Japan's approach toward ZERO Emission shipping

- How to develop an international framework through IMO to make international shipping zero GHG emission sector -

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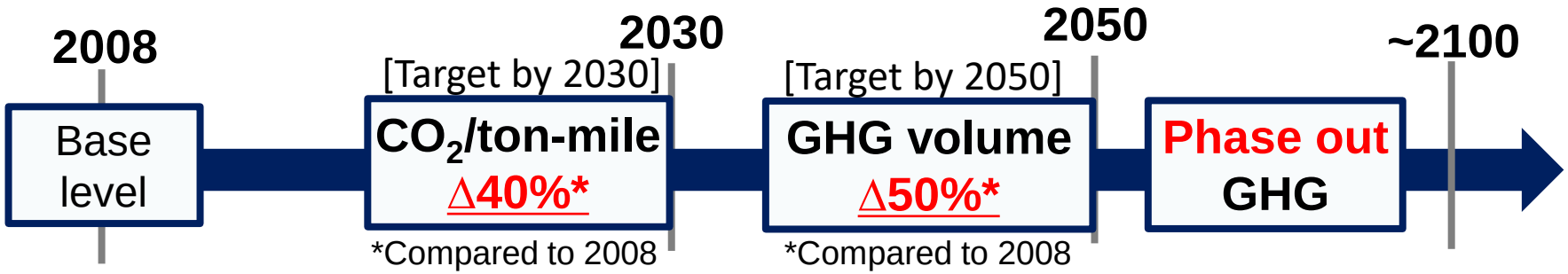
Background

IMO adopted the Initial GHG Strategy (April 2018)

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



- **The Strategy is subject to be revised in July 2023 (at MEPC80).**
- MEPC 77(Nov 2021) **recognized the need to strengthen the ambition** of the Initial IMO GHG Strategy during its revision process, and agreed to initiate the revision of the Strategy.

Revision of the IMO Strategy

- Japan's position towards the GHG reduction target -

- ✓ On 26th October 2021, Mr. Tetsuo Saito, the Minister of Land, Infrastructure, Transport and Tourism expressed that ***"Japan aims to achieve net-zero GHG emissions from international shipping by 2050."***

- ✓ On the same day, the Japanese Shipowners' Association has also announced that **the Japanese shipping industry will take on the challenge of 2050 net zero GHG**.

- Revised strategy will be adopted next year at MEPC80, but more important than setting new targets (levels of ambition) is how we achieve.
- Existing IMO instruments (EEDI, EEXI, CII) seem insufficient to achieve zero emissions.
- Effective mid- and long-term measures need to be introduced as soon as possible.

For further reduction of GHG emission

- **Introduction of Zero-Emission Vessels (ZEVs) should commence as early as possible**.
- Research and development on ZEVs is underway around the world.
  - Commercialization of ZEVs are expected to take place in the latter half of this decade.
- **Barriers to diffusion of ZEVs**
  - Costs for zero-emission fuels and technologies would likely remain high as technical maturity and fuel production capacity would be limited.
  - If operating ZEVs would be a disadvantage to shipping business due to high operating cost, no one would willingly introduce ZEVs.
  - If ZEVs are not promoted, GHG reductions will not progress and “zero emission” will not be achieved.

