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GUIDELINES SUPPORTING THE CII FRAMEWORK

Proposal concerning CII reference line for vehicle carriers

Submitted by WSC

SUMMARY

Executive summary:	This document proposes a refinement of the CII reference line for vehicle carriers to better reflect the three distinctive vehicle carrier subgroups that occur within the vehicle carrier ship type
Strategic direction, if applicable:	3
Output:	3.2
Action to be taken:	Paragraph 18
Related documents:	MEPC 76/7/5 and MEPC 76/INF.10

Introduction

1 The IMO Carbon Intensity Indicator (CII) framework seeks to rate the performance of ships using a reference line derived from known or estimated data for a given ship type. For some ship types a single regression line plotted across the full range of ship sizes can serve as a fair and accurate reference line for evaluating CII performance for all ships of that type. However, other ship types consist of groupings of distinct ship categories (often characterized by ship sizes that serve a unique commercial purpose) and in those cases the reference line is split. That ensures the baseline better reflects the different characteristics of the different categories, thereby making the reference line more accurate and equitable as a whole.

2 This document examines the unique characteristics of two groups within the vehicle carrier ship type where one group consists of three subgroups and lays out a detailed proposal to modify the reference line to reflect more fairly and accurately the groups that make up the vehicle carrier fleet. The CII reference line is a retroactive application of CII values for existing ships. Consequently, it is important that the reference line reflect the various groups within the ship type where distinct design characteristics are present.

Understanding the vehicle carrier fleet

3 The vehicle carrier fleet consists of two main groups of ships: "short-sea" and "deep-sea" ships. The deep-sea set can be further divided into three distinct subgroups of ships. The outline of the two categories and the relevant subgroups is as follows:

.1 "Short-sea" vehicle carriers, typically below 30,000 GT, most often serve the automotive industry's logistics chain as feeders for the deep-sea transportation of vehicles. In specific areas, such as northern Europe or the Mediterranean region, they are used for the regional, non-transoceanic transport of vehicles.

Short-sea vehicle carriers, which cover a typical size range of 1,000 to 4,000 car units of capacity, face competition from land-based transportation modes. The design constraints for these ships are size limitations in the various ports they serve, as well as speed due to the competition with land-based transport modes.

.2 "Deep-sea" vehicle carriers are ships designed for long-haul carriage of roll-on/roll-off cargo, often between continents. The deep-sea vehicle carrier fleet is composed of the following design groups:

- "Pure Car Carriers" and "Pure Car Truck Carriers" (PCC/PCTC, hereinafter Group 2a), that dominate the deep-sea fleet, and were designed to transit the Panama Canal prior to its extension. In addition, these ships have a maximum length of 200 metres that originated from terminal restrictions in Japan. These ships can typically carry 5,000 to 6,500 units. Their focus is normally on car trades and the ships have fewer liftable decks, giving less flexibility to be adapted to the profile of different rolling cargo types available in the market. Typically, the stern quarter ramp on such ships has a 150-tonne safe working load (SWL), which is low relative to other ships in the deep-sea category.

- Longer/extended vehicle carriers, or "Large Car Truck Carriers" (LCTCs, hereinafter Group 2b) started appearing from early 2000. To achieve greater economy of scale, such ships have lengths up to 265 metres to achieve a car capacity in the range 7,000 to 8,000 units. In this group, there are some ships specifically designed to carry heavier rolling cargo, such as mining, construction and agricultural machinery. Normally such ships feature a higher number of liftable decks to give more flexibility to carry such high and heavy cargo units. The stern quarter ramp capacity is normally 200 to 500 tonnes SWL. These ships were also designed and ordered prior to the extension of the Panama Canal.

- The final "Post-Panamax" subgroup of deep-sea ships was designed for the expanded Panama Canal (hereinafter Group 2c). This group came into the market around 2015-2016 and these ships are typically 200 metres long, but range in breadth from 34 to 38 metres. The increased beam means that they need less ballast water to fulfil stability requirements. This, in turn, results in less demand for displacement and thus less power is needed to propel the ship at the same speed as compared to earlier designs. The car capacity of these ships is like the LCTCs described in the previous point, i.e. approximately 7,000 to 8,000 units.

