

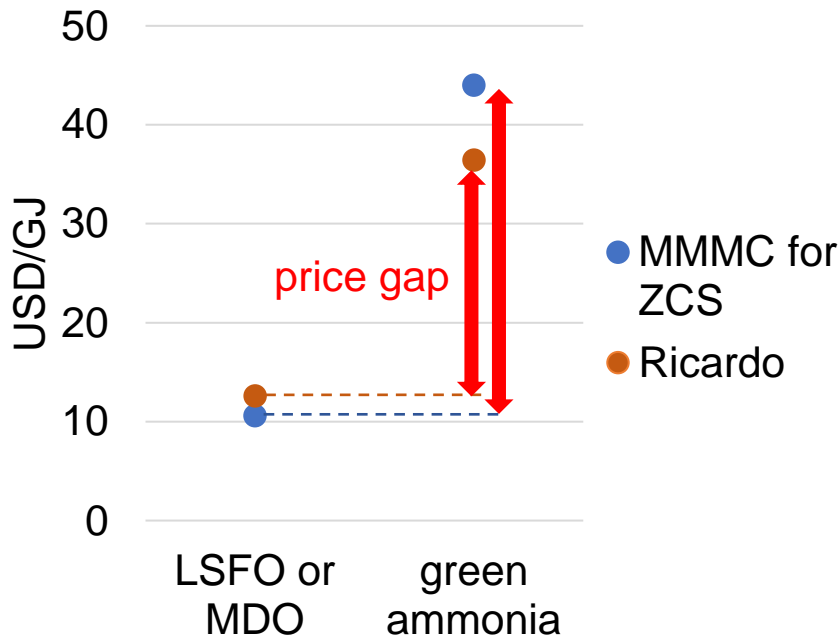
Prospects and Challenges of Market Based Measures for International Shipping

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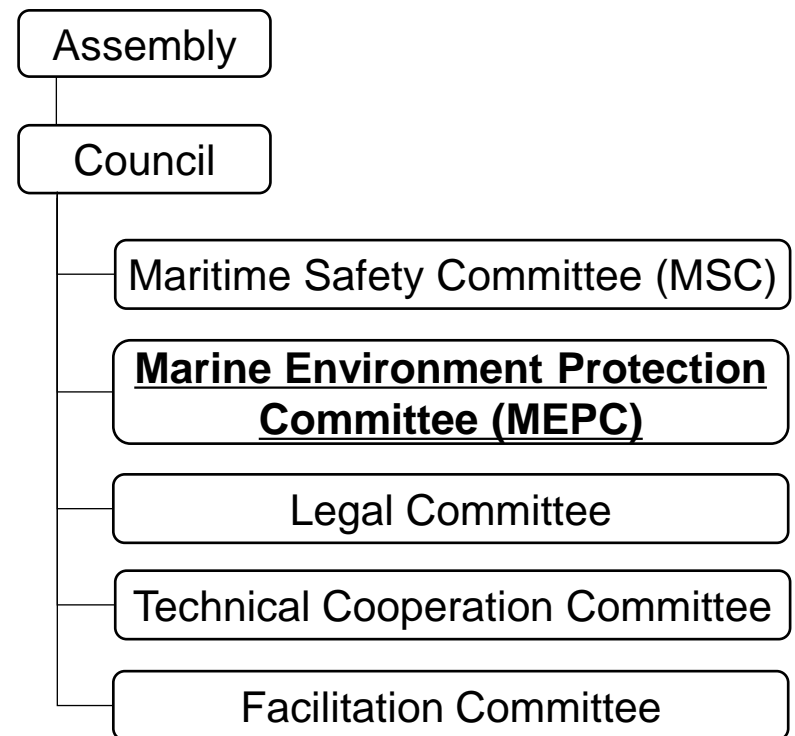
Introduction

- Market-based measures are expected as key policy measures to fill the price gap between conventional fuels and zero-emission fuels.
- There are challenges that need to be addressed in order to adopt a global market-based measure at the International Maritime Organization (IMO).