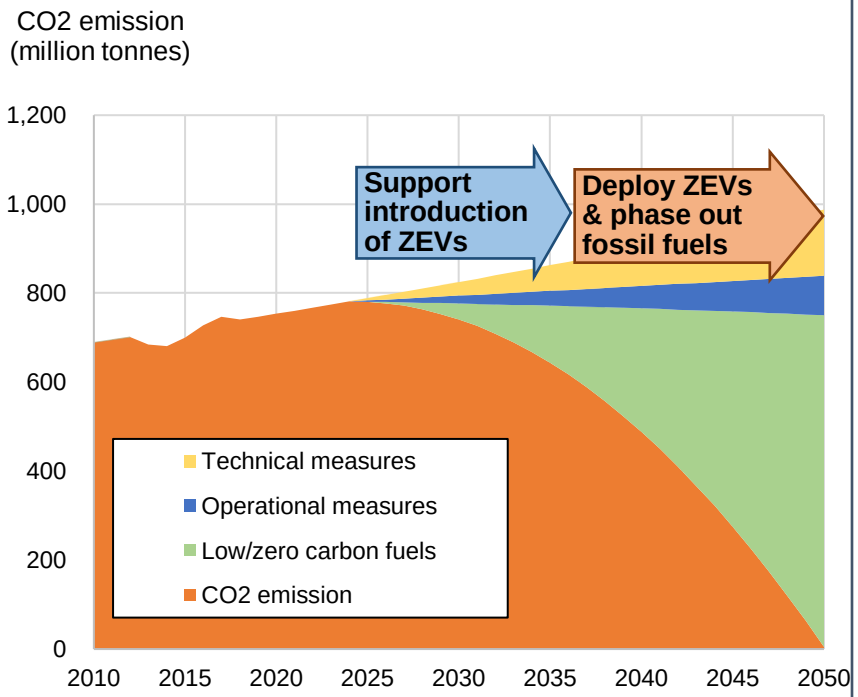
To promote Zero Emission Vessels

- **Economic barriers to the introduction of ZEVs need to be eliminated**.
- **It is imperative, especially in the initial phase, to provide strong incentives for "first movers" by MBM (Market Based Measure)**.
- If ZEVs become widespread by MBM,
  - ➢ The increased demand of ZEV will lower fuel prices and expand fuel availability.
  - ➢ Technology maturity will be improved and ship prices will be reduced.

➢ Early spread of ZEVs will pave the way for the realization of the zero-emission international shipping by 2050.

mid- and long-term perspective

- **A Market Based Measure to provide economic incentives for ZEVs will be effective especially in the initial stage of transition.**
- **BUT, Zero emissions cannot be achieved only by MBM.**
- **Regulatory approaches (technical requirements) will also have a crucial role to realize zero emission.**



Note: Image only for illustrative purpose.

General concept of two stages of transition

Initial stage of transition

- **Limited** technical maturity and **limited** fuel production capacity/availability
- **High costs** for zero-emission fuels and technologies

➢ **It is effective to pull demand of zero-emission fuels by providing incentives for first movers through MBM.**

Later stage of transition

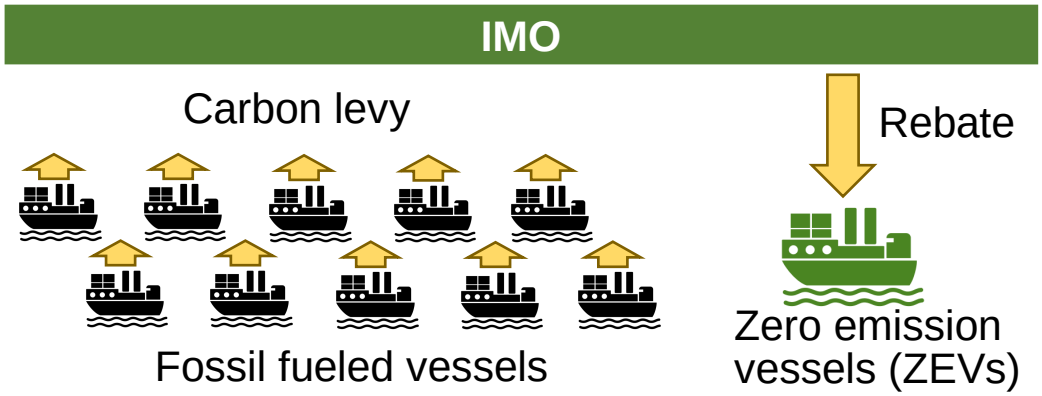
- **Increased availability**
- Technologies and fuels become **cost competitive** with conventional vessels.

