INTERNATIONAL MARITIME ORGANIZATION

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Agenda item 4

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PREVENTION OF AIR POLLUTION FROM SHIPS

Consideration of a market-based mechanism to improve the energy efficiency of ships based on the International GHG Fund

Submitted by Japan

SUMMARY

Executive summary:	This document provides, while supporting the basic direction of "International Contribution Fund for GHG Emissions from Ships" proposed by Denmark (MEPC 59/4/5), some suggestions on the implementation aspects of such a Fund scheme, as well as ideas on how to accelerate energy efficiency improvement for ships by creating stronger economic incentives
Strategic direction:	7.3
High-level action:	7.3.1
Planned output:	7.3.1.1 and 7.3.1.3
Action to be taken:	Paragraph 23
Related documents:	MEPC 57/4/4, MEPC 57/21, MEPC 57/INF.13; GHG-WG 1/5/1, GHG-WG 1/5/4; MEPC 58/4, MEPC 58/4/22, MEPC 58/23; MEPC 59/4/5, MEPC 59/4/35 and MEPC 59/INF.27

Introduction

1 At its fifty-eighth session, the Marine Environment Protection Committee (MEPC) considered documents related to market-based measures to reduce greenhouse gas (GHG) emissions from ships, including the proposal of an International Compensation Fund for GHG Emissions from Ships by Denmark (MEPC 58/4/22) and the proposal of an Emissions Trading Scheme (ETS) by France, Germany and Norway (MEPC 58/4/25). At MEPC 58, it was recognized that further submissions addressing all matters pertaining to market-based measures, including their feasibility, were needed to enable the Committee to hold an in-depth discussion at MEPC 59. Furthermore, it was agreed to dedicate enough time to hold such an in-depth discussion at MEPC 59. The Committee, therefore, requested delegations to provide as much

information as possible to MEPC 59 with a view to facilitating a more focused debate at that session (paragraphs 4.47 and 4.48 of MEPC 58/23).

Desirable direction of a market-based mechanism

2 As discussed in document MEPC 59/4/35 (Japan), a market-based framework for reduction of GHG emissions from ships should aim at accelerating the improvement of the energy efficiency of ships, instead of simply capping the total GHG emissions from ships. It is essential to establish a framework that can produce strong incentives for efficiency improvements so that new ships will be built as efficient as possible with applicable technology adopted as much as feasible, so both new and existing ships will be operated in an optimized way in terms of energy efficiency as individual ships and as a fleet.

3 As argued in document MEPC 59/4/35 (Japan), the capping in absolute term would not be an appropriate approach for mitigating the CO_2 emission from international shipping. Japan is of the view that, at this stage, the International GHG Fund scheme proposed by Denmark (MEPC 59/4/5), possibly with some modification as explained in this document, is a good basis for IMO to develop a market-based mechanism in order to achieve the objective stated in paragraph 2.

Some suggestions on the implementation aspects of the International GHG Fund

4 Japan supports the basic elements of International GHG Fund, such as:

.1 Ships pay GHG contributions when purchasing fuel, and such contributions go into the International GHG Fund;

.2 Such contributions are documented utilizing the bunker delivery note (BDN) and the evidence are kept on board;

.3 The International GHG Fund is established as a separate legal entity responsible for allocating the revenues;

.4 Collected contributions are allocated, at decisions by Parties, to finance:

- mitigation and adaptation projects for developing countries;
- research and development projects for more energy efficient ships;
- technical cooperation within the existing IMO framework; and
- administrative expenses for operation of the International GHG Fund.

5 Under the International GHG Fund scheme, a ship shall pay its contributions via a fuel supplier, who shall transfer the contribution to the International GHG Fund. There may be another option for further consideration; a ship directly pays the contributions to the International GHG Fund through established electronic accounts for individual ships (Figure 1).