Projections of Fuel Price in 2030



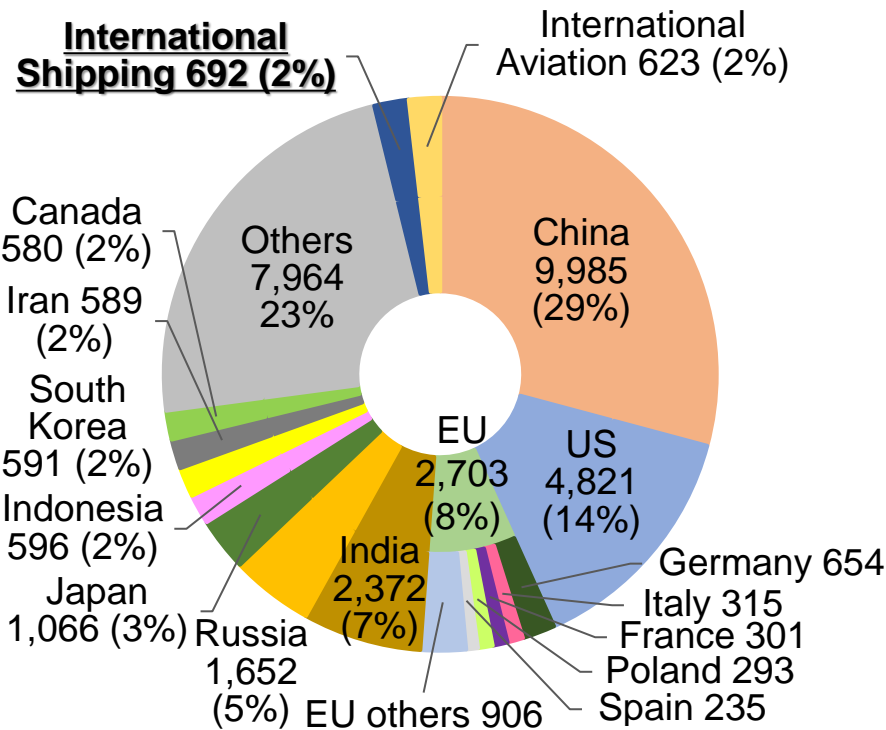
Structure of IMO



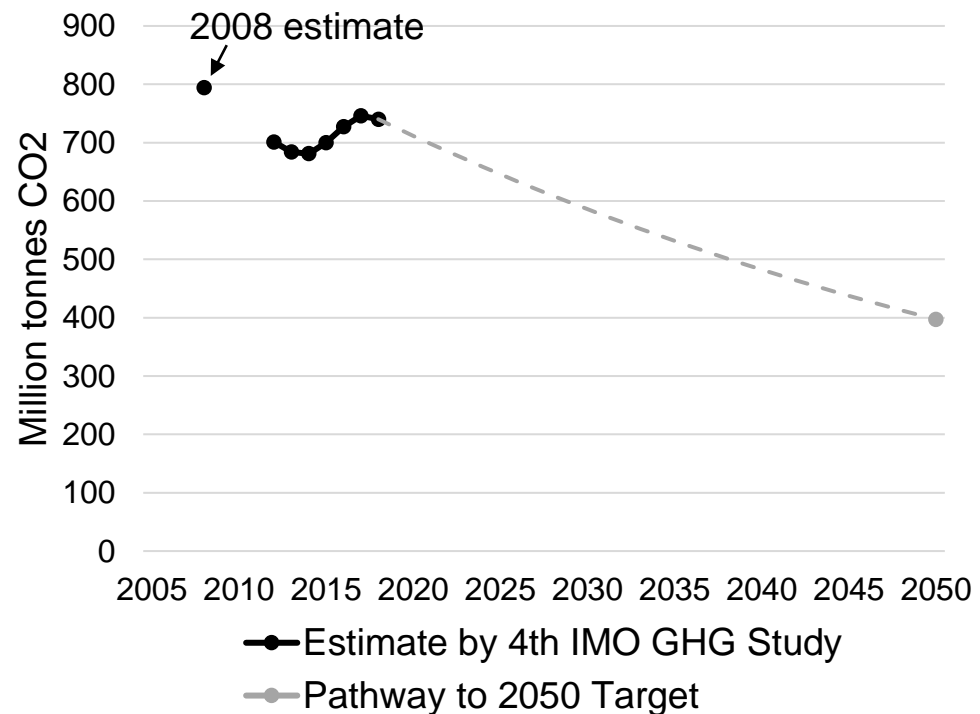
GHG Emissions from International Shipping

