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CONSIDERATION OF CONCRETE PROPOSALS ON CANDIDATE SHORT-TERM MEASURES

Short-term measures to reduce GHG emissions from international shipping

Submitted by ICS, BIMCO, INTERTANKO and IPTA

SUMMARY

Executive summary:	The co-sponsors recommend that measures to reduce methane slip, promote improved port efficiency, to assign carbon factors for those marine fuels entering the industry and guidelines for assessing the efficacy of technologies for lowering GHG emissions from ships should be developed
Strategic Direction, if applicable:	3
Output:	3.2
Action to be taken:	Paragraph 41
Related documents:	Resolution MEPC.304(72); MEPC 73/WP.5 and resolution MEPC.281(70)

Introduction

1 MEPC 72 adopted the *Initial IMO Strategy on reduction of GHG emissions from ships* (resolution MEPC.304(72)) (the Initial Strategy). The co-sponsors supported the adoption of this Initial Strategy and consider it to be a major step forward for the international shipping sector, setting out a pathway for the phase-out of GHG emissions.

2 ISWG-GHG 4 developed a draft programme of follow-up actions of the Initial IMO Strategy on reduction of GHG emissions from ships up to 2023 which, inter alia proposed three categories for candidate short-term measures and called for consideration of concrete proposals at MEPC 74 (MEPC 73/WP.5, annex).

3 Further to the decision of MEPC 73 to call for concrete proposals to be submitted for consideration at ISWG-GHG 5 the co-sponsors provide proposals for reducing GHG emissions from ships and to facilitate informed decision-making by the Organization.

4 These proposals are:

.1 development of measures to reduce methane slip;

.2 development of measures to improve port efficiency;

.3 assign suitable carbon factor (Cf) values to new marine fuels; and

.4 development of guidelines for assessing the efficacy of technologies for lowering GHG/carbon intensity.

Discussion

Reducing methane slip and fugitive emissions of VOCs

5 The Initial Strategy includes consideration and analysis of measures to address emissions of methane and further enhance measures to address emissions of Volatile Organic Compounds (VOCs) as a short-term candidate measure.

6 Natural gas fuelled ships emit much lower levels of local pollutants than those combusting marine fuel oil, with clear benefits for public health in coastal and port areas. Natural gas fuelled ships may also lower GHG emissions from shipping in the short term.

7 The carbon factor (Cf) of liquefied natural gas (LNG) for the Energy. Efficiency Design Index (EEDI) calculation is 2.75, compared with 3.206 for marine diesel/gas oil (MDO/MGO) and 3.114 for heavy fuel oil (HFO) (MEPC.281(70)). Therefore strengthening the EEDI, such as implementing EEDI phase 3 in 2022, will encourage the adoption of LNG fuel.

8 When combusting natural gas in internal combustion engines some methane may be emitted to the atmosphere as part of the engine exhaust. This is referred to as methane slip. Depending on the thermodynamic cycle of gas fuelled internal combustion engines, methane slip may be significant. Methane slip is particularly associated with Otto engines, it is not generally associated with gas fuelled diesel engines because of more efficient and complete combustion of gas in a gas Diesel engine. Methane is a more potent GHG than CO_2, therefore any fugitive emissions such as methane slip are undesirable and reduce the GHG benefit of using natural gas fuel[1].

9 Otto engines offer some significant advantages relative to gas fuelled diesel engines since they do not need the high pressure gas supply requirement of gas Diesel engines, emit less NO_X and can operate without a pilot fuel such as oil. The simplified gas supply arrangements, lower NO_X emissions and lower risk profile resulting from eliminating high pressure gas systems mean that Otto engines are a popular option for gas fuelled internal combustion engines on ships.

10 To reduce the risk that methane slip levels could negate the GHG benefits of using natural gas fuel it is proposed that the Organization agree measures to control methane slip.

[1] Intergovernmental Panel on Climate Change (IPCC), *Climate Change 2013: Physical Science Basis*, Anthropogenic and Natural Radiative Forcing, p. 714.

11 There may be several ways to achieve this. For example, it could be done by means of an engine certification scheme, similar to that which regulates emissions of NO_X, with an engine being pre-certificated in accordance with measures to be developed by the Organization. This could be included within the Engine International Air Pollution Prevention Certificate (EIAPPC). However, the co-sponsors consider that regulations to control methane slip should be goal based and non-proscriptive, similar to those which govern emissions of NO_X.