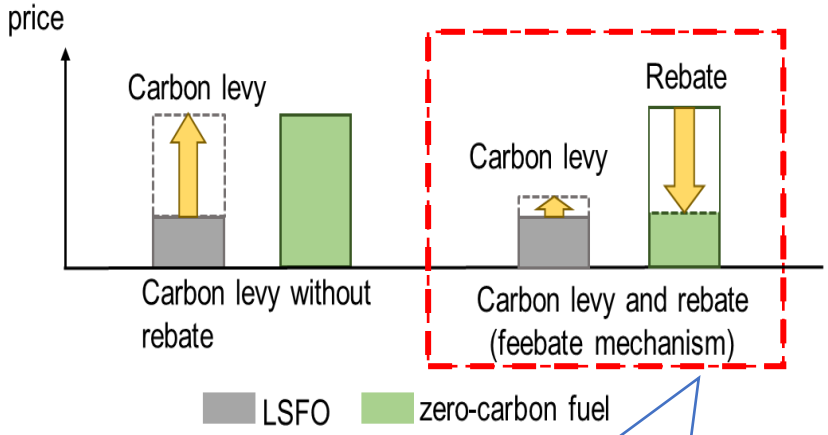
➢ **Technical requirements will be necessary to achieve zero-emission**, such as mandating all vessels to use zero-emission fuels.

Japan Proposal (1): Feebate mechanism

- This MBM concept aims to **provide clear incentives for ZEVs** by using revenues raised by carbon levy as rebates for zero-emission fuels.

