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AIR POLLUTION AND ENERGY EFFICIENCY

The case for further work on the EEDI and for a review of phase 2 requirements

Submitted by Clean Shipping Coalition (CSC)

SUMMARY

Executive summary:	The efficiency increases that are technically possible for current ships, and that are happening as a result of market forces, threaten the relevance and effectiveness of the EEDI as a driver of greater efficiency. This document makes the case for work on the EEDI review to continue and for it to consider changes to the phase 2 requirements that take account of today's best practice and the potential of currently under-utilised approaches for improving the design efficiency of new ships. It also identifies problems with the content of the EEDI database that are hindering the review, and suggests a way forward.
Strategic direction:	7.3
High-level action:	7.3.2
Output:	7.3.2.5
Action to be taken:	Paragraph 18
Related documents:	MEPC 68/3/27; MEPC 69/5/5, MEPC 69/INF.29, MEPC 69/INF.16 and MEPC 69/7/3

Introduction

1 This document is submitted in accordance with the provisions of paragraph 6.12.5 of the *Guidelines on the organization and method of work of the Maritime Safety Committee and the Marine Environment Protection Committee and their subsidiary bodies* (MSC-MEPC.1/Circ.4/Rev.4) and provides comments on document MEPC 69/5/5.

2 In document MEPC 69/5/5 (Interim Report of the Correspondence Group on EEDI review required under regulation 21.6 of MARPOL Annex VI), Japan invites MEPC to concur with its recommendation that the EEDI reduction rates set out in regulation 21 of MARPOL Annex VI should be retained (along with the time periods and EEDI reference line parameters). The Clean Shipping Coalition does not think that there has been proper consideration of this issue in the correspondence group nor that the evidence contained in the interim report supports that conclusion. Indeed the review's analysis clearly indicates that reduction rates can be strengthened without placing an unreasonable burden on ship designers/builders and owners, and that it would be appropriate to do so.

The background to phase 2 reduction rates

3 The required EEDI reference lines were calculated by using a constant specific fuel consumption (SFOC) of 190 g/kWh for main engines (215 g/kWh for auxiliaries). An IMO commissioned study in 2011 concluded that main (and auxiliary) engines were already available with an SFOC around 10% lower[1].

4 The choice of reference years for construction of the EEDI baseline is also significant. As shown in previous submissions (MEPC 68/3/27), the chosen period of 1999-2009 was not representative of historic design efficiency, which has fluctuated with the economic cycle. Design efficiency was relatively poor during the period chosen to construct the EEDI baseline and some 10% better in the previous decade.

5 These two factors make it easier for new ships to meet the phase 2 EEDI limits.

The performance of recently built new ships

6 As reported in document MEPC 69/5/5, "Almost all members [of the correspondence group] expressed the view that already today a large number of ship types could meet phase 2 criteria". The analysis of the EEDI database contained in the group's interim report shows that 100% of phase 0 container and general cargo ships, 88% of tankers and 50% of bulk carriers already meet the 20% phase 2 requirement. Over half of those container ships also exceed the 30% phase 3 requirement, with the best performing of these ships having an EEDI score nearly 50% below the EEDI baseline. Some caution is necessary when using the EEDI database because only a fraction of the ships requiring an EEDI are contained in it (see more on this below), and those that are in have been self-selected with all the bias selection risks that this carries.

7 Nevertheless, studies using the Estimated Index Values (EIV) of almost all recently built ships show similar results to those found from the EEDI database. The EIV is a simplified version of the EEDI that was used to construct the EEDI baseline. It normally results in an underestimate of the EEDI (i.e. suggesting the ship is less efficient). Document MEPC 69/INF.29 reports on the most recent of these EIV studies commissioned by CSC members Seas at Risk and Transport & Environment. It shows that of the ships built in 2015, 64% of containerships, 57% of general cargo ships, 24% of tankers, 22% of bulkers and 31% of gas carriers have EIV scores more than 20% below the EEDI reference line. Over a third of containerships also exceed the phase 3 requirement. Importantly, there are ships that have EIVs at least 20% below the EEDI reference line in all ship type and size categories analysed (except bulkers over 330,000 dwt). And since the EIV is an underestimate of the EEDI, the proportion of ships 20% or more below the EEDI baseline will almost certainly be larger.

[1] Document MEPC 63/INF.2

What's driving improved EEDI scores?