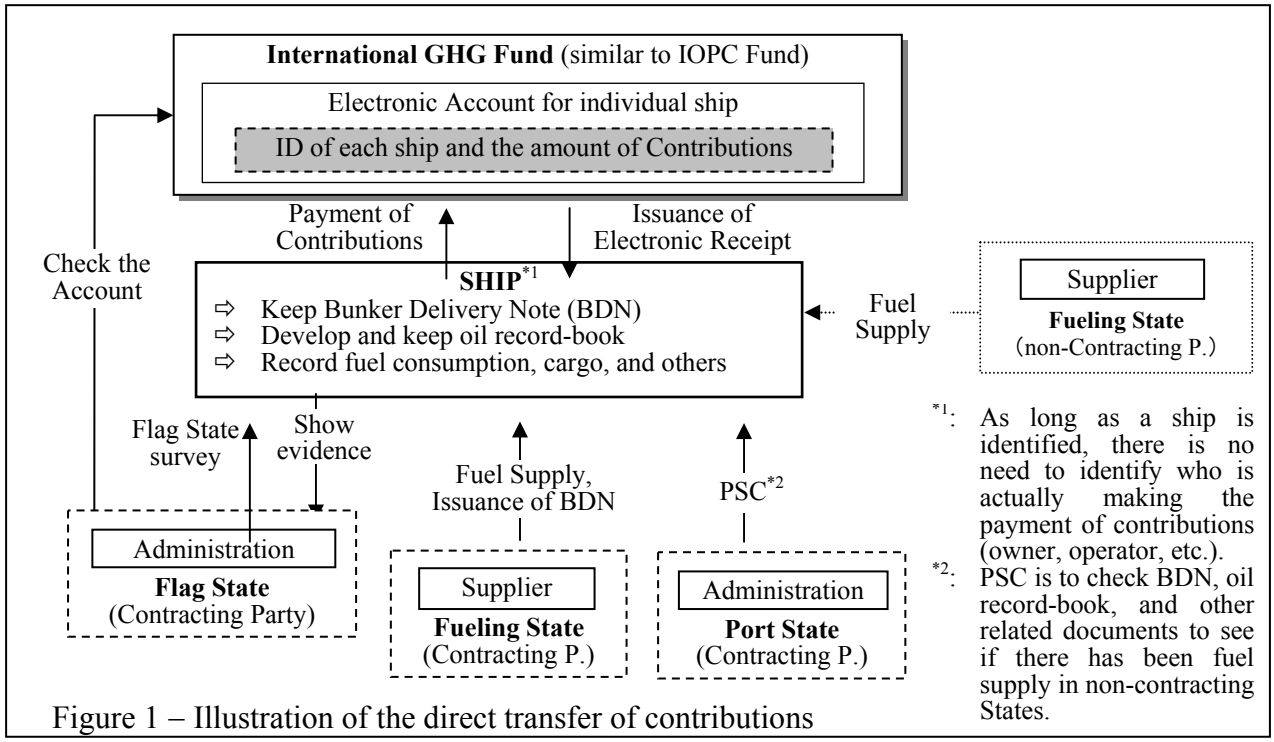

Figure 1 – Illustration of the direct transfer of contributions

6 Japan is of the opinion that such direct payment can reduce administrative costs included in the contribution collection, and contribute to the establishment of a fraud-free system of transferring the paid contributions to the International GHG Fund.

7 In addition to the specific purposes of the revenue allocation proposed by Denmark as summarized in paragraph 4.4 above, Japan is of the view that the following activities may deserve further consideration as additional items for the revenues:

Assisting the investment on maritime-related infrastructure in developing countries

.1 Development of port facilities may allow larger ships to serve such ports and thereby increase the overall energy efficiency of maritime transport. Development of navigation supporting systems may not only enhance safety at sea but also decrease GHG emissions from ships by, for example, reducing offshore waiting-time through improved navigation control.

Human resource development

.2 Investment in seafarer training and educational organizations in developing countries can contribute to better management of ship operations to improve the efficiency of ship operations, as well as to develop the entire maritime industry.

Development of ship recycling capability

.3 Capacity-building in ship recycling facilities in developing countries is the foundation for smooth replacement of aged ships with highly-efficient new ships, which can reduce GHG emissions from ships and also assist developing countries in promoting related businesses.

8 In considering the allocation of the collected contributions, the principle should be established that such financial assistance would not distort the competitive conditions of international shipping. For example, financial assistance for R&D projects should not be converted to subsidies for construction of ships, which would be significantly distortive.