The following graphic (figure 1) offers a convenient reference to reference what the respective subgroups look like when plotted by weight (GT) and length (m).

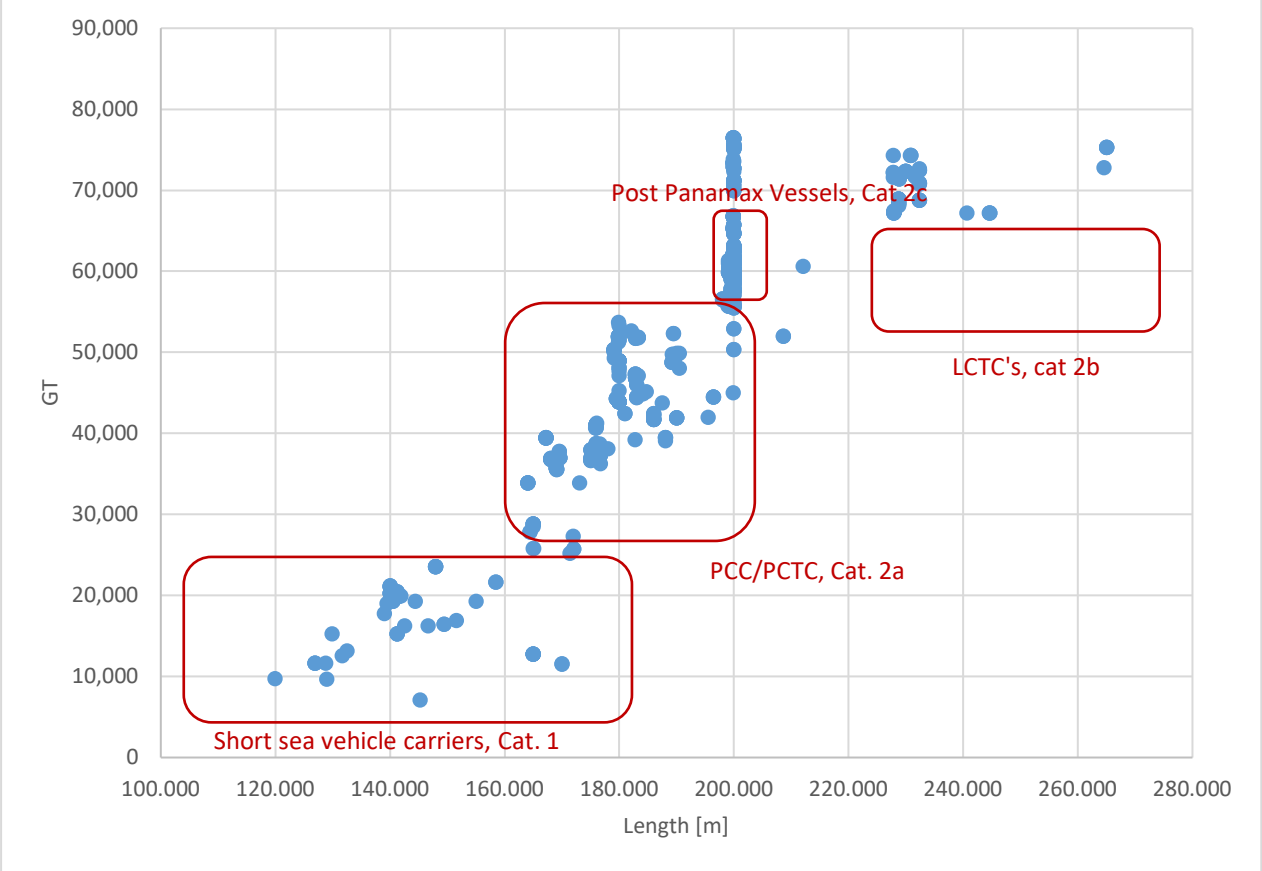

Figure 1: Vehicle carrier fleet composition (Source IHS Sea-Web database)