- International shipping accounts for around 2-3% of global GHG emissions.
- Demand of international shipping, which serves as the backbone of trade, is expected to increase, and GHG reduction measures are needed.

Global CO2 Emissions in 2019



International Shipping's GHG Emissions



Source: IEA (2021a)

Source: Faber et al (2020) as estimate for 2008, 2012-2018. 3

GHG Emissions Reduction Targets

- In 2018, IMO adopted the Initial IMO GHG Strategy, setting out the vision and levels of ambition as reduction targets for international shipping.
- Work is undertaken at MEPC to revise the Strategy, under its commitment to strengthen the levels of ambition, with a view to adoption in mid-2023.

Initial IMO strategy on the reduction of GHG emissions from ships

Vision:

IMO remains committed to reducing GHG emissions from international shipping and, as a matter of urgency, aims to phase them out as soon as possible in this century.

Levels of ambition:

1. carbon intensity of the ship to decline through implementation of further phases of the energy efficiency design index (EEDI) for new ships;
2. carbon intensity of international shipping to decline by at least 40% by 2030 compared to 2008; and
3. GHG emissions from international shipping to peak and decline by at least 50% by 2050 compared to 2008.

Measures to Improve Energy Efficiency

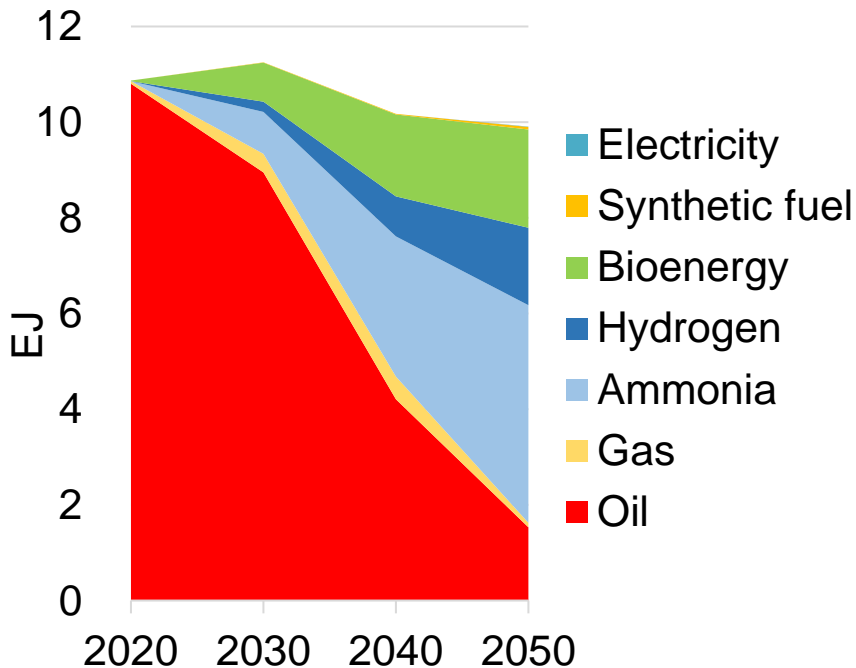
- The IMO has adopted measures including EEDI, EEXI and CII rating, which are expected to improve energy efficiency of ships.
- These measures are necessary to reduce GHG emissions from ships, but further measures to promote adoption of alternative fuels are needed to achieve net zero GHG emissions.