12 It will be necessary to consider both emission limit values for methane slip and methane slip at different engine load points.

13 In addition to methane slip, VOCs may be released during loading and unloading of cargo, this can be easily mitigated by using a vapour return system. Most tankers are already provided with vapour arrangements however operator experience is that most ports and terminals do not have vapour return arrangements.

14 The Organization should consider measures to increase the take up of vapour return arrangements in tanker terminals.

15 Development of suitable methane slip and port vapour return measures may require significant effort to complete. However, as a purely technical matter it could be undertaken by the PPR Sub-Committee, and should not divert resources from development of other GHG reduction measures.

16 This is considered to be a Group B candidate short-term measures, one that is not a work in progress and which would be subject to data analysis in order to establish emission limit values.

Development of measures to improve port efficiency

17 MEPC 73 agreed that improving port efficiency/optimization could contribute to reducing GHG emissions from ships and encouraged the exchange of best practices as well as the development of non-mandatory guidelines to assist Member States to reduce emissions from ships in ports (MEPC 73/WP.1 paragraph 7.21).

18 The efficiency of shipping is linked to the efficiency of a wider logistic chain, improving the efficiency of shipping is contingent on similar efficiency enhancements being applied in other parts of that chain, especially ports. For example, for speed optimization to be effective ports must ensure the availability of berths, cranes, pilots, tugs, land transport etc. on time for the planned arrival time of the ship. This would facilitate smoother voyage speed profiles and avoid the current all too common situation where ships manage their voyage speed to arrive at a given time only to be required to anchor, or be allocated a berth but then have to await cranes.

19 Although some aspects of port optimization may have to be addressed via national action plans there may be a role for IMO in developing improved communication and planning tools.

20 A further measure which could reduce emissions from ships in ports would be the creased provision of shoreside electrical power supplies (cold ironing). Efforts to promote cold ironing have been hampered by two factors:

.1 in many cases it is more cost effective for ships to use their electrical generators at berth; and

.2 incompatibility between the ship and shoreside power systems.

21 Additionally, it must be recognized that cold ironing was primarily advocated as a means to reduce local emissions (NO_X, SO_X and PM), whether or not the use of cold ironing will reduce GHG emissions is determined by the means of generating electricity.

22 The capital investment to retrofit a ship for cold ironing is significant in the case of ships with high at-berth electrical loads (for example, ships such as container ships, cruise ships, chemical tankers and LNG carriers). Modifications and additional equipment are necessary on both ship and shoreside in order to provide the necessary capacity to supply the power requirements of large electrical loads and consumers (for example, tankers and LNG carriers using cargo pumps, nitrogen generators, IG blowers, cargo heating/cooling plant etc).

23 Many ships, particularly container ships and cruise ships, spend very limited periods of time at berth. In such cases it is questionable whether the necessary capital investment would be used to best effect by installing cold ironing arrangements or whether it would result in lower emissions if invested in technologies to reduce emissions whilst under way or alternative methods to reduce at-berth emissions.

24 In 2016 according to the International Energy Agency, power generation from combustible fossil fuels accounted to around 67% of the world total gross electricity consumption. The largest contributor was coal. Furthermore, the use of coal for electricity consumption continues to grow. If the ship and the power plant ashore both use oil, the same amount of GHG will be emitted regardless if it is generated on board or ashore, however if the power plant ashore uses coal, the GHG emissions will be even larger by using cold ironing. Cold ironing will contribute to a relative reduction of greenhouse gas emissions only in cases where the power plant ashore is using low-carbon or renewable energy.

25 At present only a fraction of ports in the world can guarantee that the power supply comes from low-carbon or renewable energy sources. In order to make cold ironing a short-term option to reduce greenhouse gas emissions, a large redistribution of the source for power would need to take place in a very short time. Based on the development of gross electricity consumption and continued reliance on fossil fuels in much of the world this is not likely to happen.

26 As electricity supply arrangements change from combusting fossil fuels to low carbon fuels and renewable sources of energy, cold ironing may contribute to reduce GHG emissions from shipping. In order for this to happen, a number of practical and commercial obstacles will have to be removed.