Further insights on possible additional elements to International GHG Fund: "leveraged incentive scheme"

9 Drawing upon the International GHG Fund as argued in paragraphs 4 to 8 above (for the sake of argument, it is called "base scheme" hereafter), Japan would like to explore the possibilities of adding another element to the base scheme in order to further spur the efficiency improvement.

10 The concept is, after GHG contributions on marine bunker are collected and transferred to the Fund, to evaluate actual ship performance in terms of energy efficiency in a certain evaluation period, and to refund a part of the collected revenues to those ships ranked "excellent" based on those ships' performance. The purpose of this scheme is to accelerate the energy efficiency improvement of ships by creating stronger economic incentives for investments in improving the efficiency of ships, as well as for operational measures.

11 The base scheme itself does provide incentives to improve ship efficiency to the extent that improvement in efficiency can reduce fuel consumption and thus decrease both the fuel cost and GHG contributions, with the other elements such as the mass of transported cargoes and the sailed distance being kept equal. It should be noted that, under the base scheme, the degree of incentives to reduce fuel consumption and to improve the efficiency depends on the amount of GHG contributions per unit fuel. The leveraged incentive scheme is to amplify the magnitude of the impact of the GHG contributions per unit fuel by introducing the concept of refund to "excellent" ships.

12 An example on the comparison of these two schemes in terms of the magnitude of created incentives, using the economically justifiable level of investment as yardstick, is provided in Table 1. This example assumes that the fuel cost is 100 and the contributions are 10% of the fuel cost[1] for simple calculation, and it also assumes that there is available technology to increase energy efficiency by 10%. It is further assumed that the players expect in advance that 75% of their contributions will be refunded to them as an incentive if they achieve 10% efficiency improvement. The question here is how much the players would be willing to invest in such technology.

13 The expected reduction of the total costs by applying the technology (11 in base scheme, and 16.4 in leveraged incentive scheme) is equal to the willingness for the players to invest in such technology. Therefore, in the example in Table 1, the leveraged incentive scheme could create approximately 60 per cent stronger incentives for improvements than the base scheme. Such leverage expands as the percentage of the refund against the total contributions increases.

14 Intuition on a possible method to amplify the incentive may be to increase the rate of the contribution. However, even if the contribution rate is doubled, the incentive for investment to improve efficiency increases marginally from 11 to 12 in the base scheme of the example above (Table 2). On the other hand, the incentive would increase from 17.7 to 25.5 under the leveraged

[1] For the sake of illustrative explanation, simplistic assumptions are used here, and these are not the same as those examples of contribution level provided in the Danish proposal (MEPC 59/4/5); the assumptions do not prejudice any parameters of the mechanism, such as contribution rate.

incentive scheme using the same example. Thus, compared with the base scheme without a refund mechanism, the leveraged incentive scheme can amplify to a great extent the incentive for efficiency improvements. This is why Japan calls this scheme "leveraged incentive scheme".

Table 1 – Comparison of the magnitude of incentives created under both schemes

	Base scheme			Leveraged Incentive Scheme		
	Fuel Cost	Contributions	Total Cost	Fuel Cost	Contributions[*1]	Total Cost
In case no-investment No-improvement	100	10	110	100	10	110
In case investment and improvement	90	9	99	90	2.3[*2]	92.3[*1]
How much investment is economically justifiable	Up to 11 (= 110 –99)			Up to 17.7 (= 110 – 92.3[*2])		

Table 2 – Comparison of the magnitude of incentives, in case of the doubled contribution rate

	Base scheme			Leveraged Incentive Scheme		
	Fuel Cost	Contributions	Total Cost	Fuel Cost	Contributions[*1]	Total Cost
In case of no-investment no-improvement	100	20	120	100	20	120
In case of investment and improvement	90	18	108	90	4.5[*2]	94.5[*1]
How much investment is economically justifiable	Up to 12 (= 120 – 108)			Up to 25.5 (= 120 – 94.5[*2])		

[*1] After the deduction of the refund. [*2] Expected values.

