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**Consideration of How to Progress the Matter of Reduction of  
GHG Emissions from Ships  
Impacts of GHG reduction measures on transport costs and on  
States**

Document submitted to the ISWG-GHG of the International  
Maritime Organization by Submitted by Belgium, France,  
Germany, Kiribati, the Marshall Islands,  
the Netherlands, Solomon Islands, Tonga, Tuvalu and ICHCA

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**CONSIDERATION OF HOW TO PROGRESS THE MATTER OF  
REDUCTION OF GHG EMISSIONS FROM SHIPS**

**Impacts of GHG reduction measures on transport costs and on States**

**Submitted by Belgium, France, Germany, Kiribati, the Marshall Islands,  
the Netherlands, Solomon Islands, Tonga, Tuvalu and ICHCA**

**SUMMARY**

*Executive summary:* Impacts of GHG emission reduction measures on States are brought about by changes in transport costs, domestic production and consumption. GHG emission reduction measures may influence some, but not all components of maritime transport costs. Several strategies exist to mitigate undesired impacts on States.

*Strategic direction:* 7.3

*High-level action:* 7.3.2

*Output:* 7.3.2.1

*Action to be taken:* Paragraph 26

*Related documents:* MEPC 68/5/1; MEPC 69/7/2; MEPC 70/7/6, MEPC 70/7/13, MEPC 70/18/Add.1 and MEPC 71/7/9

**Introduction**

1 At MEPC 70, the Committee approved the *Roadmap for developing a comprehensive IMO strategy on reduction of GHG emissions from ships* as set out in annex 11 to document MEPC 70/18/Add.1.

2 In accordance with the Roadmap, the Intersessional Working Group on Reduction of GHG Emissions from Ships (ISWG-GHG) should address (among other things) the impact on States, taking into account the High-level Action Plan, HLAP (resolution A.1098(29)).

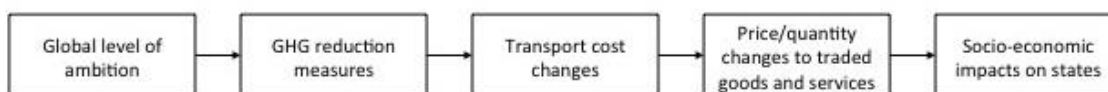
3 In document MEPC 70/7/13 it had been identified that one possible consequence of further measures to reduce GHG emissions of shipping might be a change in transport cost, which could in turn create an impact on States.

4 In addition to taking guidance from the Paris Agreement objectives, a number of United Nations Sustainable Development Goals (SDGs) overlap with the IMO GHG Roadmap, and are therefore relevant, particularly: Goal 7 (Ensure access to affordable, reliable, sustainable and modern energy for all); Goal 9 (Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation); Goal 13 (Requiring urgent action on climate change) and Goal 14 (Conserve and sustainably use the oceans, seas and marine resources for sustainable development).

5 To progress the IMO Roadmap discussions on the impact on States, this document proposes a framework that links GHG reduction measures and transport costs with impacts on States, and uses existing literature to summarize what is currently known on this topic.

### High-level description of links between measures for reducing GHG emissions and impact on States

6 Figure 1 shows a high-level generalized description of a suggested set of links between some of the different items on the Roadmap and how they could ultimately have a socio-economic impact on States. In order to achieve a global level of ambition, GHG reduction measures will be needed which may result in changes in transport costs. These could lead to changes in the value of imports and/or exports which in turn, could impact consumption or production of final goods both domestically and abroad. As detailed in document MEPC 70/7/13, the specifics of GHG reduction measures rather than the level of ambition determine the impact at a State level.



**Figure 1: Links showing the connection between the global level of ambition and socio-economic impacts on States**

7 The co-sponsors recognize that much of the detailed analysis of the impact on States will only be possible once a number of candidate GHG reduction measures have been proposed. However, even at this stage, useful progress can be made in Roadmap discussions by agreeing on a common framework and approach for the consideration of socio-economic impacts on States. This document sets out to develop such a framework.