Energy Efficiency Design Index (EEDI)	Newly built ships are required to achieve a certain level of design efficiency. The requirements came into effect from 1 January 2013.
Energy Efficiency Existing Ship Index (EEXI)	Existing ships (pre-EEDI ships) are required to achieve a certain level of design efficiency. The requirements will come into effect from 1 January 2023.
Carbon Intensity Indicator (CII) Rating	Ships are required to calculate their annual operational efficiency (CII) and rated against a benchmark. The requirements will come into effect from 1 January 2023.

Zero Emission Fuels for Ships

- Zero-emission fuels such as ammonia, hydrogen, biofuels and synthetic fuels are considered viable candidates to achieve net zero emissions.
- Collaborative works are undertaken in order to overcome technical and economic barriers and to address supply-chain issues to deploy these fuels.

Shipping Energy Demand

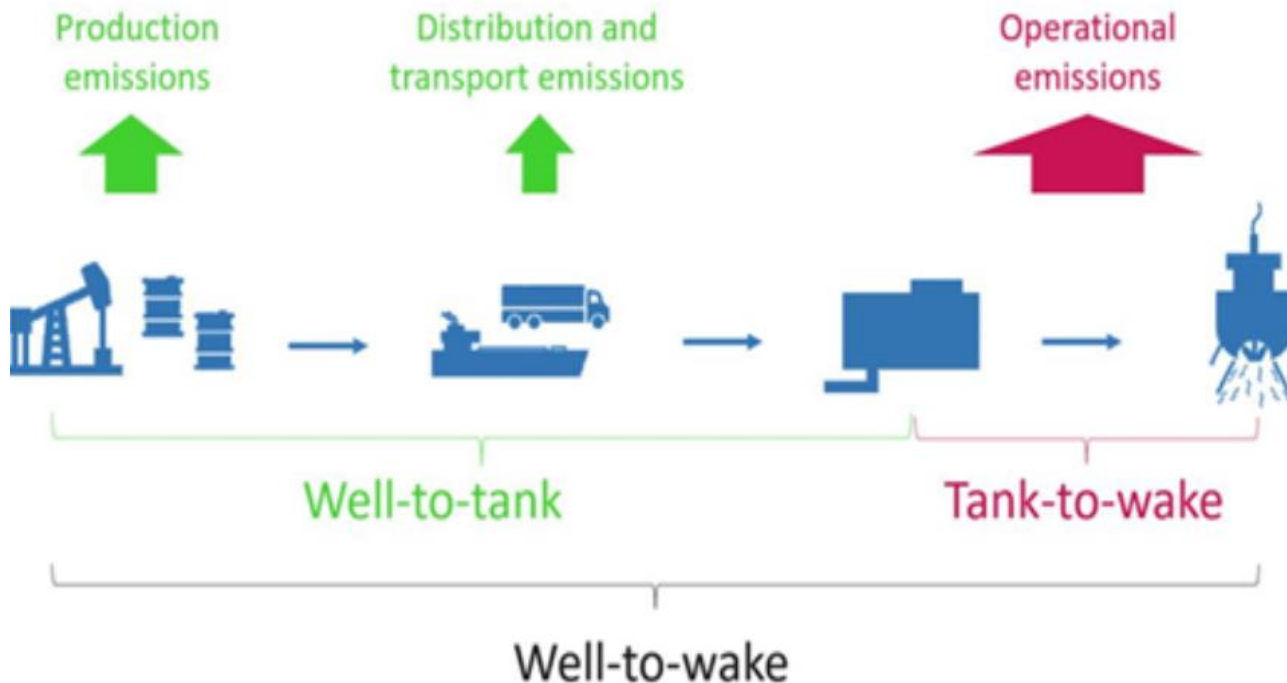


Challenges of Zero-Emission Fueled Vessels

Ammonia (NH ₃)	<ul style="list-style-type: none"> • Corrosion and leakage prevention • N₂O reduction measures
Hydrogen (LH ₂)	<ul style="list-style-type: none"> • Control technology for abnormal combustion • Fitting to resist low temperatures and hydrogen embrittlement
Synthetic fuel (e-methanol, e-methane)	<ul style="list-style-type: none"> • Accounting methodologies to determine net zero emissions from onboard use