15 The difficult part in designing and implementing the leveraged incentive scheme is transparent and fair evaluation of the performance of individual ships, which is to be utilized for rating ships. There may be several tools to evaluate ship performance. One of the available evaluation tools is Energy Efficiency Operational Indicator (EEOI) presently under review by MEPC. Based on the common understanding that the EEOI should not be used for comparison of ship performance between different ships, evaluation should not intend to compare the performance, i.e. absolute level of efficiency, of different ships. Rather, the evaluation using the EEOI would be to assess the relative improvement of efficiency of the same ship over a reasonably long time span.

16 Figure 2 shows an example on actual trend for the EEOI of an existing pure car carrier. The graph shows that there is much fluctuation of the EEOI depending on voyages[2], but it should be noted that the tendency can also be observed if the average EEOI is calculated for a reasonably long time span. The average EEOI of period 1 is 96.7 and that of period 2 is 87.3, which is approximately a 10% improvement of efficiency. During period 2, speed reduction has been implemented, but not during period 1. Thus, impact of such operational measures to improve the efficiency may not be seen clearly if one voyage or a short series of voyages only are picked up, but may be observed as a tendency of relative improvement if the monitoring is done over a sufficiently long time span.

[2] Each single voyage in Figure 2 is actually a series of voyages starting from one ballast voyage. In case of ballast voyage, EEOI will be infinite as the transported cargo mass is zero, therefore, instead of counting a voyage on strictly port-to-port basis, "a series of voyages" starting from one ballast voyage and ending just before the next ballast voyage is regarded as one voyage.

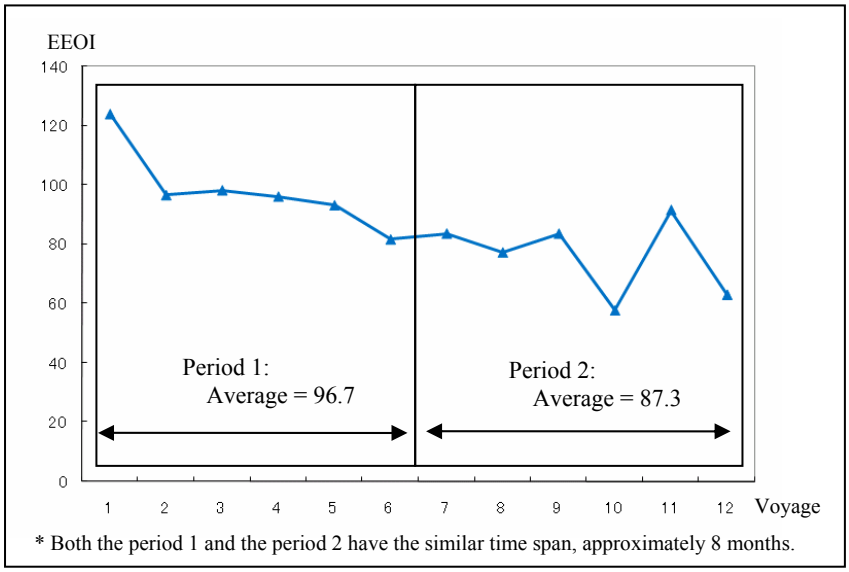

Figure 2 – EEOI of Pure Car Carrier

17 Rating of ships should be implemented by the International GHG Fund. The rating should be conducted within the same categories to be established depending on ship types and sizes – e.g., ship types and size categories used in the *Updated Study on Greenhouse Gas Emissions from Ships Phase 1 Report* (MEPC 58/INF.6) such as 60,000-79,999 DWT crude oil tankers. No comparison of ships over different categories should be conducted.

18 In developing the method of rating, it should be emphasized that the remaining room (or potential) to improve the efficiency of ships differs from ship to ship. A ship may already have taken most of the applicable operational measures to improve the efficiency, and thus it is difficult for that ship to continue improving the efficiency. Even a ship which has considerable potential for improvement will reach, if it continues its efforts, its limit for further improvements at some point. Rating of ships should take into account such saturation in efficiency improvements. Furthermore, rating should not be conducted based only on the absolute level of efficiency of a ship, as mentioned in paragraph 15. This means that, even if the absolute level of efficiency of a ship is worse than those of other ships, the ship should be labelled as "excellent" in case it has achieved "relative" improvements over a long time span.

