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KEY POINTS

- Shipping carries over 80 per cent of world merchandise trade by volume and generates 3 per cent of global greenhouse gas emissions that, without timely decarbonization action, are expected to grow in tandem with growth in maritime transport and trade.
- Uncertainty regarding the type and availability of fuels in future and the scope of regulatory measures are delaying investment in the required low-carbon fuels and the shipping fleet.
- Shipping cannot decarbonize on its own; enhanced collaboration among key stakeholders from within and outside the maritime transport sector is crucial.
- Significant investments in ships and alternative fuelling infrastructure are required and are likely to generate transition costs affecting all economies, particularly the least developed countries and small island developing States, which already face relatively higher shipping costs and will need to deal with increased maritime logistics costs.
- An economic measure in the form of a levy on fuels or a carbon price can help make alternative fuels more competitive, provide certainty to investors and generate funds that can support a green and just energy transition in shipping.

An equitable and just transition to low-carbon shipping

The twenty-eighth session of the Conference of the Parties to the United Nations Framework Convention on Climate Change provides an opportunity to assess progress in decarbonization efforts in the shipping sector and adds further momentum to carbon reduction actions. As noted in this policy brief, taking swift measures to reduce the carbon footprint of this sector is instrumental, given the economic role of the sector and the potential for the current carbon footprint to grow in tandem with global economic growth and trade expansion.[1]

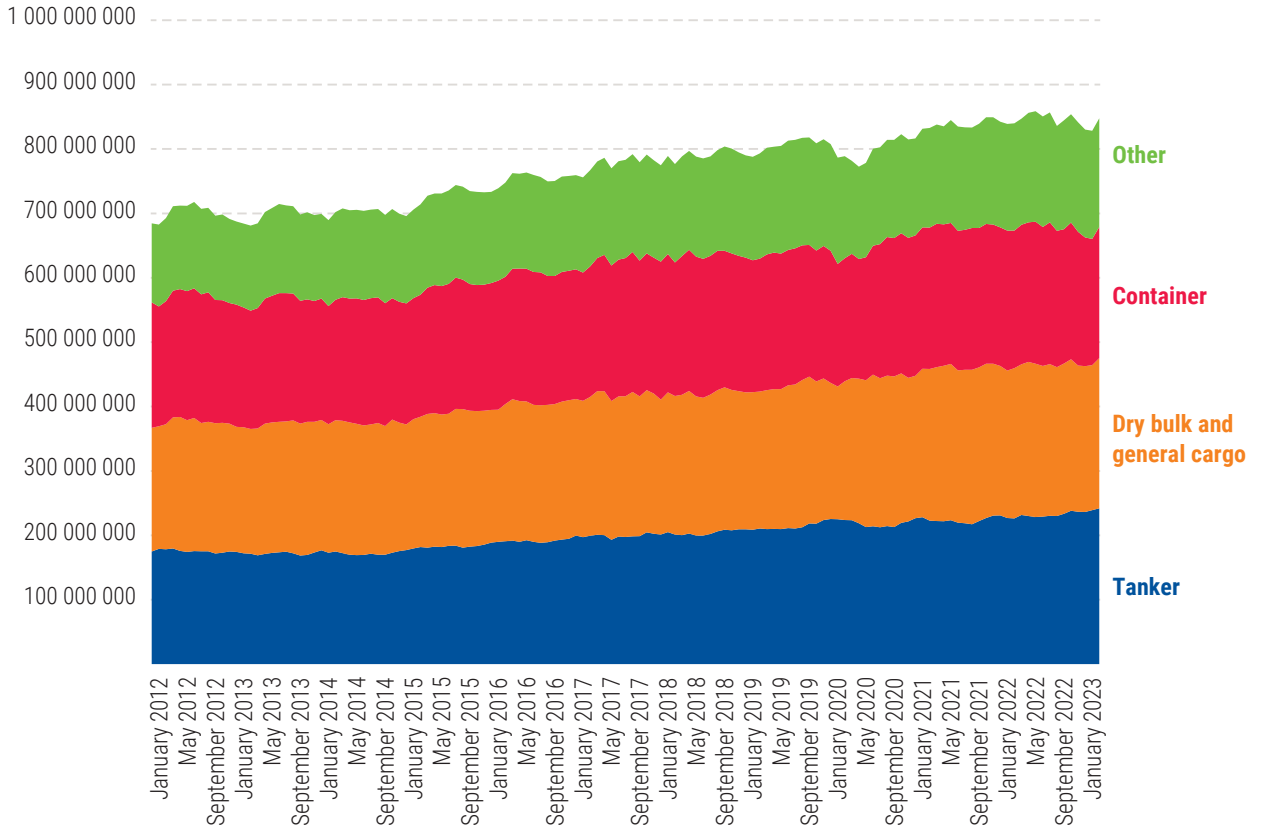
[1] This policy brief builds on the findings in chapter 3 of UNCTAD, 2023, *Review of Maritime Transport 2023* (United Nations publication, Sales No. E.23.II.D.23, Geneva), available at https://unctad.org/publication/review-maritime-transport-2023.

