

Insight brief

Policy Options for Closing the Competitiveness Gap Between Fossil and Zero-Emission Fuels in Shipping

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1 Introduction

To decarbonise shipping new policy frameworks need to be in place within the next few years. This Insight Brief explains why and presents an overview of policy options.

For shipping's decarbonisation to be in line with the Paris Agreement temperature goals, by 2030, we must reach at least five percent zero-emission fuels in international shipping¹ and have commercially viable zero-emission vessels operating along deep-sea trade routes. This will need to be supported by the necessary infrastructure for scalable zero-emission fuels (SZEf) and energy sources² including production, distribution, storage, and bunkering. Even to reach the least ambitious interpretation of the Initial IMO GHG Strategy's reduction target (50% reduction of greenhouse gasses (GHG) by 2050 compared to 2008), and given ships' usual life of 20-25 years, ordering zero-emission vessels must be the competitive choice no later than 2030. A zero-emission fleet is only commercially viable and investable if zero-carbon energy sources are competitive with traditional fuels. However, under current policy and technology frameworks, fossil fuels remain readily available, reliable, cheap – and compatible with existing ships and engines – creating a competitiveness gap that the market alone cannot solve. Without new policy or policies, this gap will persist for decades, not only hindering the decarbonisation of shipping, but also further delaying decarbonisation of the global economy dependent on shipping.

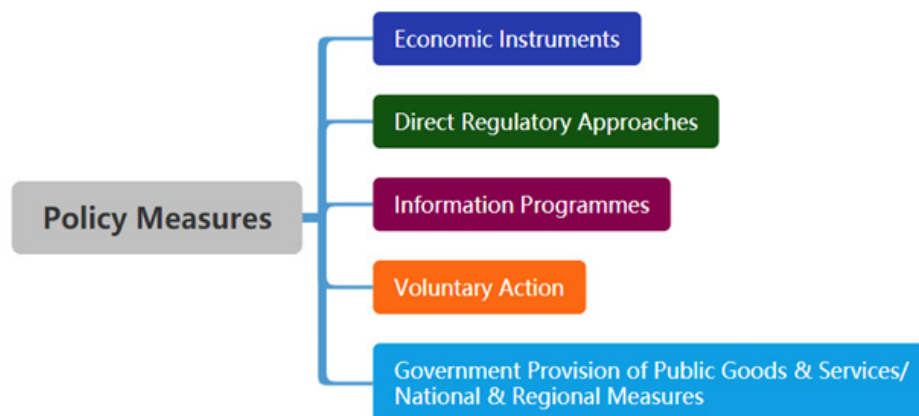
A forthcoming report by UMAS analyses policy measures for closing the competitiveness gap between fossil fuels and zero-emission alternatives in shipping. The report considers the extent to which different measures can close the competitiveness gap and how they could enable an equitable transition. Fairness and equity aspects are emphasised by e.g. the Initial IMO GHG

¹ Osterkamp et al. (2021) Five percent zero emission fuels by 2030 needed for Paris-aligned shipping. Available at: <https://www.globalmaritimeforum.org/news/five-percent-zero-emission-fuels-by-2030-needed-for-paris-aligned-shipping-decarbonization>

² The terms zero-carbon or zero-emission energy sources should be understood as including zero-carbon and net zero-carbon energy sources. See definition of zero carbon energy sources: https://www.globalmaritimeforum.org/content/2019/09/Getting-to-Zero-Coalition_Zero-carbon-energy-sources.pdf

Strategy. Therefore, the viability of any IMO climate policy instrument depends to a large extent on how these aspects are considered and operationalised.

This Insight Brief explains which policy options could help close the competitiveness gap and enable an equitable transition. It considers the policy options shown in the diagram below.



2 Overview of Economic Instruments

In many other sectors and countries, economic instruments, or market-based measures (MBMs), are widely used by regulators to internalise the costs of pollution caused by economic activities, address market inefficiencies and decrease price differences between fossil fuels and alternatives. MBMs have been on the IMO agenda since 2003³ and although discussions of MBMs in the IMO were suspended in 2013, MEPC 76 in June 2021 adopted a structured plan to start work on mid-term measures to cut GHG emissions from ships, which include MBMs alongside other measures.

MBMs can support the decarbonisation of shipping by closing the competitiveness gap between fossil fuels and zero-emission fuels by increasing the costs of using fossil fuels through setting a price on carbon, and/or reducing the costs of zero-emission alternatives, e.g. through tax breaks, RD&D funds, subsidies, or a combination of these. Additionally, MBMs can also help to mitigate some of the market failures and barriers which are slowing decarbonisation efforts. The main MBM policy options are summarised in the table below.