Concept of feebate mechanism

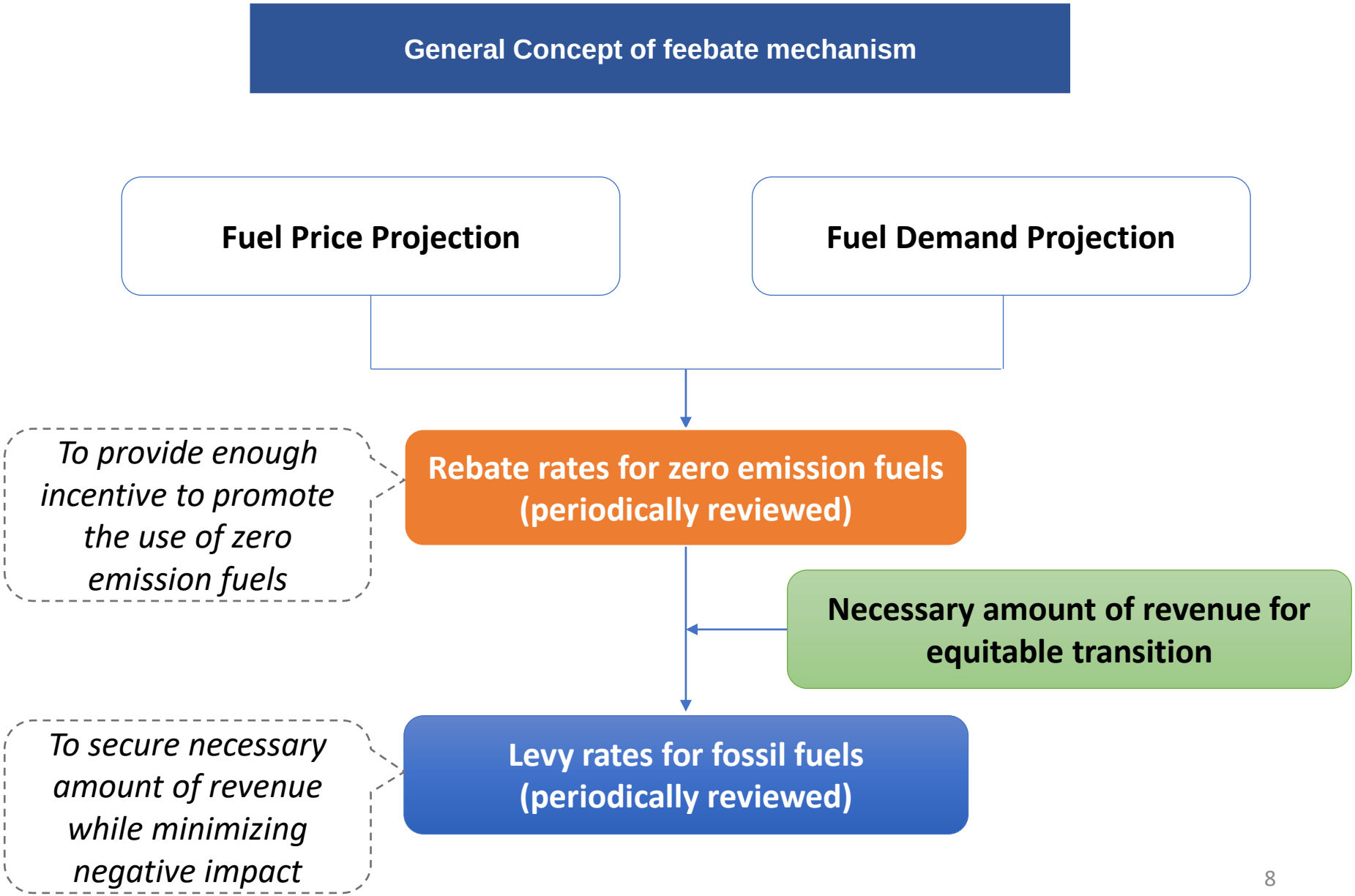




- **Fuel price gap is compensated by way of providing rebate for zero-emission fuels.**
- This mechanism would **ensure necessary incentives** to enhance deployment of ZEVs while **minimizing negative impacts** on fossil fueled vessels.

Scope of levy	Scope of rebate
Fossil fuels (levy rate depends on the carbon factor)	**ZEFs (fuels with zero CO2 emissions onboard)** ex. hydrogen, ammonia

Japan Proposal (1): Feebate mechanism



Japan Proposal (1): Feebate mechanism

[Basic Ideas for setting rates of levy and rebate]

- **Rates of levy and rebate should be determined by IMO** based on considerations on estimated costs and demand of zero-emission fuels. This will provide **high predictability of carbon price**.

Amount of revenue

Determined based on

- **necessary rebate rates to close the price gap**, taking into account the projection of fuel price, fuel demand and global fleet composition
- Rebate rates should be set **to ensure sufficient levels of incentives** are provided to ZEVs.
- Necessary amount of **revenues for assisting States** (esp. SIDs and LDCs) **to make equitable transition** should also be considered.

Levy rate

Levy rate are calculated to secure

- necessary amount of **revenues for rebate**
- necessary amount of **revenues for equitable transition**

Preliminary analysis

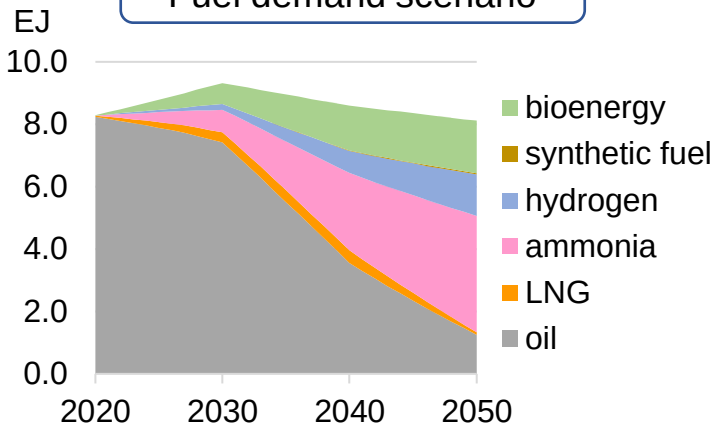
Price projections of ZEFs

(USD/GJ)

Fuel	2020	2030	2040	2050
E-ammonia	55-96	47-82	39-68	30-55
E-hydrogen	52-92	44-79	36-65	28-52
E-methanol	84-136	73-118	63-101	52-83
Bio-diesel	22-25	24-49	27-74	29-98
LSHFO	8	11	11	11