Note: All websites referred to in footnotes were accessed in November 2023.

Taking stock of decarbonization efforts in shipping

Shipping connects world economies and underpins global supply chains, with over 80 per cent of the world's merchandise trade by volume transported by sea. About 40 per cent of seaborne trade volume is made up of energy-related commodities, including coal, oil and gas. The sector contributes around 3 per cent of global greenhouse gas emissions. Emissions per cargo unit and per distance travelled (ton-mile) have declined in recent years, partly due to economies of scale, yet the total global emissions of the sector have increased by 20 per cent in the past decade (see figure).

Shipping: Global carbon dioxide emissions by main vessel type
(Tons)



Source: UNCTAD, 2023.

Greenhouse gas emissions from shipping are the focus of ongoing negotiations at the International Maritime Organization, the United Nations agency responsible for regulating many aspects of international shipping. In 2023, the International Maritime Organization adopted a revised strategy on reduction of greenhouse gas emissions from ships, aimed at reaching net-zero emissions from international shipping by or around 2050 and including levels of ambition with regard to the adoption of zero or near-zero emission technologies, fuels and/or energy sources. The goal is for the uptake of zero or near-zero emission technologies, fuels and/or energy sources to represent at least 5 per cent, striving for 10 per cent, of the energy used by international shipping by 2030. At present, negotiations at the International Maritime Organization are focused on candidate midterm reduction measures that comprise a technical element, namely a goal-based marine fuel standard regulating the phased reduction of the greenhouse gas intensity of marine fuel, and an economic element, on the basis of a maritime greenhouse gas emissions pricing mechanism.[2]

Fuel transition in shipping at infancy stage, but progress is under way

The shipping industry requires a portfolio of measures to align with global emissions reduction targets, including intervention measures affecting operations (e.g. route optimization, vessel speed, maintenance), fleet design, propulsion, engines, fuels and infrastructure for alternative fuel bunkering supplies. The use of fossil fuels in shipping needs to be replaced as soon as possible with alternatives that do not emit greenhouse gas emissions across their entire life cycle (well-to-wake). However, at present,

[2] See https://www.imo.org/en/OurWork/Environment/Pages/2023-IMO-Strategy-on-Reduction-of-GHG-Emissions-from-Ships.aspx.

there is no readily available, one-size-fits-all fuel solution, and the transition to the use of low-carbon or zero-carbon alternative fuels remains in the early stages, with 98.8 per cent of the fleet still using fossil fuels. However, 21 per cent of vessels ordered by shipowners in 2022 are expected to operate using cleaner alternatives such as liquefied natural gas, methanol and hybrid technologies. Liquefied natural gas dual fuel remains the most popular choice, but is viewed as a "transition fuel" while more long-term, sustainable alternatives are sought.

Hydrogen, ammonia and methanol are being explored as potential alternative fuels. Each has its merits but also its drawbacks, such as the cost of production and the high pressures required to store hydrogen and the potential toxicity of ammonia. Risks and drawbacks need to be better understood and mitigated, and training will be required for seafarers and others, to ensure the safe handling of such new fuels. The use of biofuels has also been gaining traction, as it offers the advantage of not requiring major engine modifications. However, estimates of the greenhouse gas emissions from the use of pure biofuel compared with the use of standard fuels may not be accurate, since biofuels used by ships are generally blended with a high proportion of traditional fuels. There are also concerns about the sustainable production of biofuels, since they may be sourced from agricultural crops used for food and for animal feed.

The availability of fuels and bunkering facilities remains a key issue with regard to all alternative fuel options. Low-carbon and zero-carbon fuels are less energy intensive than fossil fuels and ships are therefore expected to bunker more frequently. At the same time, port authorities may be hesitant to invest in storage and supply facilities until there is greater certainty about which fuels will be required, with the likelihood that ports will be expected to provide more than one fuel type.

Headwinds to decarbonization efforts in shipping: Transition costs and regulatory uncertainty

Decarbonizing shipping is necessary, yet presents challenges, including high transition costs and uncertainty about the choice of the alternative fuels of the future and whether these will be readily available. In addition, uncertainty about the regulatory framework also presents challenges for shipowners, who need to decide whether to renew fleets now or wait until there is greater clarity and certainty about alternative fuels, green technology options and regulatory regimes.

The ageing of the world fleet presents a further complication. As at early 2023, compared with a decade earlier, the world fleet was on average two years older, at 22.2 years, and over half the fleet is now older than 15 years. Ships currently being built are expected to remain in operation for the next 20–30 years; retrofitting is not always possible and is generally expensive.