4 Examining the vehicle carrier fleet using available data reveals the following fleet composition:

Table 1: Number of ships in the various databases and subgroups

Vehicle Carrier Sub-Group	IHS (Sea-Web)	IMO DCS	EU MRV
Total number of ships	735	668	388
Short-Sea <30,000 GT	74	Unknown	15
Deep-sea Group 2a	546	Unknown	278
Deep-sea Group 2b	62	Unknown	37
Deep-sea Group 2c	83	Unknown	49

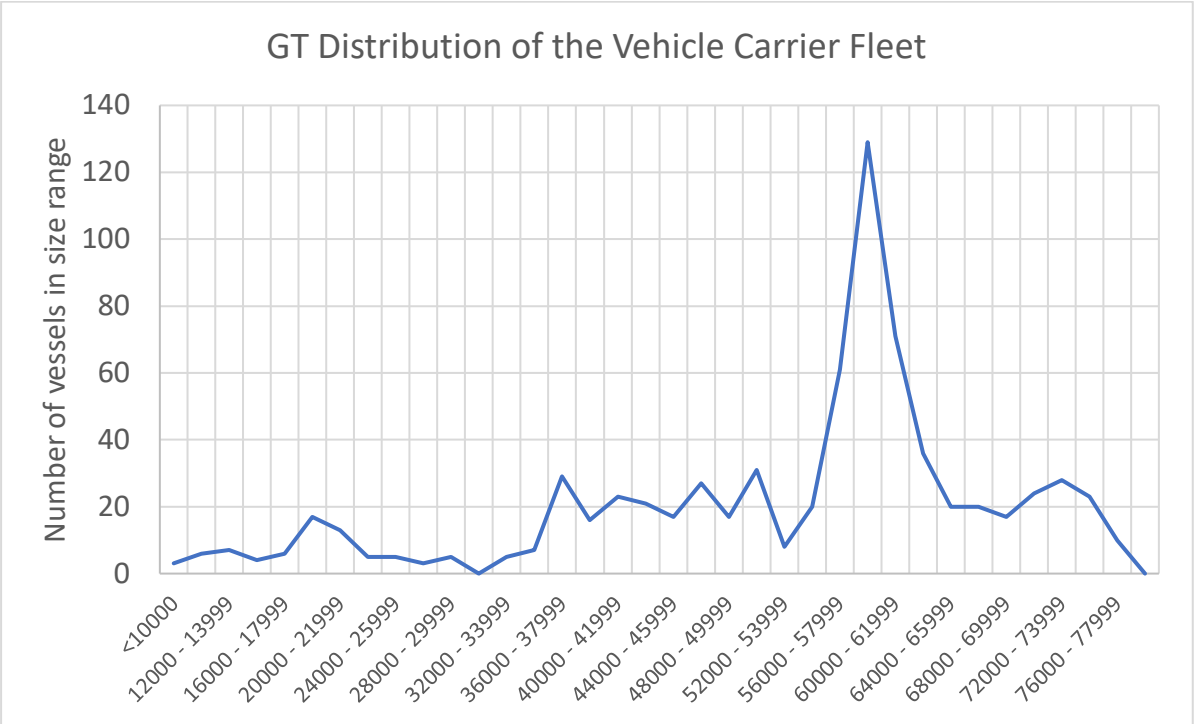

Figure 2: Vehicle carrier fleet GT distribution (Source IHS Sea-Web database)

5 As can be seen from figure 2, 74% of the total PCC/PCTCs (Group 2a) dominate the vehicle carrier fleet.

Reference line analysis

6 As IMO DCS data is not available publicly, the analysis has been done based on the EU MRV 2019 data.

7 To analyse how the various subgroups of the vehicle carrier fleet fit the reference line derived from the 2019 DCS data, each subgroup has been provided with a reference line following the same power regression line principle. Additionally, a line has been fitted through the combined "short-sea" (Group 1) and LCTC (Group 2b) fleets.