27 The Organization is already developing technical guidelines for shoreside electrical power systems, including the interface between ship and shore and safe management of operations. The report of a correspondence group which has been progressing this work was considered at SSE 6. Improving the interface between ship and shoreside, along with international standards for connections and safe management of connection and disconnection are a pre-requisite for increasing the viability and attractiveness of cold ironing at a global level. As such the co-sponsors support the ongoing work of the correspondence group and look forward to the final guidelines. Such guidelines will ease the adoption of cold ironing once the requisite low carbon and renewable supplies of electricity become available.

28 The co-sponsors are of the opinion that cold ironing cannot be seen as a short-term measure to reduce greenhouse gas emissions on a global basis, but rather as a mid- or long-term measure, pending decarbonizing electricity production.

29 These measures are considered to be a combination of Group A and Group C.

Development of carbon factors for all types of marine fuels

30 The co-sponsors consider that the 2050 levels of ambition in the Initial Strategy can only be achieved by adopting new low-/zero-carbon fuels (which may include fossil-free sustainable carbon fuels), energy carriers and technologies.

31 In order to accommodate new fuels and energy carriers into the EEDI calculation it is necessary for them to be assigned a carbon factor (C_f). In order to promote confidence to invest in alternative fuels industry requires surety that these C_f values are robust and will not be subject to constant ongoing revision.

Development of guidelines for assessing the efficacy of technologies for lowering GHG/carbon emissions

32 As stated in paragraph 30, the co-sponsors consider that the 2050 levels of ambition in the Initial Strategy can only be achieved by adopting new low-/zero-carbon fuels and technologies.

33 The Organization is already considering strengthening the EEDI regulation, as the industry moves beyond EEDI phase 2 it will be increasingly necessary to adopt new and innovative technologies, and for the Organization to understand what is technologically achievable when considering further EEDI strengthening.

34 In addition to the EEDI regulation it is anticipated that the Organization will take far reaching decisions as it implements the Initial Strategy. Some of these decisions may be predicated on assessments of the readiness of technologies to reduce GHG emissions.

35 If decisions are made based on unrealistic assessments of what is technologically achievable, or based on inappropriate analysis of proposed technical solutions then the consequences could be setting unrealistic objectives and wrongful decision-making.

36 Documents ISWG-GHG 4/3/4 and MEPC 73/5/9 (both RINA) highlighted some of the issues associated with evaluating the efficacy of technologies for improving the efficiency of ships.

37 Operational experience indicates that there can be significant differences between claimed improvements for new technologies and what is actually achieved in service. How are such claims verified and quantified? For example, are measured improvements in an aspect of performance compared with alternatives on a like for like basis, or based on conditions which could be favourable to certain outcomes? For example, if a ship is fitted with a new propeller design during a dry dock, it is probable that the hull will also be cleaned to some degree at the same time and the opportunity taken to perform engine maintenance, sea water system cleaning and other routine works which will improve performance and efficiency. This presents the question of how much of any measured improvement is because of the new propeller design and how much is attributable to maintenance and cleaning. Or it may be that changes in operational management are introduced along with a technology trial which make it difficult to assess whether these changes in operational management or the new technology are responsible for any measured differences in performance and efficiency.

38 The efficacy of technologies should be demonstrated under a range of representative conditions. This is to minimise the risk that data obtained under highly optimized conditions, which are not representative of actual operations, is used to support claims made for a technology.

39 IMO guidelines for assessing the efficacy of technologies for lowering GHG/carbon emissions would promote consistency and transparency, facilitate informed decision-making and promote improved regulation-making.

Proposals

40 The co-sponsors propose that:

.1 measures to reduce methane slip and promote the provision of VOC vapour return arrangements in ports should be developed as a short-term candidate measure. This includes developing appropriate emission limit values, followed by development of goal based regulations to control such emissions. This should consider the practicability of an engine pre-certification scheme and the most effective means to verify continued compliance through life;

.2 the Organization should develop requirements to improve communications between ships and ports so as to improve voyage planning and improve port efficiency. In addition, the Organization should develop guidance for Member States for promoting improving port efficiency for inclusion in national action plans;

.3 the Organization should complete its work to develop technical guidelines for cold ironing;

.4 assign robust and appropriate carbon factor (C_f) values to marine fuels which do not currently have one; and

.5 guidelines for assessing the efficacy of technologies for lowering GHG/carbon intensity should be developed.

Action requested by the Working Group

41 The Group is invited to consider the comments and proposals contained in this document and to take action as appropriate.

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