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REDUCTION OF GHG EMISSIONS FROM SHIPS

Comments on the report of the Correspondence Group on Carbon Intensity Reduction (TOR 1 and 4.1)

Additional draft amendments to the *2016 Guidelines for the development of a Ship Energy Efficiency Management Plan (SEEMP)* (resolution MEPC.282(70))

Submitted by ICS and INTERTANKO

SUMMARY

Executive summary:	This document addresses the considerations of ships using cargo as a fuel and proposes additional text to the draft amendments to the *2016 Guidelines for the development of a Ship Energy Efficiency Management Plan (SEEMP)*
Strategic direction, if applicable:	3
Output:	3.2 and 3.5
Action to be taken:	Paragraph 8
Related document:	MEPC 78/7/8

Introduction

1 MEPC 76 established a Correspondence Group (CG) on Carbon Intensity Reduction, under the joint coordination of China, Japan and the European Commission.

2 The CG final report set out in document MEPC 78/7/8 (China et al.) provides draft amendments to the *2016 Guidelines for the development of a Ship Energy Efficiency Management Plan (SEEMP)*.

3 This document proposes additional amendments to cater for the ships using cargo transported as fuel, e.g. LNG carriers.

Background

4 The proposed additional amendments to cater for the ships using cargo transported as fuel were shared within the CG, albeit late in the process as mentioned in the CG report.

5 Since the CG did not have time to review these proposals, the report suggested that the matter should be further referred to the Committee. Therefore, the co-sponsors submit this document providing advice for further consideration on how to include ships using cargoes as fuel.

Discussions

6 The following comments are made regarding the use of speed optimization applicable to LNG carriers:

.1 document MEPC 78/7/8, annex 1, paragraph 5.2.6 considers optimum speed only for a typical conventional marine propulsion plant;

.2 for most of LNG carriers designs, the marine propulsion plant is highly integrated with the cargo tanks pressure control plant;

.3 this means the excess pressure generated by the evaporation inside the cargo tanks is handled by feeding the gas vapours from the tanks to the propulsion plant;

.4 using energy generated by the combustion of cargo tanks' vapours for propulsion is also an optimum way to control cargo tanks pressure;

.5 the higher the amount of cargo vapour, the higher the energy generated and the higher the speed;

.6 the amount of LNG evaporation in the cargo tanks varies during a typical laden voyage; the evaporation rate is highest after loading the LNG cargo;

.7 for typical ballast voyages, LNG carriers consolidate a quantity of LNG in one cargo tank, called the LNG heel, to limit evaporation rate;

.8 the LNG heel is used at the end of the ballast voyage to cool down the empty LNG cargo tanks in preparation for the cargo loading;

.9 toward the end of the ballast voyage, the cooling down of the LNG cargo tanks generates high amounts of cargo vapours; and

.10 the above reflects the optimum operational use of LNG cargo vapours for cargo handling and for propulsion which needs to be included into the revised SEEMP Guidelines. Therefore, the Committee is invited to consider the proposed additional text to the draft revised 2022 Guidelines for the development of a Ship Energy Efficiency Management Plan (SEEMP) as presented in annex 1 to this document.

7 The following comments are made regarding the methods of determining the annual fuel oil consumption, for ships using its cargo as fuel:

.1 paragraph 7.1 of the draft 2022 guidelines for the development of a Ship Energy Efficiency Management Plan (SEEMP) (annex 1 to MEPC 78/7/8) lists three main different methods for determination of fuel oil consumption:

.1 method using Bunker Delivery Notes (BDNs);
.2 method using flow meters; and
.3 method using bunker fuel oil tank monitoring on board;

.2 for ships using cargo as a fuel, such as but not limited to LNG, LPG, methanol and ethanol, there is no guidance on cargo tank monitoring method to address fuel consumption;

.3 cargo tank monitoring consists of determining the volume of cargo liquid consumed from the tanks and applying appropriate density to this volume to convert to mass; and

.4 when using LNG cargo as a fuel, the following should be considered:

.1 LNG is consumed in vapour form when used as fuel;

.2 LNG is a mixture of different hydrocarbons, methane being the main component; there is a significant difference between the composition of the LNG vapours and LNG liquid inside the tank; the LNG vapours within the cargo tanks have a higher methane concentration in comparison to the LNG liquid; this is because the other hydrocarbons such as ethane and propane have higher boiling point than methane and remain in the liquid state;

