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ENERGY EFFICIENCY OF SHIPS

Review of the Carbon Intensity Indicator (CII) for bunker vessels

Submitted by IBIA

SUMMARY

Executive summary:	Preliminary data gathered by IBIA supports and confirms findings by other organizations in consultative status with the Organization, that is, for ships undertaking short voyages by duration as part of their standard service duties, compliance with the Carbon Intensity Indicator (CII) requirements under regulation 28 of MARPOL Annex VI is already challenging. As part of the current review of the CII, consideration is requested for an amendment of the CII Guidelines, G5 with the inclusion, as with other ship types, of a specific correction factor for bunker vessels that are, and will always be, constrained by the vital operational duty they undertake for international shipping that consists primarily of short voyages (duration).
Strategic direction, if applicable:	3
Output:	3.2
Action to be taken:	Paragraph 15
Related documents:	MEPC 80/17/Add.1; MEPC 81/16, MEPC 81/INF.27, MEPC 81/INF.28 and ISWG-GHG 8/3/1

Introduction

1 MEPC 76 adopted amendments to MARPOL Annex VI that included requirements for the short-term GHG reduction measure, including the Carbon Intensity Indicator (CII) and the CII based annual rating. The short-term measure entered into force in November 2022 and came into effect on 1 January 2023.

2 MEPC 80 approved the Review plan of the short-term GHG reduction measure that includes a data gathering stage from MEPC 80 to MEPC 82 which will be followed by a data analysis stage (MEPC 80/17/Add.1, annex 13).

3 Increasing evidence presented by the shipping industry identifies the challenges for ships across the international fleet to comply with the current CII requirements resulting in a detailed discussion being held at MEPC 81. During that discussion, some delegations expressed their expectation that the CII review process would result in a fairer system but also cautioned that, if left unaddressed, this situation would be likely to lead to unintended consequences for the decarbonization process and penalize ships for factors that were beyond their control, for example due to short voyages and extended port waiting time (MEPC 81/16, paragraph 6.19).

4 The Committee noted the concerns expressed regarding the shortcomings and unintended consequences of the CII mechanism and the general agreement that these concerns should be fully considered and addressed during the CII review process (MEPC 81/16, paragraph 6.23.2).

Impact of short duration voyages on the CII

5 The two key variable parameters for determining the CII are the CO_2 emissions resulting from fuel oil used by the ship and the distance travelled/voyage duration by the ship. Data collected by IBIA indicates that for applicable bunker vessels by far the majority are achieving a E rating for the CII and some a D rating. No ships analysed are able to achieve the minimum C rating requirement for tankers. The requirements are to be strengthened in 2025 and 2026 and are expected to be strengthened further following the review of the CII initiated by MEPC 80.

6 MEPC 81 received information on the CII and, in particular, on the impact of short voyages, port waiting time and ship loading conditions on attained CII, based on a study by INTERCARGO and five classification societies (ABS, BV, Class NK, DNV and LR) using the IMO DCS and EU MRV data for bulk carriers (MEPC 81/INF.27).