19 Ships ranked as "excellent" by the International GHG Fund would benefit from refunding of the collected contributions. The amount of contributions to be allocated for refunds is to be determined by the International GHG Fund, and should be large enough (more than half) in view of the primary purpose of this scheme, i.e. to strengthen incentives for investing in improving the efficiency of ships. An electronic system for collection of contribution suggested in paragraph 5 could be a good fit to making refunds to ships ranked "excellent". Ships can choose either receiving the refunds from the Fund or retaining the refunds as credits for the contributions in the next year.

20 Besides the operation-based appraisal of ship efficiency performance, there may be other evaluation criteria and methods. One example is to evaluate new ships from the viewpoint of *early investment for improvements*, to reward those ships with much higher efficiency by utilizing advanced energy-saving technologies.

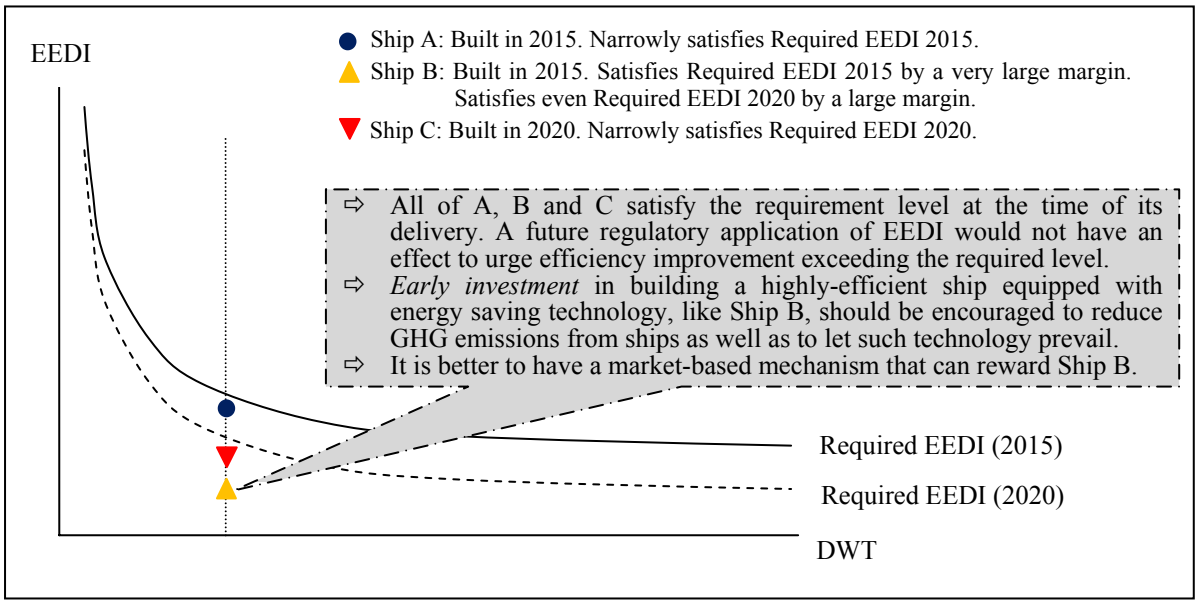

Figure 3 – Image of a future framework on EEDI

21 It should be noted that the above proposals on leveraged incentive scheme assumes that the technical measures currently under discussion – i.e. the Energy Efficiency Design Index (EEDI) and Ship Energy Management Plan (SEMP) – would be widely implemented by the time the market-based mechanism is established.

22 The additional elements to the base scheme of the International GHG Fund, explained in paragraphs 9 to 21, would certainly require careful consideration of various aspects such as evaluation criteria, data availability and methods of data collection, verification of the data, fairness and transparency of the rating, and refund methodology and decision-making by the Fund in these implementation aspects. Japan has undertaken a preliminary analysis on these issues and hopes to have an opportunity to share the outcome widely. Despite such challenges, Japan believes that our idea deserves further consideration by stakeholders in the maritime community worldwide, because it has a vast potential to achieve the overall objective of controlling CO_2 emissions from international shipping while enabling sustainable development of shipping activities that provides essential services to the global economy.

Action requested of the Committee

23 The Committee is invited to consider the proposal contained in this document on the International GHG Fund and possible additional elements to it, and take action as appropriate.