Source: LR&UMAS (2020)

Fuel demand scenario



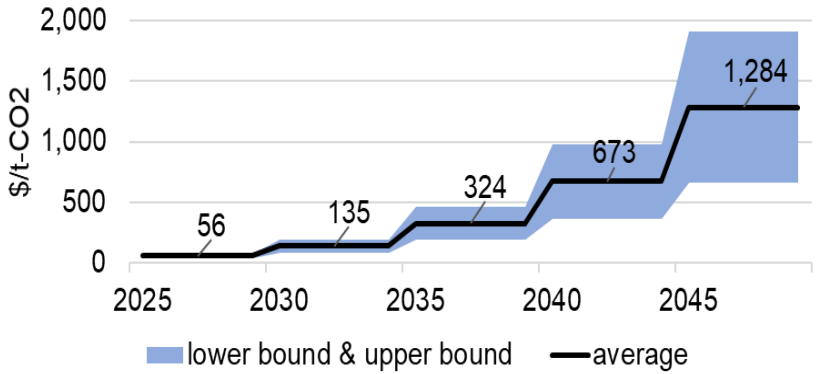
Source: Based on IEA (2021) and DCS data

Levy rates (provisional)

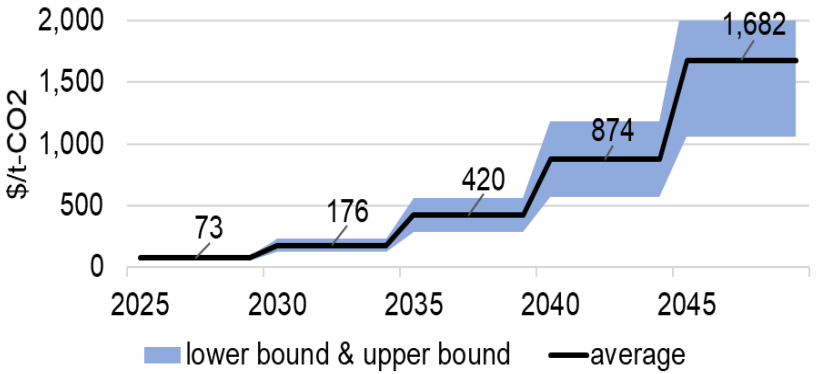
Levy rates are calculated under below 2 cases.

- **Case A** provides rebate **to fill the price gap** between zero-emission fuels and LSFO.
- **Case B** provides **further incentives ($10/GJ for each zero-emission fuel) in addition to the price gap**.

