INTERNATIONAL MARITIME ORGANIZATION

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FURTHER TECHNICAL AND OPERATIONAL MEASURES FOR ENHANCING THE ENERGY EFFICIENCY OF INTERNATIONAL SHIPPING

Analysis of the data from the IMO Ship Fuel Oil Consumption Database Phase 2 of the three-step approach

Submitted by IACS and OCIMF

SUMMARY

Executive summary:	MEPC 73 agreed, in principle, that a method for conducting the future data analysis of the IMO Ship Fuel Oil Consumption Database needs to be developed as a priority. This document provides information on possible analysis of data from the IMO Ship Fuel Oil Consumption Database including identification of performance indicators and the possible further analyses that could be undertaken.
Strategic direction, if applicable:	3
Output:	3.7
Action to be taken:	Paragraph 14
Related documents:	MEPC 73/6/2; MEPC 72/6/1 and resolution MEPC.293(71)

Background

1 Document MEPC 73/6/2 (IACS and OCIMF), whilst taking into account the *2017 Guidelines for the development and management of the IMO Ship Fuel Oil Consumption Database* (resolution MEPC.293(71)), urged the Committee to develop and agree, as soon as possible, a methodology for the data analysis (phase 2) that is to be conducted by the Organization.

2 Following discussion, MEPC 73 agreed, in principle, that a methodology for conducting the data analysis needed to be developed as a priority with a view to its approval by MEPC 75.

3 This document discusses Performance Indicators (PIs) that could be used in the data analysis to be undertaken by the Organization. This recognizes that this data is being provided to the Organization in an aggregated and anonymized manner and therefore analysis of the performance of individual ships is not proposed.

Analysis of the data in the IMO Ship Fuel Oil Consumption Database

4 The data from the IMO Ship Fuel Oil Consumption Database can be used to estimate the total annual CO_2 emissions from shipping and assess the CO_2 emissions associated with different ship types and sizes. Discussion of the most appropriate ship types and sizes would require further consideration.

5 Comparing the IMO Fuel Oil Consumption data, for all ships of 5,000 gross tonnes and above, between multiple years could allow for:

.1 assessment of the change in total CO_2 emissions per annum between years and/or by different ship types and sizes;

.2 assessment of the change in the annual CO_2 emissions per distance travelled and CO_2 emissions per period of operation (e.g. year/day) between years for different ship types and sizes; and

.3 assessing the potential impact of current and future policy instruments, including the EEDI, over an appropriate period of time, to be decided.

6 The data from the IMO Fuel Oil Consumption Database could be used more accurately at a global level where many data points can be taken into consideration, rather than at an individual ship level.

7 In order to account for the variation between different ships the annual fuel oil consumption could be divided by either distance travelled or hours underway, respectively. It is useful to use both of these Performance Indicators (PIs) because work done in terms of distance travelled cannot be inferred for all ships.

8 Different performance indicators (PIs) are applicable to different ships. For example, for ships where the agreed proxy for cargo is design deadweight (DWT), it is appropriate to divide the fuel oil consumption by a product of distance travelled and deadweight to derive a proxy of transport work undertaken by the ship in "tonne-miles". A number of possible PIs are set out in the annex to this document. It should be noted that each PI value would be derived from the information provided per ship in the database, which can subsequently be used to obtain the emission characteristics for a selected group or fleet of ships.

9 Hours underway could be used to calculate daily fuel oil consumption for ships that cannot measure work by cargo carried. This PI is also applicable to ships where it is more difficult to develop meaningful proxies for transport work, such as dynamically positioned vessels, as explained in document MEPC 72/6/1 (IOGP and IMCA). Further PIs may be developed, as appropriate.

Further possible analyses

10 Being able to measure and understand the energy efficiency of the existing fleet is important, especially because the EEDI data that will be reported to the IMO Ship Fuel Oil Consumption Database is only applicable for recently built ships and is not applicable to all ships. In 2018, there were 3,622 ships reported in the EEDI database (MEPC 73/19, paragraph 5.64).