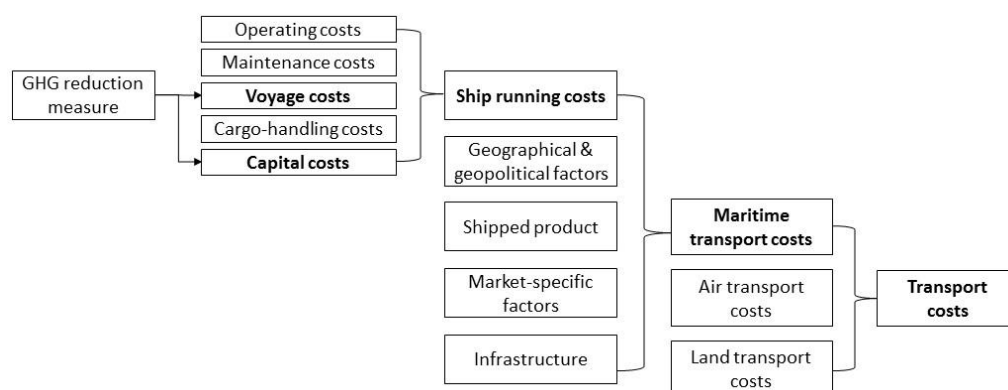
### Breaking down the main components of transport cost, and identifying which components could be affected by GHG reduction measures

8 The co-sponsors propose figure 2 (see next page) as a way to describe the components that make up a good's transport cost.

9 A ship's running costs comprise of five major component costs as suggested by Stopford (2009) and are shown here as part of figure 2. Operating costs relate to costs of consumables, crew, etc., whereas voyage costs relate to fuel costs, canal and port dues.

10 The co-sponsors acknowledge that measures to reduce shipping's GHG emissions could be expected to predominantly affect either or both a ship's voyage costs (e.g. change in fuel use, fuel costs or a carbon price) and capital costs (associated with additional fuel-efficient technology).

11 This breakdown shows that there are many determinants of transport cost and that only a subset of these determinants will be affected by a GHG reduction measure on shipping.



**Figure 2: A proposed structure for considering the different components that make up transport costs (UNCTAD 2015, Korinek 2011)**

12 The increase of the total price of a commodity is the product of two factors: the increase of maritime transport cost on the one hand; and the part of maritime transport cost in the total price of a commodity on the other hand. Both terms have to be significant so that a significant impact occurs. The first factor – increase of transport cost – can be seen as an average that affects the whole maritime traffic, uniformly. But the second one varies very largely with importing/exporting countries, and imported/exported commodities. This is a key element to understand the impacts on States and it suggests that some will be more affected than others.

### **Existing work done to estimate the impact of GHG reduction measures on transport costs and the study of transport cost related issues for Small Island Developing States (SIDS) and Least Developed Countries (LDCs)**

13 To date, several studies have assessed the impact of potential GHG reduction measures on maritime transport costs and in some cases also the value of imports and exports. Very few studies have evaluated the impact of changing transport costs on domestic consumption and production and hence assessed the possible scale of impact on States. Combined, the studies provide insight into the different methods available for evaluating the impact on transport costs or on States.

14 The main results of these studies are briefly summarized in table 1 (see next page). The co-sponsors note that the vast majority of these studies assume different market-based measures (MBMs) with varying price levels – but their inclusion here is not meant to reflect any preference by the co-sponsors towards this GHG reduction measure.

15 In addition, a number of studies have looked at the issue of transport costs in relation to SIDS and LDCs (ADB 2007, Anger et al. 2013, Faber et al. 2010, Moon 2013, Moon 2014, UNCTAD 2014a, 2014b). Moon (2014) for example, finds that over the period 2004-2013, SIDS have on average paid 2% higher freight costs for their imports than the world average of 8.1%, with the highest values being estimated for the Comoros (20.2%), Seychelles (17.9%), Solomon Islands (17.4%) and Grenada (17%). These are imports that SIDS often heavily rely on because of limited agricultural or mineral production or manufactures. Their higher transport costs are often due to a combination of low volumes of trade, trade deficits, geographical remoteness and distance from maritime belts or corridors, as well as relatively inefficient port facilities. Studying the maritime transport cost increases of a carbon price of USD 15-30/tonne CO<sub>2</sub>, Faber et al. (2010) estimate that cost increases would be around or below 0.1% of GDP for most countries, including developing countries, however would be considerably higher at 0.66% of GDP for SIDS.