Investment is required to adjust ship operations, designs and engines, generate alternative fuels at scale and implement green on-board technologies. Existing estimates indicate that an additional $8 billion–$28 billion will be required annually to decarbonize ships by 2050 and more substantial investments, ranging from $28 billion to $90 billion annually, will be needed to develop infrastructure for 100 per cent carbon-neutral fuels by 2050. According to some estimates, the more expensive energy sources and onshore investments could increase fuel expenses by 70–100 per cent from present amounts.[3] UNCTAD assessments indicate a potential disproportionate impact on the least developed countries and small island developing States that rely heavily on maritime transport.

Transition costs and impacts, particularly in the least developed countries and small island developing States

Decarbonization measures in shipping are expected to drive up maritime logistics costs and negatively impact trade flows and economic output, particularly in developing regions. Such impacts are likely to be greater among the least developed countries and small island developing States, which are already marginalized from international shipping and trading networks and face disproportionately high shipping costs compared with other developing countries. In addition, the least developed countries and small island developing States have limited capacity to mitigate higher maritime logistics costs.

In 2021, UNCTAD conducted a comprehensive impact assessment of the short-term greenhouse gas emissions reduction measures proposed at the International Maritime Organization, estimating an increase in maritime logistics costs of 2.7 per cent under the low-reduction scenario, with an increase in time at sea of 2.8 per cent and an increase in average maritime shipping costs of 1.5 per cent in 2030. Coastal developing countries, including the least developed countries and small island developing States, could experience a greater decline in gross domestic product (GDP) and trade flows compared with developed countries.

In 2023, UNCTAD conducted a simulation showing that hypothetical increases of 10, 30 and 50 per cent in maritime logistics costs would negatively impact trade, with median reductions of 0.11, 0.32 and 0.60 per cent, respectively; and GDP, with median reductions of 0.01, 0.04 and 0.08 per cent, respectively. Based on the global GDP of $104 trillion in 2022, a reduction of 0.08 per cent would be equivalent to a reduction of global GDP by about $80 billion.

[3] See https://www.dnv.com/maritime/publications/maritime-forecast-2023/index.html.

Shipping is international by nature; a just and equitable transition is required

The distinct features of international shipping require multilateral rules on the reduction of greenhouse gas emissions, to avoid fragmented solutions and exemptions that distort the level playing field for shipping and trade. A universal regulatory framework for decarbonization that applies to all ships, irrespective of flag of registration, country of ownership or area of operation, is critical, to avoid a two-speed decarbonization process.

Among developing countries, a multilateral solution adopted under the auspices of the International Maritime Organization that also considers the particular needs of vulnerable economies is crucial, particularly among countries expected to be most affected by transition costs. In this regard, an economic element such as a levy on fuels or a carbon price on greenhouse gas emissions from shipping, currently under consideration at the International Maritime Organization as part of midterm measures, can help incentivize action, promote the competitiveness of alternative fuels and narrow the cost gap with fossil fuels. In addition, a levy on fuels or a carbon price can generate a revenue stream to be channelled towards scaling up decarbonization efforts and supporting developing countries expected to face increased maritime logistics costs. The funds generated could, for example, support investment in climate change adaptation, trade and transport reforms and/or transport and digital connectivity in the least developed countries and small island developing States.

Collaboration and cooperation key to enabling the transition

Shipping cannot decarbonize on its own. Shipowners depend on fuel producers and are also seeking certainty about the decarbonization regulatory framework, and ports and terminals depend on the choice of fuel made by shipowners and the sourcing and availability of fuels. Therefore, decarbonization efforts need to bring together the broader industry, including carriers, ports, manufacturers, shippers, investors, energy producers and distributors.

Recommendations

Maritime transport should decarbonize as soon as possible, while supporting economic growth, enhancing environmental sustainability and ensuring regulatory compliance. At the same time, the impacts of the decarbonization of shipping on the most vulnerable economies should be continually assessed, and technical and financial support should be provided to the most heavily impacted countries. Balancing these varied objectives is vital in order to ensure a prosperous, equitable and resilient future for maritime transport. To achieve this, UNCTAD recommends the following:

- A universal regulatory framework applicable to all ships should be supported, irrespective of flag of registration, country of ownership or area of operation, to avoid a two-speed decarbonization process and maintain a level playing field for shipping operators and traders, given that fragmented solutions and exemptions in international shipping can lead to suboptimal outcomes whereby developing countries could end up being serviced by high-carbon shipping.
- Regulations should minimize uncertainty, which restrains the investment decisions of shipowners, shipyards and ports.
- Investors and financial institutions should substantially boost funds for research and development in clean fuel shipping technologies and infrastructure.
- A levy on fuels or a carbon price could help close the price gap between traditional and low-carbon or zero-carbon fuels and make alternative fuels more competitive, while at the same time generating funds that can support smaller and vulnerable economies in achieving a green and just transition.

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