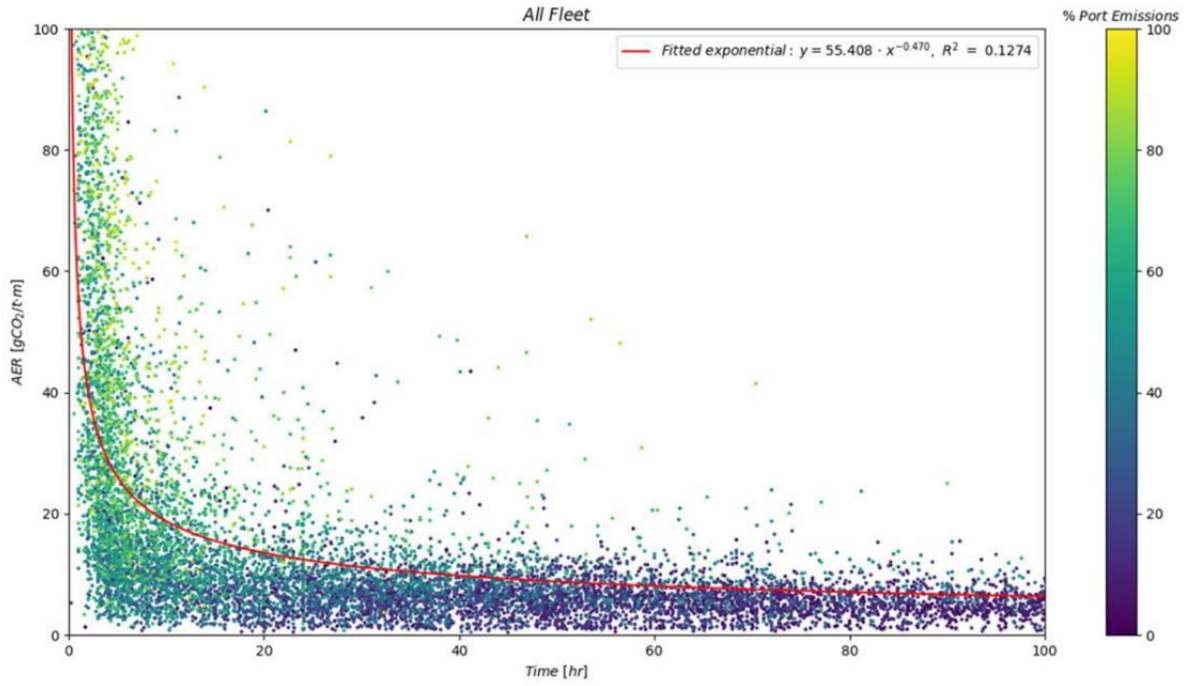


Figure 1: Distribution of voyage AER towards voyage duration

7 INTERCARGO specifically identified in their document MEPC 81/INF.28 the significant impact of short voyages on the attained CII and concluded that "the attained CII on voyage basis increases as the time spent at sea decreases, especially for short voyages i.e. less than 72 hours of duration." Figure 1, taken from document MEPC 81/INF.28, illustrates the regression curve for the analysis undertaken on the effect of voyage duration (hours) on the CII and clearly indicates the acute impact of short duration voyages, i.e. less than 20 hours, that is the operational duty of the majority of bunker vessels.

8 Using the regression equation for the distribution set out in figure 1, the CII (gCO_2/tonne.mile) can be determined for voyage durations that reflect the standard duties of bunker vessel operations, which can be seen from table 1.

Table 1: CII (gCO_2/tonne.mile) relative to voyage duration (hours)

Voyage duration (hours)	CII (gCO_2/tonne.mile)
0.5	76.746
1	55.408
2	40.003
3	33.062
4	28.880
5	26.005
10	18.775
20	13.555

9 Table 1 identifies the specific challenge for bunker vessels to comply with the current CII requirements as the very nature of their operational duty is undertaking voyages of predominantly short durations. Furthermore, there is very limited, if any, possibility of enhancing the CII rating as the duty of bunker vessels is determined by the service they provide to international shipping. It is evident that bunker vessels have all the negatives of some ship sectors, i.e. frequent loading/unloading of product, frequent changes of speed, frequent rudder movements, without the opportunity for long distance voyages ("distance travelled").

10 IBIA notes that the CII Guidelines, G5 (resolution MEPC.355(78)) for calculating the CII already provide for a correction factor for shuttle tankers or STS voyages on tankers (AF_{Tanker}) based on tonnage (DWT) of the ship and also a cubic correction factor for chemical tankers (f_c). However, in particular, AF_{Tanker}, has been determined for operational duties up to 600 nautical miles and that the time for each voyage (which does not include port or discharge time) is limited to a maximum of 72 hours. As identified above, the operational duty for bunker vessels is significantly more limited, especially in terms of the parameter "distance travelled" (voyage duration), providing an additional penalty for calculating the CII.

11 IBIA also notes that the Steering Committee on the comprehensive impact assessment of the basket of mid-term GHG reduction measures has included work on the impact on the fleet (Task 2) by DNV. For their analysis* DNV used an assumption on the future CII requirements as follows:

> "*Strengthened CII reduction factors is expected to be established from 2027 until 2030 based on the upcoming CII review. We assume the IMO will increase the CII reduction requirement relative to the segment specific reference line by 2 percentage points per year, reaching 19% reduction in 2030. This is the same increase in the rate as between 2023 and 2026. From 2030 and onwards the CII requirement stays at the same level. We assume no changes to the scope of the CII, on ship types, sizes and emissions*."

12 The above assumption is concerning in that, as demonstrated above, bunker vessels are already finding the current CII requirements challenging. To that effect, IBIA wishes to highlight for the Committee's consideration, and to reflect bunker vessel operational duty more appropriately, possible remedial action.

13 Document ISWG-GHG 8/3/1 (Greece) analysed operational factors affecting fuel consumption of small and medium size tankers with frequent port visits. The analysis included a total of 3,281 voyages and showed that the attained CII (AER) increases as the time spent at sea decreases. Furthermore, that the attained CII increase is generally observed for voyages with a duration below 72 hours (less than three days). From the analysis of data, Greece determined a short voyage (duration) correction factor for ships with deadweight up to 40,000 tonnes as follows:

$$Cfsv = 0.2448 \cdot time^{0.323}$$

14 This correction factor was applied for illustration purposes to two bunker vessels and demonstrates that adjusted CII for some bunker vessels (higher DWT) would likely meet the current and possible strengthened CII requirement up to 2030 while for other bunker vessels (lower DWT), even with an adjusted CII rating, there would be a likely need to continue to undertake further remedial action to meet the "C" rating requirement for the CII, especially should it be strengthened in the future. The analysis is set out in the annex to this document.