³ IMO Resolution A.963(23)



	Emissions Taxes and Levies	Emissions Trading System	Subsidies
Role of the regulator	Regulator sets a fixed price tied to fossil fuel consumption or CO ₂ /GHG emissions	Regulator sets maximum emissions target or baseline and creates a market for emissions, either as a cap-and-trade or a baseline-and-credit system.	Regulator directs the use of subsidy payments.
How the MBM works	The carbon price set by the regulator increases the price of fossil fuels, stimulating the market to decrease consumption and switch to alternatives. ⁴	Market reaction to a cap or baseline increases the price of fossil fuel use, stimulating the decrease of emissions and move to alternative fuels. Cap-and-trade system: A cap is set and lowered over time. Allowances under the cap are distributed or auctioned to market actors. Baseline-and-credit system: Baseline emissions levels are defined and emission credits are issued to entities with emissions below the baseline. Credits can be banked or sold to other entities exceeding baseline emission levels.	Subsidies are sums of money granted by the State or a public body used to support RD&D and lower the cost of alternative zero-emission fuels (e.g. Contracts for Difference) rather than increasing the price of fossil fuels.
Price characteristics	The price is known for the timeframe chosen by the regulator.	The price is not known and is produced by the market response to the parameters of the policy design.	N/A
Risks/uncertainty	The exact reduction of emissions is not certain, as this is dependent on the market reaction to the price.	Price is uncertain and defined by market action, which can lead to price volatility, market uncertainty and higher risks for investors.	Being a direct form of funding, subsidies are highly dependent on the information available to and focus of the subsidy-awarding body and may not be an option for all governments or organisations.
Key to effectiveness	Appropriate price setting and reviewing on a clearly communicated schedule against predefined criteria will increase control over environmental impacts and decrease business uncertainty.	Setting an appropriate cap or baseline is key to effectiveness.	Subsidies are best used as a companion to other policies and can be targeted to support either the supply or demand-side of the fuels transition.

⁴ There is also a feebate MBM which is a variant of taxes/levies whereby the regulator sets a pivot point (benchmark) of maximum total or relative pollution. Those above the pivot point pay fees and those below receive rebates. For more detail, see the full report.

2.1 Potential uses of revenue generated by economic instruments

A key advantage of taxes/levies and ETS is the potential to generate significant revenues which could be used in different ways to help close the competitiveness gap and/or enable an equitable transition, for example:

- Recycling revenues back into the maritime industry to support shipping decarbonisation by subsidising deployment of zero-emission fuels and technologies.
- Offering incentives to ships with lower emissions or carbon intensity compared to a certain benchmark.
- Addressing disproportionately negative impacts on States of GHG reduction measures as stipulated by the Initial IMO GHG Strategy.
- Supporting capacity development, technology transfer, and crew training in developing countries, in particular small island developing States (SIDS) and least developed countries (LDCs), to facilitate the development and uptake of zero-emission technologies and fuels, and the implementation of maritime climate policies.
- Funding climate projects in developing countries, SIDS and LDCs through existing or new climate finance mechanisms under the UNFCCC or other international organisations.

The most fair and effective allocation of revenues across the different options will require further investigation and deliberation. The management of revenue, from collection to allocation and distribution, is a fundamental aspect to be considered and for some of the revenue usage options, existing mechanisms could be used. An aim of any system should be to avoid significant administration and transaction costs.

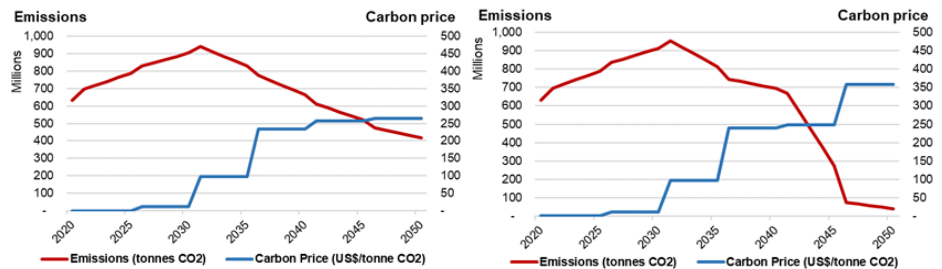
2.2 Possible level of the carbon price

Recent analysis based on techno-economic models, provides estimates of how the carbon price might need to be set in order to enable a certain absolute emissions reduction trajectory. Two scenarios are produced, achieving a 50% and 100% reduction in absolute emissions by 2050 respectively. In both scenarios, the carbon price is started in 2025, but the emissions pathway followed has emissions rising until a peak in 2030. It should be noted that all carbon price estimates have been calculated solely to create the commercial case for reducing emissions. The modelling does not include the consideration of how to ensure that emissions mitigation is equitable.