		Kronbak et al. 2009 <sup>1</sup>	Faber and Rensma 2008 <sup>2</sup>		Faber et al. 2010 <sup>3</sup>	IMO 2010 <sup>4</sup>				Anger et al. 2013 <sup>5</sup>	Chowdhury and Dinwoodie 2011 <sup>6</sup>	
Inputs/assumptions	Transport segment/ product studied	Container			Handy- and capesize bulker, handysize product tanker, VLCC, container and ro-ro		Iron ore	Crude oil	Grains	Furniture & clothing	all	Coking and steam coal
	Fuel price	US\$ 550/tonne	US\$ 700/tonne	US\$ 450/tonne	US\$ 360.5/tonne					US\$ 738/tonne		
	Carbon price or bunker contribution/levy	US\$ 45/tonne CO <sub>2</sub>	US\$ 30/tonne CO <sub>2</sub>	US\$ 30/tonne CO <sub>2</sub>	US\$ 15-30/tonne	10% increase of bunker fuel price				US\$ 10-50/tonne CO <sub>2</sub>	1% increase in spot bunker price	
Findings	Increase in freight costs	1-5%	4-8%	6-12%	4-16%		5-14%	3.2-3.7%	2.5%		0.4-3.4%	0.6-1.36%
	Increase in import prices of goods	<1.9%	<1% for food imports		0.2-3%	<0.2% (similar for exports)		0.2-0.4%	0.2-0.7%	<0.2%	n.a.	

**Table 1: Summary of some of the key existing literature for estimating impact on States**

16 The following information relevant to the Roadmap can be deduced from these existing studies:

- .1 a substantial body of work already exists and can be leveraged by the ISWG-GHG;
- .2 most of the existing work focuses on primary impacts of changing transport costs on prices and costs. This may miss some important secondary impacts on States that occur due to production and consumption patterns (e.g. induced by changes in the relative prices of imports, exports and domestically produced goods). This omission can mean that the existing

<sup>1</sup> Kronbak, J., Yang, D. and Chen, G. 2009. *Effects on sea transport cost due to an International Fund for Greenhouse Gas Emissions from ships*. Results presented in MEPC 60/INF. 7.

<sup>2</sup> Faber, J. and Rensma, K. 2008. *Left on the High Seas: Global Climate Policies for International Transport*. Results presented in MEPC 58/4/39.

<sup>3</sup> Faber, J., Markowska, A., Eyring, V., Cionni, I. and Selstad, E. 2010. *A Global Maritime Emissions Trading System – Design and Impacts on the Shipping Sector, Countries and Regions*; Results presented in MEPC 60/4/54.

<sup>4</sup> IMO 2010. Full report of the work undertaken by the Expert Group on Feasibility Study and Impact Assessment of possible Market-based Measures, MEPC 61/INF.2.

<sup>5</sup> Anger, A., Faber, J., Koopman, M., van Velzen, A., Long, K., Pollitt, H., Comberti, C., Barker, T., Fazekas, D. and Blachowicz, A. 2013. *Research to assess impacts on developing countries of measures to address emissions in the international aviation and shipping sectors*.

<sup>6</sup> Chowdhury, N.T. and Dinwoodie, J. 2011. *The potential impact of a levy on bunker fuels on dry bulk spot freight markets*.

work overestimates the change in price (for example, because of substitution of goods from a different market), but also indicates that there may be further work needed to better understand the range of possible impacts on States;

- .3 depending on the level of the carbon price, the ultimate increase in costs of imports is often rather small, e.g. carbon/fuel cost increase of 10% often creates less than 1% increases in import prices, consistent with figure 2's demonstration that measures to reduce GHG emissions influence only a subset of the components of transport cost;
- .4 increases in the prices of goods due to GHG reduction measures can vary depending on the specifics of the commodity and the importing/exporting States. In general, the impact on import prices of commodities with a low value per unit of mass or volume is relatively high; and
- .5 there is a higher likelihood of negative impacts expected in SIDS and LDCs, due to their often remote and poorly serviced trade routes, high dependency on imports, already disproportionately high per capita transport costs, and low ability to absorb increased prices without significant social welfare impacts.

### **Strategies to mitigate the risks of undesired impacts on specific States**

17 The sections above have shown that measures to reduce GHG emissions from ships may impact maritime transport costs (both positively and negatively). In certain circumstances, this could create undesired impacts on some States.

18 In order to achieve an agreed global level of ambition, whilst mitigating the risk of an undesired impact on specific States, some potential options have already been suggested in document MEPC 70/7/13, which could include:

- .1 an exemption or phase-in through the design of the GHG reduction measure of a part of shipping emissions; or
- .2 for certain types of measures, a value transfer to mitigate the impact of the transport costs changes on certain parts of the shipping sector or on certain economies.

