open for signature from September 2023 and requires 60 ratifications to enter into force. If and when the Agreement enters into force, it is expected to close an important gap in ocean governance by providing a legal framework to enhance the conservation and sustainable use of marine biodiversity in areas beyond national jurisdiction and encourage related international cooperation. While shipping is not the main focus of the Agreement, the treaty will bolster efforts to make maritime transport more sustainable, as international shipping is one of the main economic activities on the high seas. The implementation of this Agreement is likely to lead to the establishment of new area-based management tools, including marine protected areas on the high seas with potential implications for shipping routes and may require further regulatory measures to give effect to environmental considerations affecting such routes.

- Early and widespread ratification of the new treaty will be critical. Given the large number of ratifications (60) needed to bring the Agreement into force internationally, speedy ratification by all UNCTAD Member States is strongly encouraged.

Work underway to address fraudulent ship registers/registration and regulate maritime autonomous surface ships

Among other relevant developments, work is underway by a study group established by the IMO Legal Committee to help address fraudulent registration and registries of ships, including increasing relevant communications and transparency, which has become a matter of growing urgency and priority.

As regards Maritime Autonomous Surface Ships (MASS), work is ongoing by a Joint IMO Working Group to identify and update preferred regulatory options for addressing common issues, including role, responsibilities and competencies required for MASS master and crew; identification and meaning of term “remote operator” and their responsibilities. A non-mandatory Code, regulating the operation of maritime autonomous surface ships (MASS) is expected to be adopted in the second half of 2024, to be potentially followed by a mandatory code.

- The regulatory work under the auspices of IMO on MASS is important to ensure that for all levels of ship automation security, safety of navigation and environmental protection objectives are effectively implemented. All public and private stakeholders are encouraged to play an active part in this work.
- Against a background of increasing ship-automation, appropriate consideration should also be given to the development of effective measures to protect against related cyber-risks.

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END NOTES

1 Electronic trading systems approved by the International Group of P&I Clubs (IG) include Bolero and the EssDOCS systems in 2010, the e-titleTM system in 2015, the Global Share S.A. edoxOnline, WAVE-BL98 and CargoX99 in 2020. Three further systems were recently added: IQAX Ltd and Secro were approved in 2022. TradeLens eBL was approved in 2021, but the TradeLens platform has since been discontinued, as it had "not reached the level of commercial viability necessary to continue work and meet the financial expectations as an independent business" (see Maersk, 2022).

2 In this context it is worth highlighting that traditional paper-based negotiable bills of lading – which unlike other transport documents need to be presented to the carrier in exchange for the goods - should only be used when a document of title is required, i.e. when sale of goods in transit is envisaged or independent documentary security is a material consideration. In other cases, contracting parties should consider opting for non-negotiable alternatives, such as sea waybills in paper or electronic form, which do not need to be presented (UNCTAD, 2003a).

3 For an overview of developments in other jurisdictions, see Global Trade Review, 2022a, 2022b; Insurance Marine News, 2023.

4 UNCITRAL Model Law on Electronic Transferable Records. Available at https://uncitral.un.org/sites/uncitral.un.org/files/media-documents/uncitral/en/mletr_ebook_e.pdf. According to UNCITRAL, legislation based on or influenced by the Model Law has been adopted in 7 States and a total of 7 jurisdictions, see https://uncitral.un.org/en/texts/ecommerce/modellaw/electronic_transferable_records/status.

5 The change introduced by the adoption of the new Electronic Trade Documents Act, 2023 in the United Kingdom has been estimated to add over £1 billion to the United Kingdom economy over the next decade by making trade more straightforward, efficient and sustainable (United Kingdom Government, 2023).

6 For the latest status of ratifications, see https://www.imo.org/en/About/Conventions/Pages/StatusOfConventions.aspx, or https://gisis.imo.org/Public/ST/Treaties.aspx. For an Index of MEPC Resolutions and Guidelines related to MARPOL Annex VI, see https://www.imo.org/en/OurWork/Environment/Pages/Index-of-MEPC-Resolutions-and-Guidelines-related-to-MARPOL-Annex-VI.aspx#1.

7 The Convention entered into force on 8 September 2017, and as of 31 July 2023 had 95 Contracting States covering 92.41 per cent of the global fleet.