LCA Guidelines

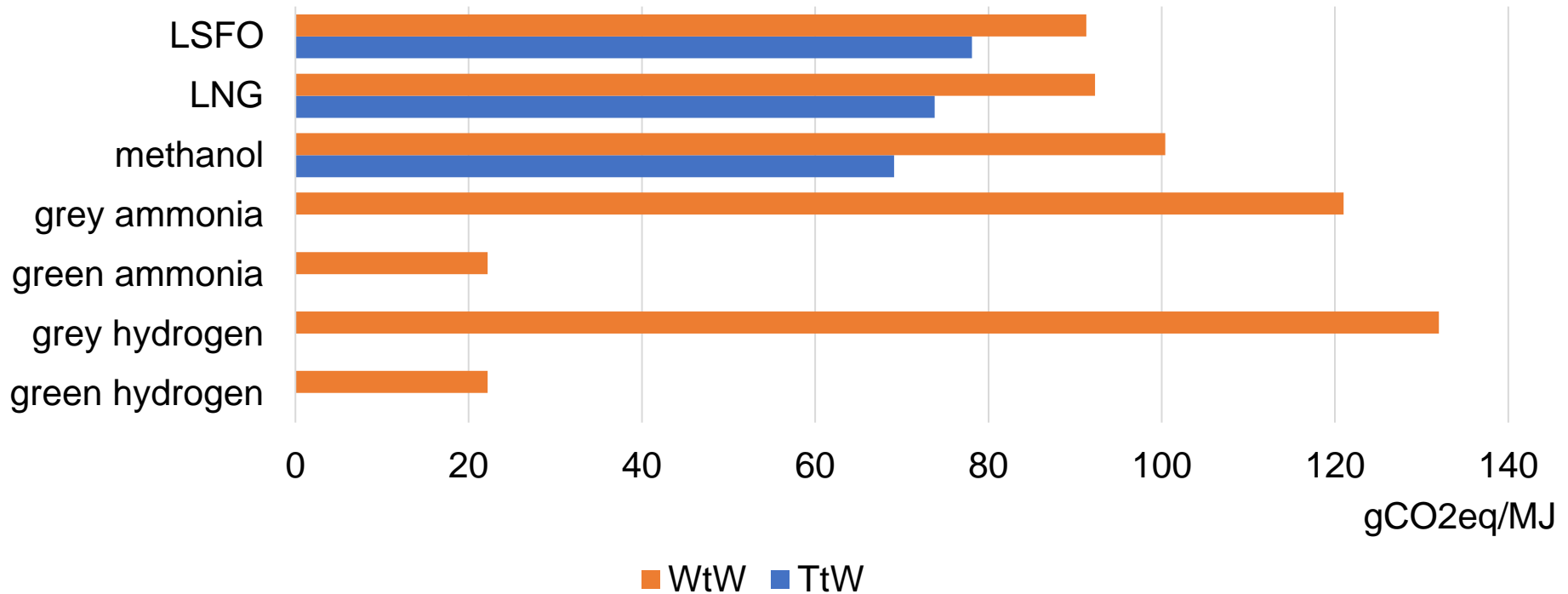
- MEPC is working to develop draft lifecycle assessment (LCA) guidelines, aiming for adoption by MEPC 80 in 2023.
- The LCA guidelines allow for calculation of GHG emissions from fuel production to end-use by ship (Well-to-Wake), which results from combination of Well-to-Tank (from production to carriage of fuel to ship's tank) and Tank-to-Wake (combustion or conversion onboard ship).



Tank-to-Wake (TtW) and Well-to-Wake (WtW)

- Measures to address WtW GHG emissions are necessary to incentivize fuels that have less environmental impact from the lifecycle perspective.
- Such a measure would require certification and verification of WtW GHG emissions.