Case A: Providing incentives to fill the fuel price gap

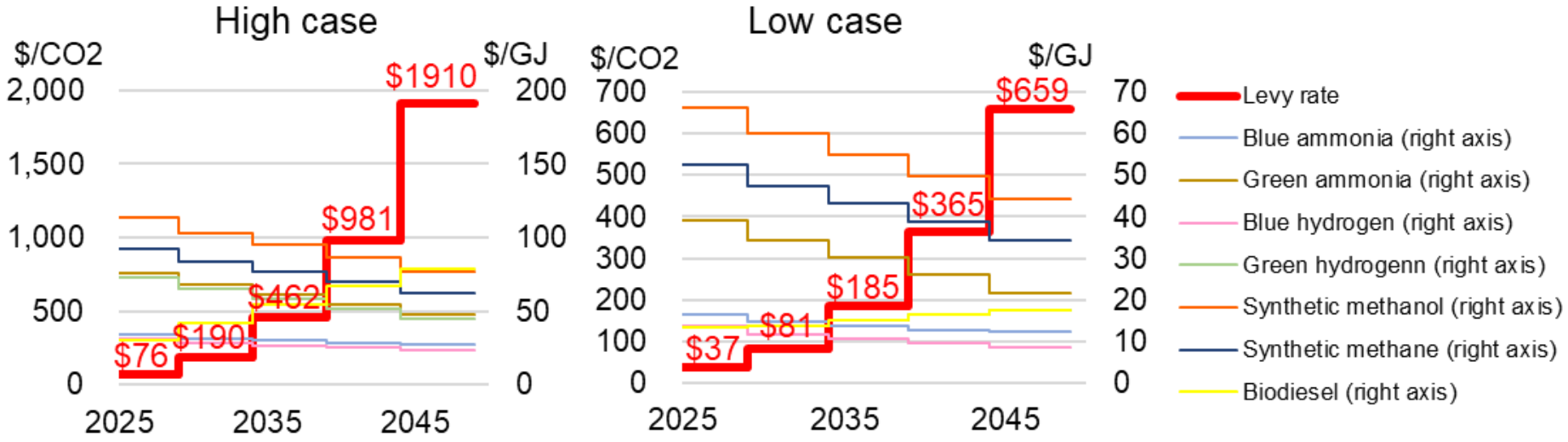


Case B: Providing further incentives in addition to fill the fuel price gap



Preliminary analysis

Detailed calculation (Case A)

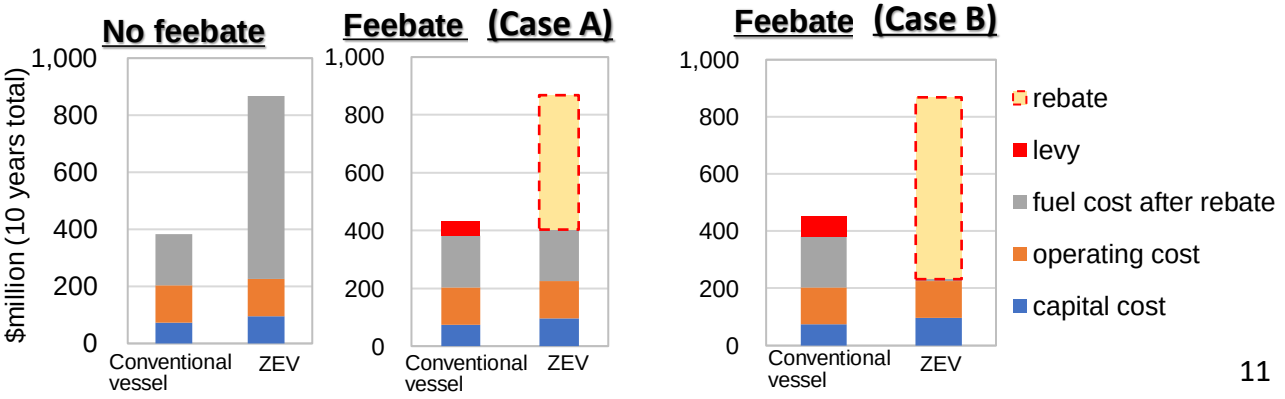


**High case uses highest value as projected fuel price*

**Low case uses lowest value as projected fuel price*

Cost analysis with 9000 TEU container vessel (ten years total)

	Conventional vessel	Zero emission vessel (ZEV)
Newbuild price	$90m	$117m(+30%)
Fuel price	$420/t-LSFO	$1510/t-LSFO
Levy rate	$120/t-LSFO	-
Rebate rate	-	$1090/t-LSFO
Other assumptions	15ys depreciation, 3% interest rate, charter rate: $13m/y, LSFO consumption: 43,000t/y	



Key findings from preliminary analysis

- Although a levy rate would vary depending on assumptions, **a levy rate well below US$100 per tonne of CO2 would likely ensure revenues to provide sufficient levels of incentives** at least in the initial period.
- Providing further incentives to accelerate deployment of ZEVs (Case B) would not necessarily raise the levy rate at significant levels.
- Although prices of zero-emission fuels are expected to decrease, reduction in fossil fuel demand may require higher levy rates, **implying the necessity of making adjustments, including possible termination of rebate mechanism**.