Action requested of the Committee

15 The Committee is invited to note the information for bunker vessels submitted under the data gathering stage of the Review plan and specifically to consider amending the CII Guidelines, G5 to include for bunker vessels the short voyage (duration) correction factor set out in paragraph 13, and to take action as appropriate.

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* DNV (2024) Comprehensive impact assessment of the basket of candidate mid-term GHG reduction measures – Task 2: Assessment of impacts on the fleet. Final report, section B.3., pg.91, 12 July 2024.

ANNEX

IMPACT OF SHORT-VOYAGE (DURATION) CORRECTION FACTOR ON EXAMPLE BUNKER VESSELS

Two example ships, Ship A and Ship B, are used to illustrate the impact of the use of the short-voyage (duration) correction factor on bunker vessels (tankers).

The CII values determined from the regression analysis highlighted (MEPC 81/INF.28) and set out in table 1 are adjusted using the short voyage correction factors calculated for the duration of the voyage undertaken. These adjusted CII values are then compared against the CII requirement (mid-point C rating), calculated for the ship using the DWT of the ship, for each calendar year.

Ship A = 9,466 DWT bunker vessel
Ship B = 22,000 DWT bunker vessel

CII requirement (mid-point C rating) for ship highlighted in YELLOW

CII adjusted using correction factor that is rated C or superior is highlighted in GREEN

SHIP A		Year	2022	2023	2024	2025	2026	2027*	2028*	2029*	2030*
		Reduction %	Reference	0.05	0.07	0.09	0.11	0.13	0.15	0.17	0.19
		CII (mid-point C)	**19.699**	**18.714**	**18.320**	**17.926**	**17.532**	**17.138**	**16.744**	**16.350**	**15.956**
voyage duration (hours)	CII (gCO2/tn.mile)	Correction Factor	Adjusted CII for Ship A								
0.5	76.746	0.196	15.019	15.019	15.019	15.019	15.019	15.019	15.019	15.019	15.019
1	55.408	0.245	13.564	13.564	13.564	13.564	13.564	13.564	13.564	13.564	13.564
2	40.003	0.306	12.250	12.250	12.250	12.250	12.250	12.250	12.250	12.250	12.250
3	33.062	0.349	11.541	11.541	11.541	11.541	11.541	11.541	11.541	11.541	11.541
4	28.880	0.383	11.063	11.063	11.063	11.063	11.063	11.063	11.063	11.063	11.063
5	26.005	0.412	10.706	10.706	10.706	10.706	10.706	10.706	10.706	10.706	10.706
10	18.775	0.515	9.669	9.669	9.669	9.669	9.669	9.669	9.669	9.669	9.669
20	13.555	0.644	8.732	8.732	8.732	8.732	8.732	8.732	8.732	8.732	8.732

* possible CII requirements for years 2027 to 2030

SHIP B		Year	2022	2023	2024	2025	2026	2027*	2028*	2029*	2030*
		Reduction %	Reference	0.05	0.07	0.09	0.11	0.13	0.15	0.17	0.19
		CII (mid-point C)	**11.777**	**11.188**	**10.953**	**10.717**	**10.482**	**10.246**	**10.010**	**9.775**	**9.539**
voyage duration (hours)	CII (gCO2/tn.mile)	Correction Factor	Adjusted CII for Ship B								
0.5	76.746	0.196	15.019	15.019	15.019	15.019	15.019	15.019	15.019	15.019	15.019
1	55.408	0.245	13.564	13.564	13.564	13.564	13.564	13.564	13.564	13.564	13.564
2	40.003	0.306	12.250	12.250	12.250	12.250	12.250	12.250	12.250	12.250	12.250
3	33.062	0.349	11.541	11.541	11.541	11.541	11.541	11.541	11.541	11.541	11.541
4	28.880	0.383	11.063	11.063	11.063	11.063	11.063	11.063	11.063	11.063	11.063
5	26.005	0.412	10.706	10.706	10.706	10.706	10.706	10.706	10.706	10.706	10.706
10	18.775	0.515	9.669	9.669	9.669	9.669	9.669	9.669	9.669	9.669	9.669
20	13.555	0.644	8.732	8.732	8.732	8.732	8.732	8.732	8.732	8.732	8.732

* possible CII requirements for years 2027 to 2030