.3 therefore, the mass of the consumed LNG volume in the cargo tanks is calculated using the density of methane;

.4 the second important element to be noted is the presence of nitrogen in LNG during laden voyages; nitrogen evaporates at a faster rate than methane; therefore, nitrogen is present in the LNG vapours at a higher concentration than its presence in the liquid LNG; nitrogen present in the LNG vapours, consumed as fuel, does not generate CO^2 emissions hence needs to be subtracted from consumption; and

.5 the details presented above describe elements which are important to consider for an accurate determination of fuel consumption for vessels using cargo as fuel; therefore, the Committee is invited to consider proposed additional text to the revised 2022 Guidelines for the development of a Ship Energy Efficiency Management Plan (SEEMP) as presented in annex 2 to this document to provide guidance on how to correctly account for fuel consumption of ships using liquid/vapour cargoes as fuels.

Action requested of the Committee

8 The Committee is invited to consider the proposals set out in paragraphs 6.10 and 7.5 of this document and take action. as appropriate.

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ANNEX 1

ADDITIONAL TEXT TO SECTION 5 OF THE DRAFT 2022 GUIDELINES FOR THE DEVELOPMENT OF A SHIP ENERGY EFFICIENCY MANAGEMENT PLAN (SEEMP)

Additional text to paragraph 5.2.6 is underlined

5.2.6 Speed optimization can produce significant savings. However, optimum speed means the speed at which the fuel used per tonne mile is at a minimum level for that voyage. It does not mean minimum speed; in fact, sailing at less than optimum speed will consume more fuel rather than less. Reference should be made to the engine manufacturer's power/consumption curve and the ship's propeller curve. Possible adverse consequences of slow speed operation may include increased vibration and problems with soot deposits in combustion chambers and exhaust systems. These possible consequences should be taken into account. For LNG carriers speed optimization means, quite often, a higher speed at the start of laden passages to control tanks pressure and at the end of ballast passages to use the operational LNG quantity needed for cargo tank cooling in propulsion instead of wasting in GCU or condenser steam dump. Charterers are generally aware of the improved efficiency of this speed pattern.

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ANNEX 2

ADDITIONAL TEXT TO SECTION 7 OF THE DRAFT 2022 GUIDELINES FOR THE DEVELOPMENT OF A SHIP ENERGY EFFICIENCY MANAGEMENT PLAN (SEEMP)

Additional text to paragraphs 7.1 and 7.2 is underlined

7.1 Fuel oil consumption should include all the fuel oil consumed on board including but not limited to the fuel oil consumed by the main engines, auxiliary engines, gas turbines, boilers and inert gas generator, for each type of fuel oil consumed, regardless of whether a ship is underway or not. Methods for collecting data on annual fuel oil consumption in metric tonnes include (in no particular order):

.1 method using bunker delivery notes (BDNs): […]

.2 method using flow meters: […]

.3 method using bunker fuel oil tank monitoring on board: […]

.4 method using LNG cargo tank monitoring on board:

LNG ships use the Custody Transfer Monitoring System (CTMS) to monitor/record the cargo volumes inside the tanks. When calculating the consumption:

.1 the LNG liquid volume consumed is converted to mass using the Methane density of 422 kg/m^3. This is because LNG is transported at Methane boiling point, while other heavier hydrocarbons have higher boiling point and remain at liquid state; and

.2 nitrogen mass content is subtracted for each laden voyage from LNG consumption as it does not contribute to CO_2 emissions.

.5 method using cargo tank monitoring on board for ships using cargo other than LNG as a fuel:

.1 To determine the annual fuel oil consumption, the amount of daily fuel oil consumption data measured by tank readings which are carried out by appropriate methods to the cargo used as a fuel. The method for tank readings should be specified in the SEEMP Data Collection Plan.

.2 The tank readings will normally occur daily when the ship is at sea and each time the ship is loading or discharging cargo; and the summary of monitoring data containing records of measured fuel oil consumption should be available on board.

7.2 Any corrections, e.g. density, temperature, nitrogen content for LNG, if applied, should be documented.