8 Most improvements in recent ship design efficiency are almost certainly the result of market drivers rather than the requirements of the EEDI. The aforementioned study for the CSC as well as others, show that the trend towards better design efficiency occurred before the EEDI came into force. Indeed, a comparison between ships that are required to have an EEDI with ships that are not required to have an EEDI (because the contract date was before 1 January 2013 and the delivery date before 1 July 2015) shows that, on average, both types of ships exceeded the reference line by almost the same percentage. Extensive over compliance is evident from both our EIV analysis and that of the IMO EEDI database, suggesting other factors were the driver. We know that design efficiency has gone up and down with changing economic circumstances in the industry[2]. High fuel prices and large scale over-capacity experienced since the 2008-2009 downturn led to efficiency improvements. With fuel prices now touching record lows it is important that a sufficiently stringent EEDI acts to prevent backsliding.

How are ships improving the EEDI?

9 Despite the shortcomings of the EEDI database (MEPC 69/INF.16) the correspondence group concluded that innovative technologies played no part in improving EEDI scores. Other factors have to have been responsible, e.g. changes to hull form, design speed and engine changes. The latter is likely to be significant because of the conservative SFOC assumptions in the EEDI baseline. Moreover it has commonly been assumed that naval architects and their customers might first choose a reduced design speed to improve a new ship's EEDI. However, these assumptions cannot be tested on the basis of the EEDI database, since it contains no information on SFOC or design speed.

10 The report of the EIV study contained in document MEPC 69/INF.29 provides more information on EIV/EEDI improvements in new ships built between 2009 and 2015. For most ship type and size categories, the improvement in the average EIV has coincided with a decrease in the average engine power. Counterintuitively, for bulkers this has been accompanied by constant or modestly higher design speeds while tankers have reduced their design speed by only a small amount. Only containerships have witnessed reductions in design speed of more than a few percent. Interestingly the fairly constant average design speed of bulkers and tankers applies both to the most and least efficient of these vessels. In a similar vein the most efficient bulkers (and containerships) had on average a higher design speed than the least efficient vessels of the same type. The study's analysis thus disproves the assumption that speed reductions have been used for EEDI compliance. Instead, it suggests that improved hydrodynamics, i.e. better hull, propeller and rudder design, have been widely adopted to allow the most efficient ships to reduce power while maintaining or even increasing their design speed.

11 Historically, changes in speed and capacity have been responsible for a smaller share of changes in design efficiency than hull, propeller and rudder designs[3].

What this means for the appropriateness of the phase 2 requirements

12 Ships in almost all type and size categories are easily meeting and exceeding the 20% phase 2 EEDI requirement. More than a third of containerships exceed the phase 3 requirement. The efficiency increases that are technically possible for current ships, and that are happening as a result of market forces, threaten the relevance and effectiveness of the EEDI as a driver of greater efficiency.

2 http://www.cedelft.eu/publicatie/historical_trends_in_ship_design_efficiency/1761.

3 Ibid.

13 The phase 2 requirement is being achieved without the use of innovative technologies, and in most cases without reverting to significant reductions in design speed. Both of these options can be utilised to generate significant further improvements in the EEDI of new vessels.

14 The phase 2 requirement is being met 4 to 5 years early while a third of containerships that already meet the phase 3 requirement are doing so 10 years early.

15 The current level of compliance, the availability of previously untapped approaches to improve design efficiency and the time remaining until 2020, all present a strong case for a potentially significant increase in the stringency of the EEDI requirements for phase 2.

16 Large differences in design efficiency gains between containerships and general cargo ships on the one hand, and tankers, bulkers and gas carriers on the other, suggest that a single stringency level for all phase 2 (or phase 3) ships may no longer be appropriate.

The EEDI database and the review

17 The terms of reference of the correspondence group require in the first instance that the EEDI review draw on data in the IMO EEDI database. Unfortunately the database in its current form is not fit for purpose as it only contains a limited number of ships. As of November 2015 there was limited data on just 681 ships (with data on only 573 ships available to the correspondence group when it drew up the conclusions contained in its interim report). Based on the analysis of Clarkson's World Fleet Register (WFR) contained in MEPC 69/INF.29, the EEDI database appears to contain only around half of the ships which are subject to the EEDI regulation. This significantly diminishes the usefulness of the database, raises concerns about potential sample bias, and leads to very small sample sizes for some ship types. For the EEDI database to be useful to the review it needs to contain additional data on design speed, corresponding engine power, hull form dimensions and other parameters. For example, without information on design speed, the EEDI database cannot be used to analyse the impact of the EEDI on transport work.

Action requested of the Committee

18 The Committee is invited to note the information contained in this document and to consider:

.1 instructing the correspondence group to continue its work on the review of the EEDI with a view to it making a recommendation to MEPC 70 on, amongst other things, the revision of EEDI phase 2 requirements and the possibility of different levels of stringency for different ship types;

.2 amending the terms of reference of the correspondence group to allow it to consider the consequential impact of potential changes to phase 2 requirements on the stringency of phase 3, this especially in respect of containerships;

.3 the need to improve the EEDI database; and

.4 take action as appropriate.