11 Using data from the IMO Ship and Company Particulars GISIS Module, which is already linked to the IMO Ship Fuel Oil Consumption Database (for cross-referencing IMO ship numbers), it may be possible to assess the impact of ship age and speed on CO_2 emissions and calculate the performance of existing ships. It is suggested that ship speed is necessary for a more accurate analysis of the energy efficiency of the existing fleet.

Summary and recommendations

12 This document, in paragraphs 4 to 9, suggests some potential analyses and outcomes using the data that is currently required to be provided to the IMO Ship Fuel Oil Consumption Database, as defined in appendix IX of MARPOL Annex VI.

13 A range of performance indicators are proposed, and it is recommended that as many as possible are used until there is a full understanding of the data collected from the IMO Ship Fuel Oil Consumption Database. Further this would allow a comparative analysis of the performance indicators to enable identification of the most appropriate performance indicator(s) for consideration in the decision-making step (step 3).

Action requested of the Committee

14 The Committee is invited to:

.1 consider and agree to the proposals for performance indicators and recommendations for analyses as set out in paragraphs 4 to 9 and in the annex to this document;

.2 consider further possible analyses, as indicated in paragraphs 10 and 11; and

.3 take action as appropriate.

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ANNEX

POSSIBLE PERFORMANCE INDICATORS (PIs) USING DATA FROM THE IMO SHIP FUEL OIL CONSUMPTION DATABASE

- PI 1 can be calculated for each fuel oil type, this particular calculation is also used commercially:

$$Fuel\ Oil\ consumed\ /\ mile = \frac{\sum_{i=1}^{n\ ships} \text{Fuel oil consumption}_{\text{Fuel Oil type}}}{\sum_{i=1}^{n\ ships} \text{Distance travelled}}$$

- PI 2 uses "Hours Underway" and could be used to measure the performance of ships that cannot measure transport work by cargo carried. This can be calculated for each fuel oil type in days:

$$Fuel\ Oil\ consumption/day = \frac{\sum_{i=1}^{n\ ships} 24.\ \text{Fuel oil consumption}_{\text{Fuel Oil type}}}{\sum_{i=1}^{n\ ships} \text{Hours Underway}}$$

- PI 3 multiplies each fuel oil type that is used by the associated carbon factor (represented by CF) to get the CO_2 emissions per year for each fuel oil, which is then summed to find the total CO_2 emissions for all of the fuel oil used per year:

$$CO_2\ emissions = \sum_{i=1}^{n\ ships} \sum_{Fuel\ oil\ type} \left(\text{Fuel Oil consumption}_{\text{Fuel oil type}}.\ \text{CF}_{\text{Fuel oil type}}\right)$$

- PI 4 calculates the CO_2 emissions per "Distance travelled":

$$CO_2\ emissions\ /\ mile = \frac{\sum_{i=1}^{n\ ships} \sum_{Fuel\ oil\ type} \left(\text{Fuel Oil consumption}_{\text{Fuel oil type}}.\ \text{CF}_{\text{Fuel oil type}}\right)}{\sum_{i=1}^{n\ ships} \text{Distance travelled}}$$

- PI 5 calculates the CO_2 emissions per "Hours Underway", which is calculated in days:

$$CO_2 emissions/day = \frac{\sum_{i=1}^{n\ ships} \sum_{Fuel\ oil\ type} \left(24.\ \text{Fuel Oil consumption}_{\text{Fuel oil type}}.\ \text{CF}_{\text{Fuel oil type}}\right)}{\sum_{i=1}^{n\ ships} \text{Hours underway}}$$

- PI 6 calculates the CO_2 emissions per tonne-mile:

$$CO_2 emissions/(tonne\ mile) = \frac{\sum_{i=1}^{n\ ships} \sum_{Fuel\ oil\ type} \left(\text{Fuel Oil consumption}_{\text{Fuel oil type}}.\ \text{CF}_{\text{Fuel oil type}}\right)}{\sum_{i=1}^{n\ ships} (\text{design deadweight (DWT)}\ .\ \text{Distance travelled})}$$