In order to achieve 50% GHG emissions reduction by 2050 compared to 2008 (-50% scenario), the carbon price level averages US\$173/tonne CO₂. For a 2050 target of full decarbonisation (-100% scenario), the average carbon price would only need to be slightly higher: around US\$191/tonne CO₂. In both scenarios, according to the model, the price level begins at US\$11/tonne CO₂ when introduced in 2025 and is ramped up to around US\$100/tonne CO₂ in the early 2030s at

which point emissions start to decline. The carbon price then further increases to US\$264 /tonne CO₂ in the -50% scenario, and to US\$360 /tonne CO₂ in the -100% scenario. The carbon price trajectories and their associated emissions trajectories are shown in the Figure below.

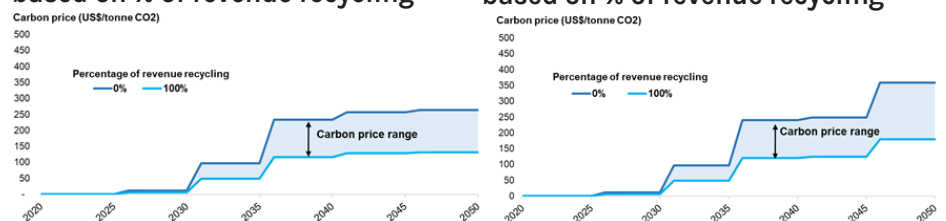
Carbon prices in the -50% scenario Carbon prices in the -100% scenario



Even though the carbon prices as modelled in the two scenarios start at a very low level, they make two significant price increases over the following decade. These two price jumps may be challenging from both a political and practical business perspective; thus, it could be better to set the initial carbon price at a higher level than the model and follow a smoother increase, thereby easing potential economic shocks of sharp price increases. The 2020s can be characterised as the emergence phase of shipping’s decarbonisation transition. Revenue could also support this phase through e.g. funding RD&D to reach five percent zero-emission fuel penetration by 2030, which enables shipping-specific cost reductions prior to the more rapid uptake of new fuels scheduled for the 2030s in the diffusion phase.⁵

Carbon prices could be lower than the model estimates if revenues generated by the MBM are ‘recycled’ to further support decarbonisation of shipping, for example by subsidising the deployment of zero-emission fuels and technologies (see Section 3). If all MBM revenue was recycled to support shipping decarbonisation, in theory this could lower the carbon price level by up to half (but this would mean no revenue use for enabling an equitable transition and addressing disproportionately negative impacts on States). Depending on the level of revenue recycling, an MBM with global scope in the -100% scenario could be designed to have a carbon price level averaging between US\$96-191/tonne CO₂ and reaching a maximum of between US\$179-358/tonne CO₂ (see Figure below). In reality, the carbon price would likely be somewhere in this range, so that more revenue can be used to enable an equitable transition.

Carbon prices in the -50% scenario, based on % of revenue recycling Carbon prices in the -100% scenario, based on % of revenue recycling



⁵ See also these [Insight Briefs for an explanation of transition scenarios and phases: The Role of the Energy Sector in Shipping’s Fuel Transition; Getting to 5%: An action plan for delivering zero-emission fuels in shipping](#)

It is worth noting that the relationship between the carbon price and revenue collected depend on modelling assumptions, including global transport demand, future fuel cost assumptions and the emission reduction pathway for which only one scenario is being presented here. The collected revenue should be considered in terms of the total amount of available revenue which can be distributed over the period of decarbonization (from 2025-2050), rather than assuming the revenue will be deployed only in the year it is collected. This scenario generally provides more subsidy/support for SZEF early in the transition when price spreads to SZEF are expected to be highest, and less towards the end of the transition when SZEF are more established and have a lower price spread. Other scenarios and spending profiles are conceivable.

3 Direct Regulatory Approaches

Direct regulatory approaches, such as the IMO's energy efficiency regulation (EEDI, EEXI and ICII), often called command-and-control measures, could also be employed to close the competitiveness gap and include the following:

- Performance or Emission Standards: Set specific performance goals that must be achieved, but without mandating which technologies or techniques to use to achieve the goal.
- Technology Standards: Mandate which technologies or techniques must be adopted without specifying the overall outcome.
- Product Standards: Define the characteristics of potentially polluting products.

These standards can support efforts to reach the goals of the Initial IMO GHG Strategy by directly decreasing ship emissions, thus indirectly making fossil fuels more expensive. They could have a positive effect on RD&D and stimulate the uptake of alternative fuels in a similar way to carbon pricing. By mandating certain outcomes, they can also bypass some of the market barriers and failures and guide investments in a way that avoids locking in infrastructural choices and stranding of assets.