8 In figure 3, the purple line is the 2019 DCS reference line for the entire vehicle carrier fleet. The blue dots represent the PCC/PCTCs (Group 2a) that constitute the majority of the vehicle carrier fleet. A reference line was drawn using the MRV data (blue line). There is good consistency which indicates that the reference line produced on MRV data matches well with the IMO DCS data for this group.

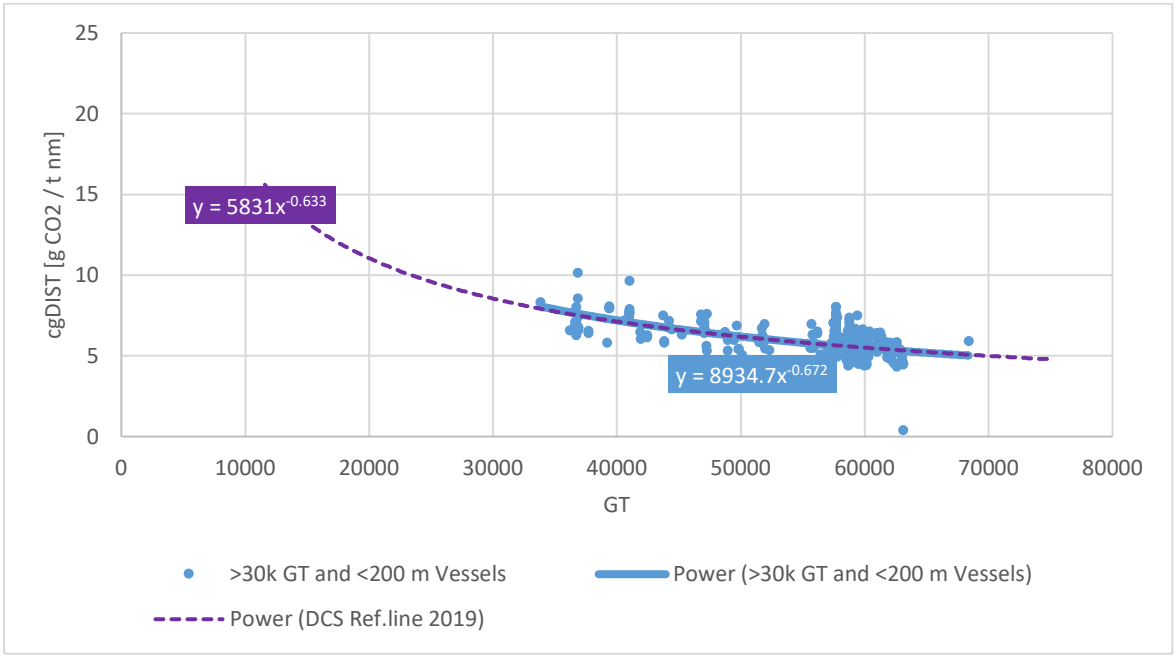

Figure 3: Vehicle carrier fleet reference line PCC/PCTC segment (Source IHS Sea-Web database and EU MRV Data)

9 In figure 4, the purple line is the DCS 2019 reference line for the entire vehicle carrier fleet. The orange dots represent the "short-sea" vehicle carrier fleet (Group 1) and the green dots the LCTCs (Group 2b). If a reference line consisting of only these two groups was made, the regression line shown in light green below would be the result. It is noted that the power regression line associated with these groups follows the course of the IMO DCS reference line, but the resulting line is about 20% above at the lower end and about 15% above at the higher end.

