INTERNATIONAL MARITIME ORGANIZATION

E

INTERSESSIONAL MEETING OF THE
WORKING GROUP ON REDUCTION OF
GHG EMISSIONS FROM SHIPS
6th session
Agenda item 2

ISWG-GHG 6/2/12
27 September 2019
ENGLISH ONLY

FURTHER CONSIDERATION OF CONCRETE PROPOSALS TO IMPROVE THE OPERATIONAL ENERGY EFFICIENCY OF EXISTING SHIPS, WITH A VIEW TO DEVELOPING DRAFT AMENDMENTS TO CHAPTER 4 OF MARPOL ANNEX VI AND ASSOCIATED GUIDELINES, AS APPROPRIATE

Proposal to regulate power of existing ships as a proxy for emissions, both of which having a relationship to speed

Submitted by BIMCO

SUMMARY

Executive summary:	This document presents a way to establish power limit curves based on the average performance of each ship type trading at target operational speeds for the past [3] years. Power limitation is already included in other proposed short-term measures. Establishing such limitation in relation to assumed performance of average ships at set target speeds per ship type bridges proposals to limit speed with other proposals.
Strategic direction, if applicable:	3
Output:	3.2
Action to be taken:	Paragraph 22
Related documents:	MEPC 73/5/1; MEPC 74/7/2; ISWG-GHG 5/4, ISWG-GHG 5/4/1 and ISWG-GHG 5/4/11

Introduction

1 The Marine Environment Protection Committee (MEPC), at its seventy-fourth session, considered a number of proposals for candidate short-term measures such as a proposal on energy efficiency improvement measures on existing ships submitted by Japan (MEPC 74/7/2), EEDI for existing ships by Norway (ISWG-GHG 5/4), EEXI for existing ships by Japan (ISWG-GHG 5/4/1) and speed regulation followed by a goal-based measure by France (ISWG-GHG 5/4/11).

2 The Committee decided that all measures would be considered further; that short-term measures should be implemented before 2023 to achieve the 2030 goal; that the measures should be practicable, implementable and verifiable and any mandatory measures would be incorporated within MARPOL Annex VI. The Committee also noted that proposed measures should be goal-based and could include energy efficiency measures for existing ships, speed optimization and reduction, alternative fuels and National Action Plans (MEPC 74/18, paragraph 7.37). The Committee instructed the Working Group to further consider, organize and streamline proposals on candidate short-term measures, with a view to identifying those measures that could be further developed and finalized in the following sessions (MEPC 74/18, paragraph 7.38).

3 This document provides a conceptual proposal for achieving the perceived emissions reductions of speed limits by regulating the propulsion power of existing ships, as a proxy for emissions.

Discussion

4 A ships' speed is the single most important variable influencing their CO_2 emissions. This fact remains undisputed and BIMCO agrees that short-term measures reflecting this should be pursued as a priority.

5 Capping a ships' speed may however not be the optimum regulatory measure to pursue for several reasons. Most importantly, ships' speed is not easily assessed from an enforcement perspective. Environmental conditions such as sea currents, sea state and weather conditions impact heavily on the relation between speed over ground and speed through water. For this reason, and due to cargo loading condition variation between voyages, emissions vary significantly for the same speed of a ship.

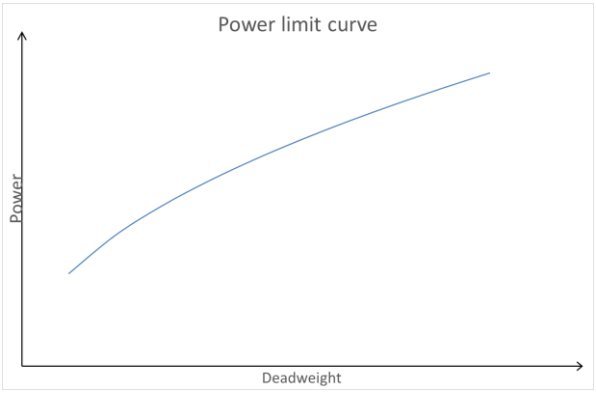
6 A ship's speed is a result of the power used to propel the ship through water. The correlation between a ship's speed and the power required to achieve the speed is well understood and reflects the efficiency of the ship's hull and propeller. Power to overcome prevalent weather and sea conditions is included by virtue of "service margin", usually set to 15% on top of the calm weather power requirement for a given speed.