One potential shortcoming of standards is they do not generate revenues, meaning that unless they are accompanied by an appropriate revenue-raising and -use policy, they are restricted in their capacity to enable an equitable transition, address disproportionately negative impacts on States, and/or reduce the shipping- and energy-specific costs of the transition. Design elements, such as exemptions, differentiation in the standard's stringency and/or phased implementation of the standard, could be used. However, such design elements could have adverse consequences. For example, they would lower the environmental effectiveness of the standard, could (if applied on a route-level basis) create loopholes and lead to carbon leakage, but also result in exempted routes being serviced by increasingly old and inefficient ships which would leave countries serviced by those vessels behind on the technological trajectory.

4 Information Programmes

Information programmes, such as IMO's Data Collection System, are designed to influence behaviour through the disclosure of information. Quality and availability of information is a key factor in raising public awareness to environmental impacts and driving policy change. In isolation, information programmes are unlikely to have a significant role in closing the competitiveness gap. However, they could contribute to enabling an equitable transition: For example, information sharing between companies, countries and regions could spread best practices, diffuse technological innovation, build capacities and lower costs associated with RD&D.

5 National and Regional Policy Measures

While IMO mainly regulates international shipping, about 30% of GHG emissions from shipping stems from domestic shipping. Therefore, national and regional policy measures have the potential to contribute significantly to the reduction of ship emissions. Furthermore, the ambition of countries' Nationally Determined Contributions (NDC) should increase over time, so it can be expected that countries will look increasingly to sectors not previously considered in their NDCs. The IMO also recently adopted a resolution encouraging countries to develop voluntary National Action Plans to address GHG emissions from ships.

Engagement at a national and regional level could help create enabling environments for first movers, stimulate innovation and shield it from open market pressures initially before scaling it up over time. Zero-emission trade routes could be established between countries supporting each other to develop the necessary infrastructure enabling zero-emission trading and a more collaborative and equitable transition. Countries with more capacities and resources could lead the decarbonisation of their national maritime sectors and domestic shipping through the development of dedicated policies and National Action Plans. Portions of any national or regional revenue-generating policy measures could be used to support developing countries, LDCs, and SIDS as part of the equitable transition. Many countries are already taking widespread action at a national level which can inform and potentially complement the development of global IMO-driven policies.

6 Voluntary Initiatives

Voluntary initiatives refer to initiatives taken by firms, non-governmental organisations, and other actors beyond regulatory requirements. However, policy-makers can play a key role in enabling the emergence of voluntary initiatives, e.g. governments can use soft policy tools like dialogue with stakeholders to encourage voluntary action. Furthermore, research suggests that voluntary initiatives are most successful when tied to future regulations. They could play an important role in reducing or removing market failures and could usefully complement other policy measures or stimulate innovation in the industry. They could also help with disseminating information,



mobilising resources for less-resourced countries, and support capacity development, thereby playing a supporting role in enabling an equitable transition alongside mandatory measures. Nevertheless, voluntary initiatives are unlikely to result in significant emissions reduction and to enable the switch to zero-emission fuels. Therefore, they should be viewed as companion activities to future mandatory policy measures and should be promoted and supported, where possible, by policy-makers.

7 Concluding Remarks

There are multiple potential policy options for closing the competitiveness gap between fossil and zero-emission fuels and enabling an effective and equitable transition. One potential route forward is the following policy package:

1. **Adopt a global MBM** capable of generating significant revenue. This mechanism needs to create a carbon price that incentivises emissions reductions and investments into readily available GHG mitigation options in the near term, and fuel switching once alternative zero-emission fuels are widely available.
2. **Combine an MBM with an effective and fair use of revenue recycling and other revenue use options** to drive both demand and supply of zero-emission fuels whilst also supporting an equitable transition and addressing disproportionately negative impacts on States.
3. **Use a direct command-and-control measure** such as a fuel mandate in the long term to send an unequivocal signal to the market that a fuel transition will take place.
4. **Develop national and regional policy** that can ensure the transition of domestic fleets at least at the same rate or sooner than international fleets and that work in synergy with global IMO-driven policy.
5. **Promote voluntary initiatives and information programmes** to stimulate supply-side investments in RD&D and infrastructure, encourage knowledge sharing and support capacity development.

Shipping is an essential global industry which is currently on an emissions trajectory that is dramatically out of line with the Paris Agreement temperature goal. As such, there is an urgent need for the development of policies which guide and support this sector through an equitable transition towards zero emissions.

The views expressed in this Insight Brief are those of the authors alone and not the Getting to Zero Coalition or the Global Maritime Forum, Friends of Ocean Action, or the World Economic Forum.

About the Getting to Zero Coalition

The Getting to Zero Coalition is an industry-led platform for collaboration that brings together leading stakeholders from across the maritime and fuels value chains with the financial sector and others committed to making commercially viable zero-emission vessels a scalable reality by 2030.