TtW and WtW GHG Emission Factors



Levy System and Emission Trading

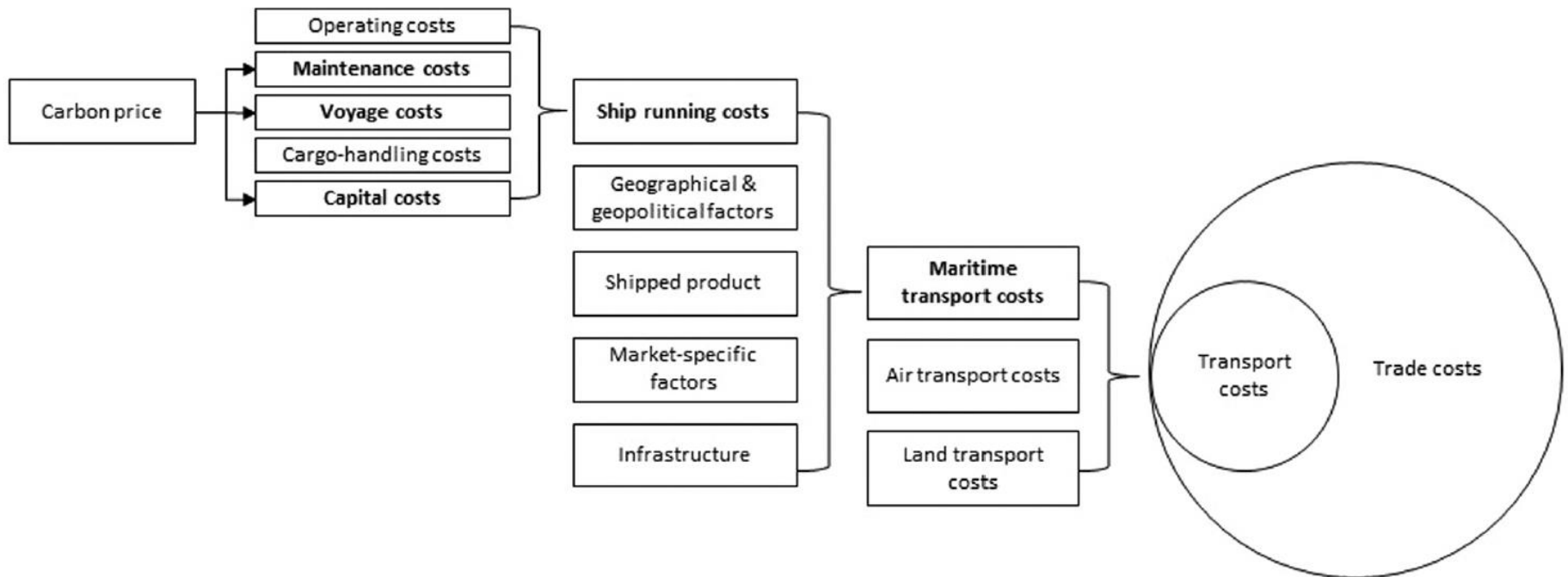
- Levy system would assign a price per ton of CO2 or GHG emitted and require payment in accordance with ship's emission.
- Emission trading assumes setting the overall cap and allocation of allowances, which may be traded. Allowances equivalent to ship's emissions need to be surrendered.
- Both system would require a feasible mechanism to ensure compliance and to setup and manage a fund for using revenues.

	Levy system	Emission trading
Strengths	<ul style="list-style-type: none"> • Easier to control the impact as price is fixed • Easier to administer 	<ul style="list-style-type: none"> • Easier to control the reduction level as cap is set
Challenges	<ul style="list-style-type: none"> • Needs to adjust the price to control the reduction level 	<ul style="list-style-type: none"> • Price would fluctuate • Needs administration of allocation (auctioning) and trading of allowances