8 The Convention entered into force on 17 September 2008, and as of 31 July 2023, had 95 Contracting States covering 96.12 per cent of the global fleet.

[9] The Convention entered into force on 21 November 2008 and as of 31 July 2023 has 105 Contracting States covering 95.20 per cent of the global fleet. See https://wwwcdn.imo.org/localresources/en/About/Conventions/StatusOfConventions/Status%202023.pdf. For the text of the Convention, see for instance https://www.gov.uk/government/publications/international-convention-on-civil-liability-for-bunker-oil-pollution-damage-2001.

[10] In some cases by more than an order of magnitude than liability and compensation available under a specialist legal regime which governs liability and compensation in cases of (bunker) oil pollution damage from ships 'constructed or adapted for the carriage of oil in bulk as cargo', see fn. 11 and 12. See also UNCTAD, 2012; UNCTAD, 2020b.

[11] See Gaskell, N. (2022) at p. 14, commenting on the final draft as adopted at LEG 110: "Interestingly, the Claims Manual has a section on limitation, but seemingly from a shipowner's perspective. The draft presented reads like a document saying what insurers and shipowners are prepared to pay. There is no attempt to highlight how low the limits might be in some cases, e.g. by way of examples of different types of ship under e.g. LLMC 1976 or 1996, or how vulnerable States may be with a limitation fund that may have to be shared with claimants (e.g. collision claimants, or cargo owners). Although member States have been able to comment on the Manual, there is no doubt that the proposal is being driven by shipowners and insurers in IMO; by contrast, the IOPC Claims Manual is produced by the separate IOPC Fund—a body that was specifically set up by States to pay claims, unlike the approach of most insurers which is to minimise payments. The draft highlights none of the nuances or difficulties of bunker claims, nor does it give practical advice to claimants about being caught by time bars. It seems as if parts of this draft are a 'uniform interpretation' in disguise and may be rushed through in 2023 with relatively little critical oversight from the perspective of victims, or commitment to revision".

[12] See https://www.iopcfunds.org/. The International Convention on Civil Liability for Oil Pollution Damage (CLC), 1992; International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage (FUND), 1992; and Protocol of 2003 to the International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage, 1992. See also art. 4 (1) of the Bunkers Convention which states: "This Convention shall not apply to pollution damage as defined in the Civil Liability Convention, whether or not compensation is payable in respect of it under that Convention". Regarding the types of ships covered, see art. 1.1 of the CLC and art. 1.2 of the FUND Convention; for related guidance, see IOPC Funds, 2016.

[13] The litigation concerned a dispute about the applicable liability regime in a case involving a bunker oil spill from an oil and chemical carrier, *The Bow Jubail* (23 196 GT), that was in ballast (i.e. unladen) at the time of the incident. In March 2023, the Dutch Supreme Court confirmed the earlier decisions of the court of first instance and Court of Appeal and found that liability was to be determined under the 1992 CLC and FUND Conventions (and the 2003 Supplementary Fund Protocol, to which the Netherlands is a Party, with an overall liability limit of 750 million SDR), rather than under the Bunkers Convention and LLMC 1976 as amended by the 1996 Protocol, according to which liability for a ship of the relevant size is capped at just over 14,3 million SDR. (IOPC Funds, 2023).

[14] See art. 2(1): "(d) claims in respect of the raising, removal, destruction or the rendering harmless of a ship which is sunk, wrecked, stranded or abandoned, including anything that is or has been on board such ship"; "(e) claims in respect of the removal, destruction or the rendering harmless of the cargo of the ship".

[15] For the full text of the Bunkers Convention, see, for instance https://www.gov.uk/government/publications/international-convention-on-civil-liability-for-bunker-oil-pollution-damage-2001.

[16] The International Maritime Liens and Mortgages Convention 1993, adopted under the joint auspices of UNCTAD and IMO, entered into force internationally on 5 September 2004, and currently has 21 Contracting States. The text is available at https://unctad.org/system/files/official-document/aconf162d7_en.pdf. For official status information, see https://treaties.un.org.

[17] For additional information, see https://unctad.org/topic/transport-and-trade-logistics/policy-and-legislation/international-maritime-transport-law. For official status information, see https://treaties.un.org.

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