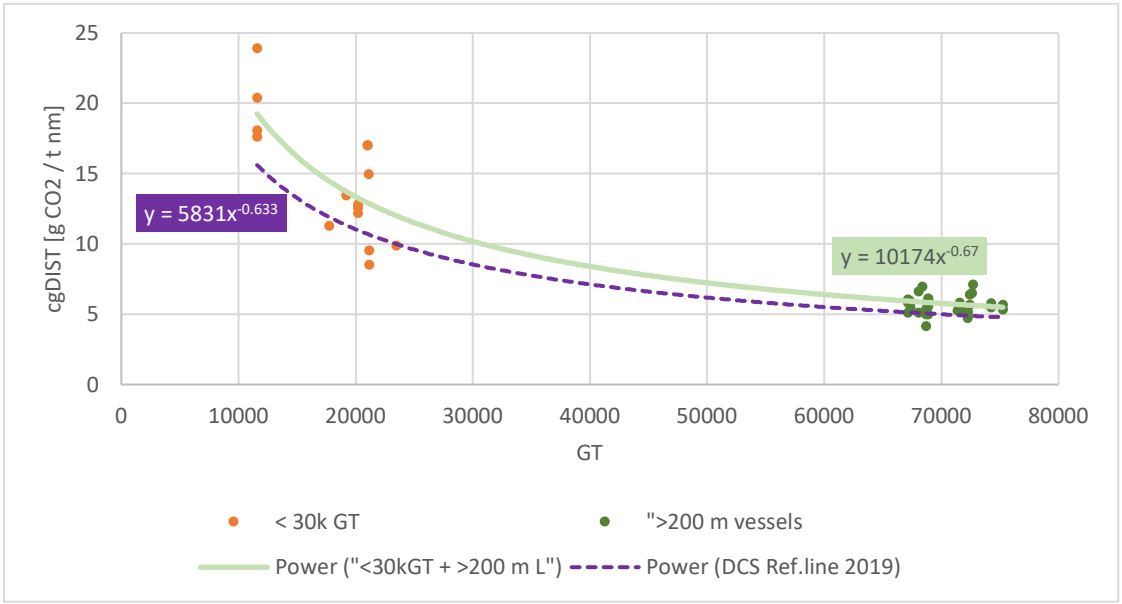

Figure 4: Vehicle carrier fleet reference line results for short-sea and LCTC fleet (Source IHS Sea-Web database and EU MRV Data)

10 Based on the findings in paragraphs 7 to 9, it can be concluded that:

.1 the group consisting of PCC/PCTCs (Group 2a) dominates the vertical position of the reference line due to the size of this group in relation to the other groups; and

.2 the short-sea group (Group 1) and LCTCs (Group 2b) are negatively influenced by the PCC/PCTC group (Group 2a) by a significant amount because Group 2a is so predominant due to the high number of ships clustered in Group 2a. For this reason, the slope of the reference line for the smaller number of ships found in Group 1 and Group 2b are adversely impacted.

11 Introducing a reference line that does not take into account the significant differences in the design of the ships in Groups 1 and 2b introduces competitive distortion because many of the larger LCTC ships (Group 2b) and the smaller short-sea vehicle carriers (Group 1) would be treated more harshly than the predominant ship designs. This would occur because setting one reference line for the entire vehicle carrier fleet is an overly simplistic approach that does not take into account the distinct subgroups that make up the vehicle carrier fleet. The short-sea group would also be negatively impacted and may affect their competitiveness against land-based transportation modes.

12 The post-Panamax (Group 2c) ships have a reference line as a subgroup that is more consistent with the 2019 DCS reference line for the entire vehicle carrier fleet. They are of the same GT size range as the above-mentioned LCTC ships, but due to different design constraints (the widening of the Panama Canal), they can achieve a reduced CII and thus also contribute to lowering the curve at the higher end of the scale. It is considered inappropriate to compare LCTCs with post-Panamax ships as their design constraints are significantly different.

Proposed modification of the vehicle carrier reference line

13 To rectify the shortcomings of constructing a single regression line across the entire vehicle carrier fleet and the differing ship designs that make up this unique ship type, a refinement of the reference line is proposed. The refinement combines and integrates the 2019 IMO DCS reference line covering the predominant ship type (Group 2a) and integrates modified reference line segments for the lower and upper groups that reflect the unique characteristics of these ships. The proposed refinement of the vehicle carrier reference line is detailed below.

14 The proposed reference line incorporates refinements that reflect the four subgroups discussed throughout the document. The proposed reference line at the lower end matches that of the reference line calculated when looking purely at the short-sea ships (Group 1). The "middle" segment, where the majority of the vehicle carriers are placed in terms of GT, follows the 2019 DCS data reference line as currently proposed. The final segment follows the reference line established based on the ships in Group 2b, as shown in figure 5 below.