19 However, using figure 2 to have a more holistic perspective, we can identify that cost increases could be compensated in other ways. Value transfers might help reduce not only voyage and capital costs but also others costs.

20 By way of example and not necessarily implying suitability for all States, UNCTAD (2012) suggest three different strategies that national policymakers could focus on in order to lower their transport costs, i.e. 1) developing coastal shipping, 2) developing port competitiveness and 3) developing port hinterland connections. An overview of these different strategies and their expected effect on maritime transport costs is given in table 2. Some of these strategies could be supported by value transfers.

21 The co-sponsors suggest that these examples and similar concepts, could be considered when discussing options to mitigate the undesired impact of increased transport cost.

## Conclusions

22 The impact on States, brought about by transport cost changes resulting in changes in the value of imports and exports, availability and trade of goods, need to be thought about holistically, particularly due to this subject's overlap with both GHG mitigation from shipping, Paris Agreement objectives and SDGs. This holistic thinking should enable a balanced approach to risks and responses.

Strategy	1. Developing coastal shipping	2. Developing port competitiveness	3. Developing port hinterland connections
Selected field of policy making	<ul style="list-style-type: none"> <li>Opening cabotage to global competition or restricting it to domestic operators</li> <li>National ship registration policies</li> <li>Institutional framework (e.g. maritime authority)</li> <li>Investment policies and ownership model</li> <li>Maritime infrastructure (e.g. feeder ports)</li> </ul>	<ul style="list-style-type: none"> <li>Port administration related laws and regulations</li> <li>Port management structures and ownership model</li> <li>Institutional framework (e.g. port authority)</li> <li>Port operations</li> <li>Port infrastructure (e.g. links to other modes of transport)</li> </ul>	<ul style="list-style-type: none"> <li>Intermodal interface connecting port with national and regional markets (options: Rail, road, waterway and air transport)</li> <li>Regulatory and institutional framework for land transport modes</li> <li>Regional transit and transport development agreements</li> <li>Public private partnerships</li> </ul>
Potential impact on maritime transport costs	<ul style="list-style-type: none"> <li>The compliance with new ship registration requirements may reduce or increase operations costs</li> <li>Opening cabotage can increase competitive pressure thus reducing freight rates</li> <li>Improving coastal shipping infrastructure connects remote regions to international trade networks → modal shift to maritime transport and better economies of scale</li> </ul>	<ul style="list-style-type: none"> <li>Reducing port related charges for maritime transport service providers through:               <ol style="list-style-type: none"> <li>efficiency gains in port operations and port administration</li> <li>reasonable profit margin of port operator in a more competitive business environment → Includes charges for all port functions: Landlord, regulator, operator, marketer and cargo-handler (e.g. cargo handling fees, channel fees)</li> </ol> </li> </ul>	<ul style="list-style-type: none"> <li>Improved port connectivity:               <ol style="list-style-type: none"> <li>Increases cargo handling volumes in ports → lower unit handling costs</li> <li>attracts larger ships → lower unit transport costs</li> <li>attracts new transport service providers → lower margins due to increased competition</li> </ol> </li> </ul>

**Table 2: Three national policy related generic strategies to reduce maritime freight rates (UNCTAD 2012)**

23 Understanding the impact on States of further GHG reduction measures for shipping can be assisted by some existing studies. Current work shows mostly a relative small impact on transport costs associated with some of the measures because measures to reduce GHG emissions influence only a subset of the components of transport cost. However, some important variations in impact exist depending on the specifics of the commodity and State – pointing to a need for further work once proposals of measures are available.

24 Understanding specific impacts on SIDS and LDCs, which is a key component of the Roadmap discussions (consistent with the HLAP), requires further work.

25 If the analysis of candidate GHG reduction measures showed that impacts on certain States are undesirable, a number of strategies to mitigate negative impacts would be available. Consideration of how these strategies should be applied, alongside proposals of specific measures for the reduction of GHG emissions from ships, should be part of further work in the Roadmap as a contribution towards the revised strategy.

## Action requested of the Working Group

26 The Working Group is invited to consider the information provided above and take action as follows:

- .1 take note of the suggested framework that links impacts on transport costs and States and of existing evidence and findings; and
- .2 agree that impact on States and costs will be further considered within the Roadmap.