INTERNATIONAL MARITIME ORGANIZATION

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MARINE ENVIRONMENT PROTECTION COMMITTEE
58th session
Agenda item 4

MEPC 58/4/38
15 August 2008
Original: ENGLISH

PREVENTION OF AIR POLLUTION FROM SHIPS

Technical considerations for determining GHG reduction targets from ships

Submitted by Canada

SUMMARY

Executive summary:	Further to the report of the GHG Working Group, this document proposes some further considerations for determining the target reduction in setting the required index as part of the CO_2 design index
Strategic direction:	7.3
High-level action:	7.3.1
Planned output:	7.3.1.3
Action to be taken:	Paragraph 12
Related documents:	MEPC 58/4 and GHG-WG 1/2/1

Introduction

1 This document is submitted in accordance with paragraph 4.10.5 of the Guidelines on the organization and method of work of the Committees and their subsidiary bodies (MSC-MEPC.1/Circ.2) and comments on document MEPC 58/4.

2 At its first intersessional meeting in Oslo, Norway in June 2008, the Working Group on Greenhouse Gases devised a mandatory new ships CO_2 design index comprising of an attained CO_2 index for an individual ship that would be compared to a required CO_2 index for that ship's class. The required CO_2 index is derived from plotting a curve of known ships' emissions data against tonnage then applying a reduction factor.

3 This approach examined CO_2 emissions from fuel combustion by ship size, and made use of a statistical regression curve comparing CO_2 emissions levels to ship size. It assumed that the entire curve could be lowered linearly by a set percentage (X) to determine a possible reduction target.

4 The resulting formula gave the required index.

$$Required\ design\ CO_2\ index = (1 - \frac{X}{100}) \times baseline\ value$$

Considerations for setting reduction targets

5 Recognizing that the value of the reduction target, *X*, would need to reflect both the practical needs of ships and their objectives for reducing GHGs, the Working Group noted a number of considerations with regard to reduction targets for GHG emissions from ships. Canada is of the view that technical information based on the physics inherent to ship's movement should be a key element in setting reduction targets for the design index.

6 A ship has a minimum required mass for its intended task and needs to operate at a minimum required speed. This requires that its engine(s) produce enough power to overcome the resistance of water; a function of the mass of the ship, the water, and hydrodynamics of the hull shape to push water out of the path of the ship. Considering the variation in ship design, a simple percentage reduction target may not be appropriate for application across all classes and sizes of ships.

7 In particular, larger ships tend to be more efficient, while smaller vessels are more constrained by minimum mass and power requirements. The derived baseline curve in Denmark's document GHG WG 1/2/1 suggests an exponential relationship between CO_2 emissions and tonnage for smaller ships, while a largely linear relationship is deemed more appropriate for larger ships (over 200,000 DWT).

8 Given this difference between small and large ships, a sliding scale reduction target for the design index could be derived based on a ship's deadweight tonnage. Such a scale could be set to meet an overall reduction target for ships. In this way, the design index could reflect the maximum opportunity for GHG efficiencies from ships.

9 Reduction targets should take into account the minimum energy needs of each ship category. For any ship there is a minimum effort required to move its mass through the water. The minimum effort is a function of two opposing forces, propulsion and resistance, which drive a ship's design. Propulsion efficiency is a function of the engines and propellers to transfer energy from fuel, while resistance is a function of required energy to overcome the ship's inertia and move the ship through the water – be it calm seas, rough seas, or opposing currents. In determining a required reduction, it would be worthwhile to consider these minimum energy needs for propulsion.

10 As well, a ship's auxiliary functions also have minimum energy requirements. Heating and cooling, crew accommodations, cargo handling equipment, electrical controls, and other machinery all require energy, which is provided either from main engines or auxiliary engines for such purpose.

11 Canada intends to carry out technical studies to examine these needs to guide discussions in setting achievable reduction targets. Interested parties are welcome to participate or may seek additional information from our national contact below[1]. Unfortunately, document deadlines for MEPC 58 after the intersessional GHG working group meeting did not allow this information to be developed in the timeframe allowed to submit this document.

Action requested of the Committee

12 The Committee is invited to take note of this information and take action as appropriate.

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