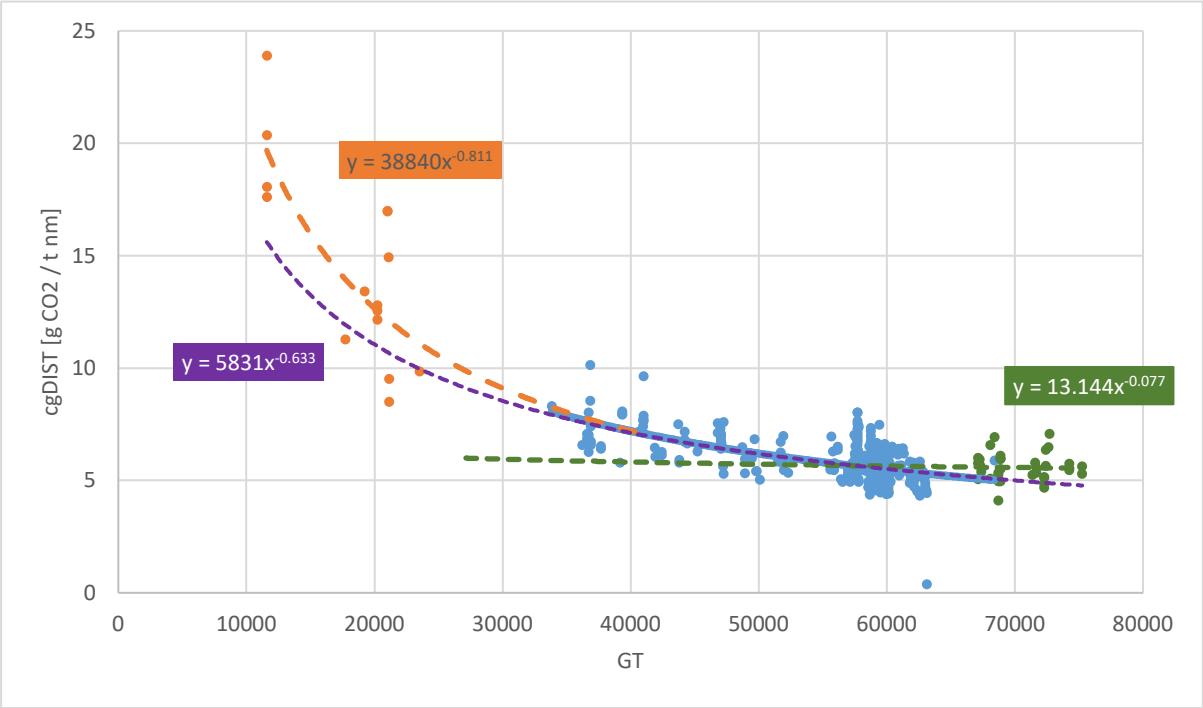

Figure 5: Reference line for ships in Group 1, 2a, and 2b (Source IHS Sea-Web database and EU MRV Data)

15 An appropriate reference line should not include gaps between various size categories to avoid the development of "rule" ships that would fall just below or above a given break. To avoid this problem, WSC created a continuous line where the three reference line segments coincide. This occurs at the GT figures shown in table 2 below. In addition, the "a" and "c" values for the power regression line for the respective segments are also included in table 2 as follows:

Table 2: Reference line proposal split in three size segments

Ship type			Capacity		a	c
Ro-ro cargo ship (vehicle carrier)	57,700 GT and above		GT		13144	0.077
	42,400 GT and above but less than 57,700 GT		GT		5831	0.633
	less than 42,400 GT		GT		38840	0.811

Note: Segment # 2 is identical to the 2019 DCS reference line.

16 The resulting reference line is illustrated in figure 6 below. As can be seen, most of the vehicle carrier fleet will have the same CII requirements as proposed in the *Technical report on CII guidelines development (under TOR 2)* as set out in document MEPC 76/INF.10 (China et al.). The refinements to the vehicle carrier reference line impact the smaller short-sea ships and the larger, specialized vehicle carriers described in Groups 2b and 2c. This effectively removes the distortion in the reference line driven by the predominant ship type and modifies the lower and upper ends of the reference line to better reflect the unique characteristics of the smaller and largest vehicle carriers.