7 Aiming a regulatory measure at ship's efficiency would be desirable as it is enforceable and provides for a goal-based approach. There are a wide range of options that may be applied to a ship to improve its efficiency and keeping in mind that the goal is to reduce emissions, focus should be on emissions, and by proxy, power.

8 Setting a limit for ships' power is already suggested by Japan in document ISWG-GHG 5/4/1 as one element of EEXI for existing ships. Establishing what that limit should be remains open and BIMCO suggests a mechanism for bridging focus on speed with focus on power using an average operational speed for each ship type as the basis, hereafter referred to as a target speed.

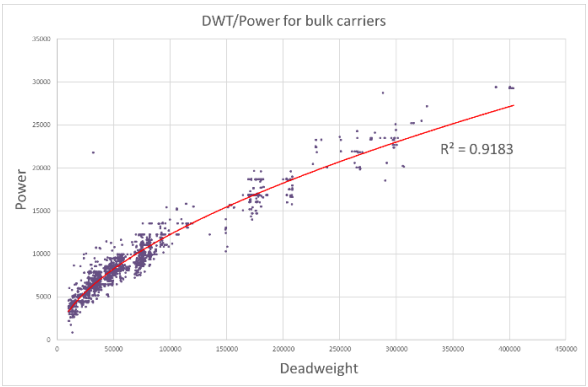
Proposal

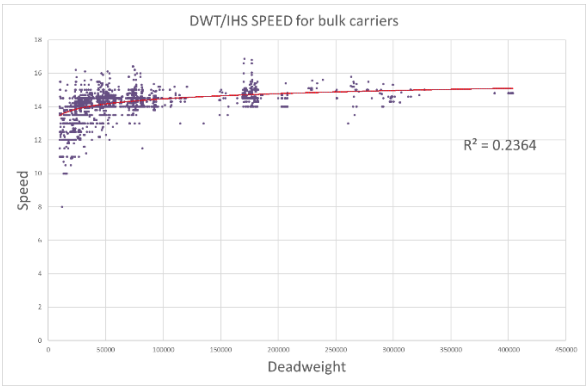
9 The power limit would be derived from the performance in real weather and sea conditions of an average ship built in the decade prior to entry into force of the Energy Efficiency Design Index (EEDI) regulation in 2013 sailing at a target speed. The target speed would be agreed for each ship type in question, taking into account the average trading speeds for each ship type over the last [3] years. The power limit curve would look like this:



10 Traditionally, IMO has established such correlations for ship types by using the IHS Fairplay database of ships' particulars. The database holds information on all ships in service and this data has been analysed for the best correlations between deadweight and installed propulsion power for bulk carriers.

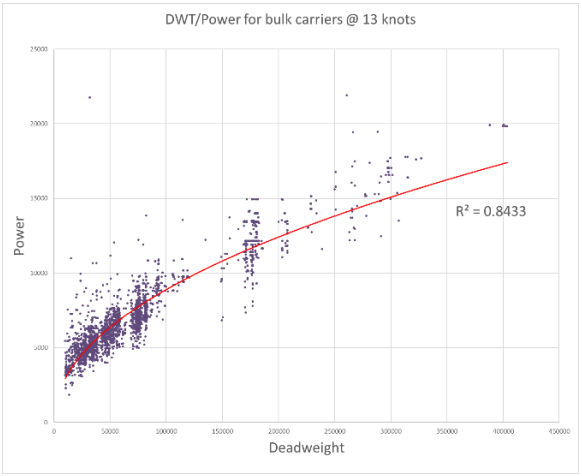
11 The correlation between installed propulsion power (Maximum Continuous Rating (MCR) of the main engine) and full deadweight of the ship is fairly good, as shown below to the left. The R^2 value is 0.92 and indicates that the underlaying dataset is consistent.