For making equitable transition

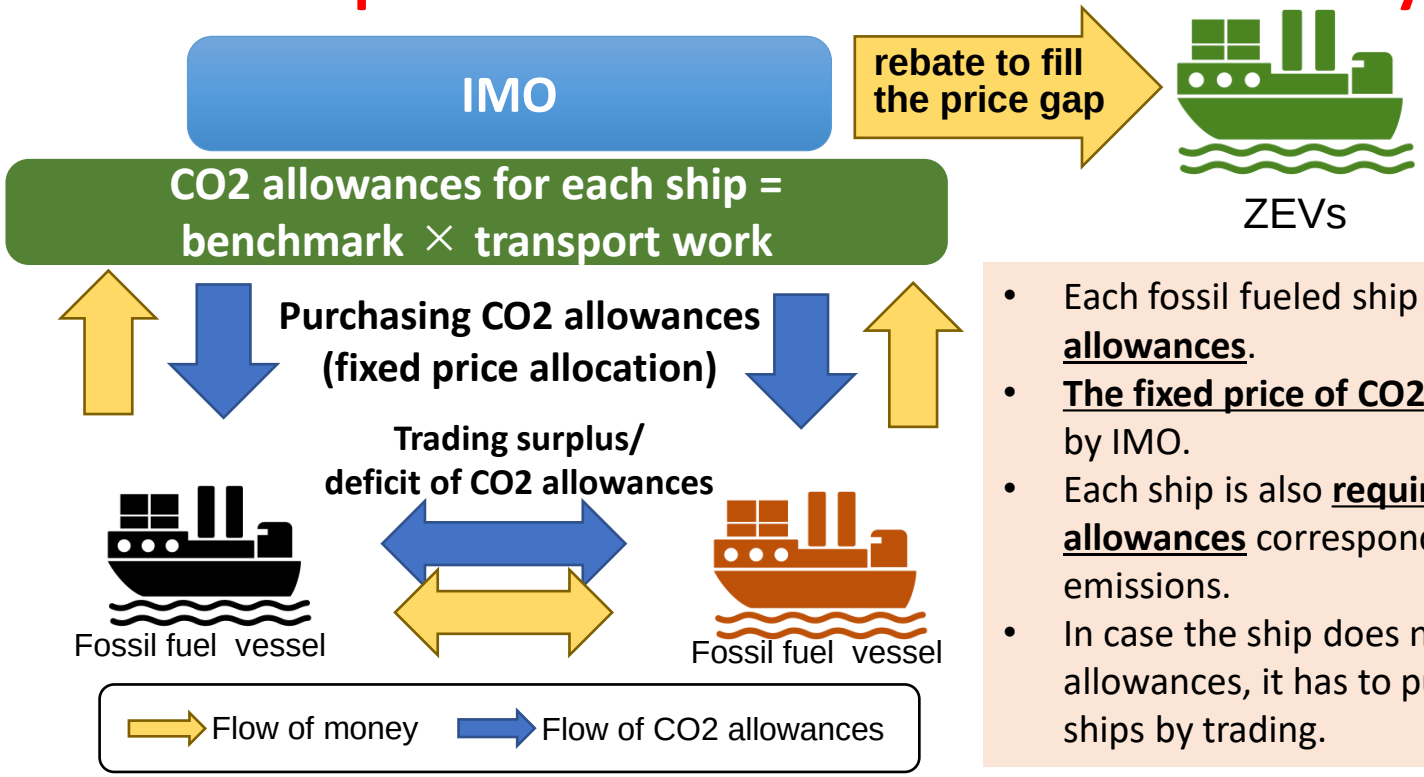
- While the larger portion should be used to provide incentives for first movers, **sufficient amount of revenues should also be allocated** to assist maritime GHG reduction efforts in vulnerable States, in particular SIDS and LDCs, **to make equitable transition**.
- **By adding the necessary amount to the levy rate**, it is **possible to raise the necessary amount** of revenue.