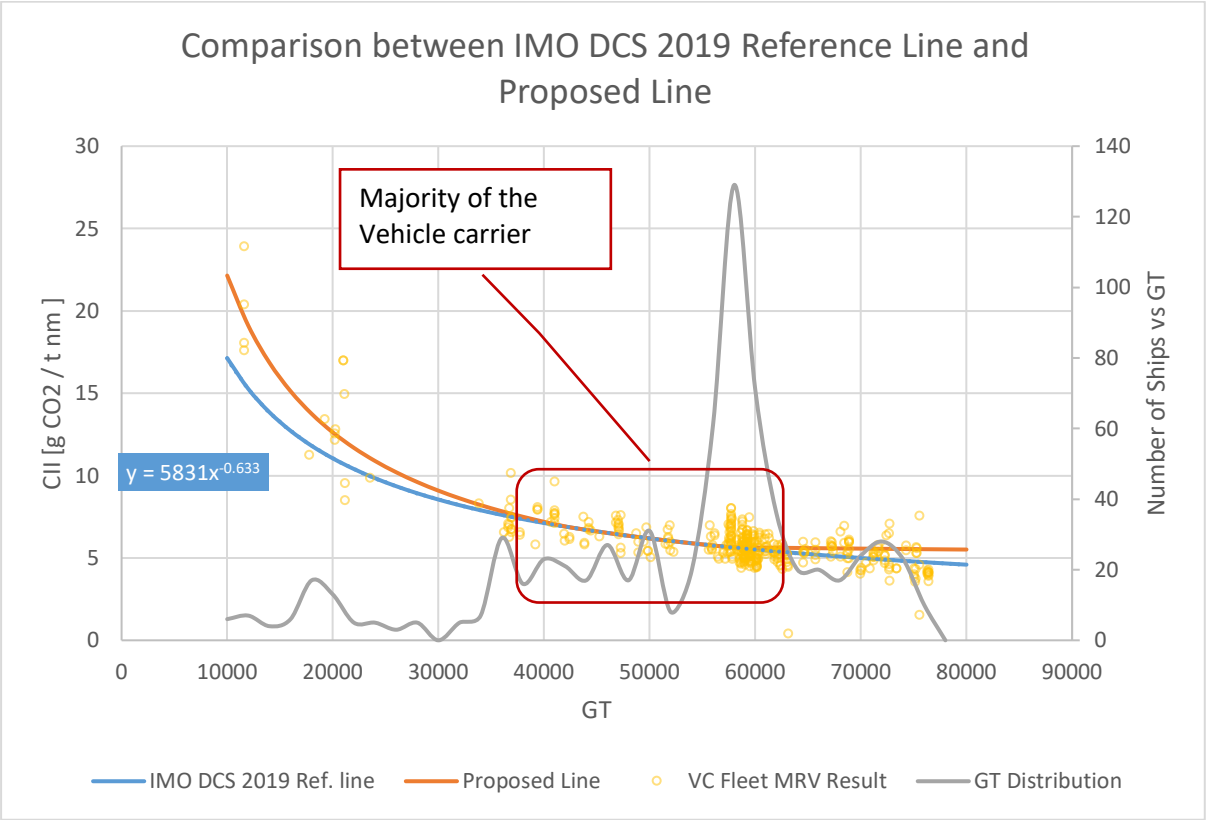

Figure 6: Resulting reference line for the vehicle carrier fleet (Source IHS Sea-Web database and EU MRV Data)

17 Should the Working Group agree to modify the vehicle carrier reference line as proposed, WSC recommends that the IMO Secretariat run their own calculations using only IMO DCS data to ensure full consistency in the method of calculation.

Action requested of the Working Group

18 The Group is invited to consider the preceding analysis and proposed refinement of the vehicle carrier CII reference line and take action, as appropriate.