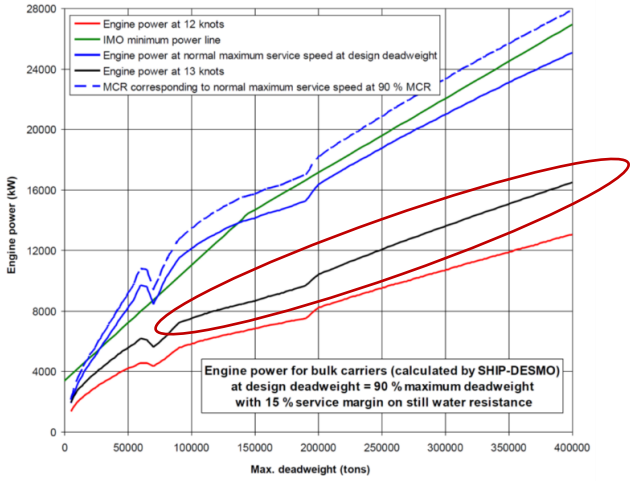




12 Whereas the power installed correlates well with the deadweight of the ships, this is not the case for the IHS Fairplay listed speed. As shown in the above chart to the right, the correlation between speed and deadweight drops to R^2 = 0.24. This indicates that the IHS Fairplay database speeds are not reported under comparable operating conditions. This has been an area of concern for many years by the industry.

13 Recognizing that the speed data is inconsistent, the installed power for all the bulk carriers in the database was nevertheless converted to a resulting power at 13 knots. Thirteen knots is taken as an example and should not be construed as a suggestion for policy decision on target speed. The conversion was done using the generic approximation between speed and power in accordance with the formulae $P = k \cdot v^3$. The resulting power was again plotted as a function of the deadweight and the below chart to the left shows the result. Of significance is, as expected, a lower correlation because of the poorer speed versus installed power correlation, but even so the regression curve may be considered applicable as R^2 remain at a reasonable 0.84.





14 Comparing the Deadweight/Power at 13 knots regression curve, using IHS Fairplay data, with the result of the Danish Technical University's SHIP-DESMO generic computer model for bulk carriers' power at 13 knots versus deadweight shows a reasonable fit. This suggests that using the IHS Fairplay database to derive the required power limit curve may be feasible, subject to further examination for any applicable ship type.

Application of power limitation to ships

15 The application of a regulatory requirement to limit a ship's power under normal operating conditions could be universal within each applicable ship type. The reason is that finding a proper interface with EEDI certified ships may be difficult and, even more so, because ships have been built for different EEDI phases. Applying across the board eliminates such discussions and EEDI certified ships should anyhow be advantaged by a better efficiency in the first place.

16 It may be beneficial for the purpose of effectiveness of a regulation to establish a lower threshold of tonnage for application of the rule. This is similar to the EEDI regulation that has not caused any significant issues in the industry.

Corrections to be considered for individual ships

17 As regulations need to stand the test of time, factoring in the carbon content of the fuel used by the ship should be considered. This may be best done by using the principles and carbon factors (C_f) from the EEDI regulation and associated calculation guidelines. It can be foreseen that a designated calculation guideline may also be needed for a power limitation regulation. Other corrections cannot be ruled out but should be considered carefully to avoid any possible technical evasion of the regulation.

Implementation and enforcement of a power limit for ships

18 A limitation should fulfil the requirement of a "verified technical means" as already mentioned in the EEDI Calculation Guidelines. Consequently, the limit is to be implemented in a way that makes its operational state transparent to the Administration. Furthermore, cancelling the limit due to conditions that forced the ship to operate outside what can be considered "normal operation" such as under adverse weather conditions, should be transparent to port State control. Many main engines in ships do already have mechanisms that can be used to implement the limitation. Others may need additional technical means retrofitted to allow for implementation of the limit.

Conclusion

19 The proposed concept would have the benefit of capturing the emissions reductions already achieved since 2008 by slower steaming whilst maintaining the present competitive playing field between ships. It would similarly maintain the benefit of operating ever more efficient ships should owners opt for modifications to improve efficiency of their ships.

20 The regulatory scheme would be consistent with the principle of the EEDI regulation as well as the MARPOL Annex VI requirement for minimum safe power in adverse weather conditions – both of which primarily regulate a ship's power to the propeller. It also resonates with proposals for applying a quasi EEDI for existing ships (EEXI by Japan in ISWG-GHG 5/4/1) and would utilize the power limitation feature recently elaborated by Germany, Norway and Spain (MEPC 73/5/1).

21 The main policy decisions to be made are setting of target speeds for each applicable ship type, at which the resulting power limit curves should be established. The setting of target speeds as the policy decision is also sending a political signal that shipping addresses speed as called for by some stakeholders.

Action requested of the Working Group

22 The Group is invited to consider the proposals set out in this document and take action as appropriate.