Impacts on States

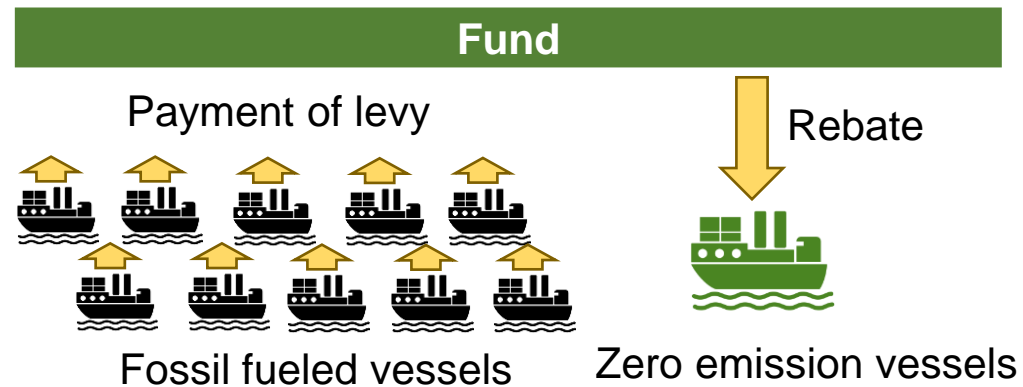
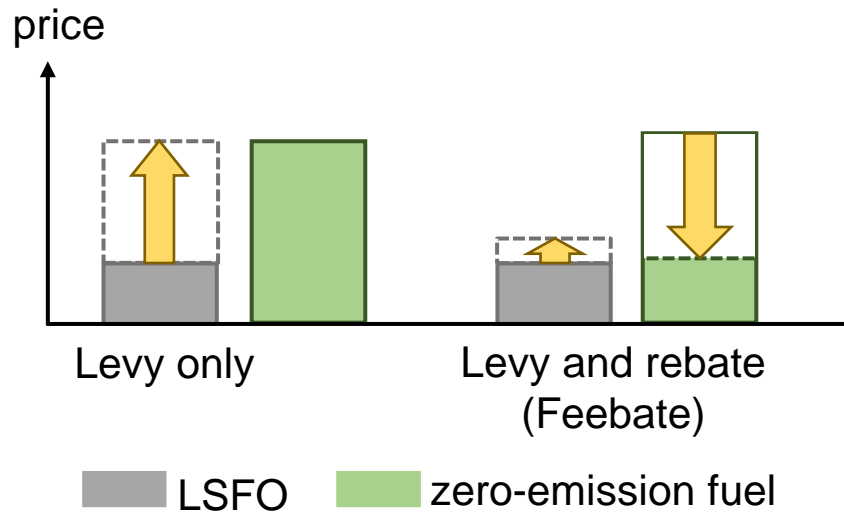
- The Initial IMO GHG Strategy states that a measure's impacts on States should be assessed and taken into account before adoption.
- Market based measures may well affect transport costs and trade costs, by putting a price on CO2 or GHG. Therefore, careful consideration is necessary to find ways to minimize their impacts on States.

Impact of a carbon price on the determinants of maritime transport costs



Feebate System

- Simple levy to fill the price gap may raise the cost of conventional fuels at punitive levels.
- Feebate system, which aims to fill the price gap by providing rebate using revenues raised by levy, would minimize the cost increase of conventional fuels, while providing sufficient incentives for zero-emission fuels.



Further Work on Market Based Measures

- MEPC 78 last June had acknowledged the advancement from Phase I to Phase II of the Work Plan to develop mid- and long-term measures, and encouraged member states to submit new or refined proposal.
- Progress on the development of market based measures would provide signals to stimulate deployment of zero-emission fuels.

Work Plan to develop mid- and long-term measures

Phase I (Spring 2021 to Spring 2022): Collation and initial consideration of proposals for measures, along with considerations of their potential impacts on States.

Phase II (Spring 2022 to Spring 2023): Assessment and selection of measure(s) to further develop as a priority. Decision will be based on an assessment of proposed measures, in particular their feasibility, the effectiveness to deliver long-term reduction target, and their potential impacts on States.

Phase III (target date(s) to be agreed): Development of (a) measure(s) to be finalized within (an) agreed target date(s).

Summary

- A global market based measure is needed to provide incentives for the uptake of zero-emission fuels while ensuring a level-playing field.
- Key challenges are; addressing Well-to-Wake emissions, developing a feasible mechanism to ensure compliance, set up and manage a fund to use revenues, and minimizing impacts on states.
- Prospects of fair and just transition will improve by overcoming these challenges, which will provide signals to stimulate deployment of zero-emission fuels including hydrogen-derived fuels.

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