Japan Proposal(2):

fixed price allocation of CO2 allowances by benchmarking

- **Disadvantages** of feebate mechanism
  - ✓**Uncertainty in reduction levels** of GHG emissions
  - ✓**Possible conflict with sovereign rights** of taxation in some states
- **Another MBM concept** that could be applied instead of feebate mechanism

=> **fixed price allocation of CO2 allowances by benchmarking**



- Each fossil fueled ship is **allocated with CO2 allowances**.
- **The fixed price of CO2 allowance** is determined by IMO.
- Each ship is also **required to surrender allowances** corresponding to its actual CO2 emissions.
- In case the ship does not have enough allowances, it has to purchase them from other ships by trading.

Japan Proposal(2):
fixed price allocation of CO2 allowances by benchmarking

- CO2 allowances are determined by multiplying actual transport work with the benchmark (ex. carbon intensity).

CO2 allowances (t-CO2) =

transport work (tonne-mile) × benchmark (t-CO2/tonne-mile)

Amount of payment ($) =

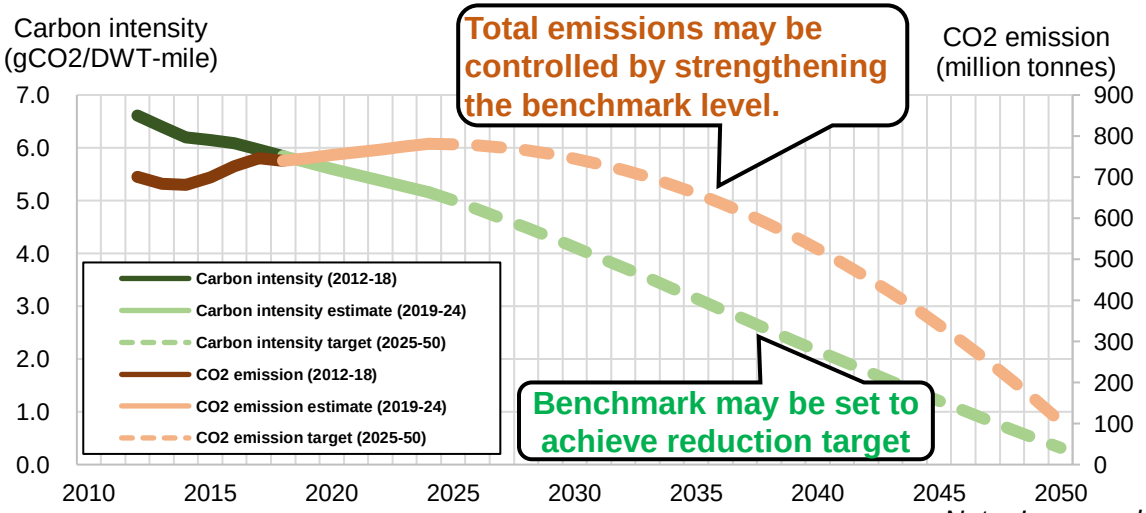
CO2 allowances (t-CO2) × fixed price ($/t-CO2)

- The fixed carbon price can be determined in the same way as setting the levy rate in the feebate mechanism.

Japan Proposal(2):

Features of this concept

- this concept both provides **increased certainty of reductions** and **predictability of the carbon price**.
  - ➢ The introduction of **benchmarks ensures higher levels of certainty in reduction of GHG emissions** compared to a simple levy scheme.



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  - ➢ As there is no limit on the total amount of emission allowances, **the system does not restrict shipping activities** and **the price of the allowances can be fixed** (no need for auctioning).

- This concept is more complex than the Feebate system, further considerations on details including the definition of benchmark and “transport work” are needed.

Summary （Features of the Japan's MBM concept）

- Japan's MBM concepts aims to **promote the introduction of zero-emission vessels**, which are essential for further GHG reduction (for realizing "zero-emission" international shipping.)
- The proposed MBM can secure the revenue **to provide the necessary incentives for zero-emission vessels**, such as compensating for fuel price gap, and also **to make equitable transition**.
- **Not unnecessarily collect excessive revenues** to minimize the impact on the shipping industry and seaborne trade.
- By fixing carbon price, **no price volatility** issues arise.
- **Not restrict shipping activities**.

Thank you for your kind attention.

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