INTERNATIONAL MARITIME ORGANIZATION

IMO

E

MARINE ENVIRONMENT PROTECTION COMMITTEE
57th session
Agenda item 4

MEPC 57/4/11
25 January 2008
Original: ENGLISH

# PREVENTION OF AIR POLLUTION FROM SHIPS

## Development of an index for $CO_2$ emissions per unit shipping capacity in actual operational conditions

**Submitted by Japan**

**SUMMARY**

| | |
|---|---|
| ***Executive summary:*** | Although a number of plans have been proposed for the reduction of $CO_2$ emissions from international shipping, no matter which plan is adopted it will be essential to increase energy efficiency per ship, as this element is fundamental to all such plans. This document proposes a practical index of $CO_2$ emissions per unit shipping capacity to be used in the evaluation of energy efficiency, taking actual shipping conditions into consideration. |
| ***Strategic Direction:*** | 7.3 |
| ***High-level Action:*** | 7.3.1 |
| ***Planned output:*** | 7.3.1.3 |
| ***Action to be taken:*** | Paragraph 13 |
| ***Related documents:*** | MEPC 57/4/12 |

### The need to control greenhouse gas emissions from international shipping

1 The most significant greenhouse gas (GHG) emitted from international shipping is carbon dioxide ($CO_2$), in an amount corresponding to approximately 3% of the total $CO_2$ emissions worldwide. Not only is this amount equivalent to the aggregate emissions of a country such as Germany, but this figure is projected to increase in the future, based on growth in world trade and increase in international shipping activity (growing by 5.1% in the year 2005 alone on a ton-mile basis).

2 IMO is updating the 2000 IMO GHG Study. When this report is complete, the need for controlling future $CO_2$ emissions from international shipping would be further recognized globally. Although discussions continue within the United Nations Framework Convention on Climate Change (UNFCCC) concerning the prevention of global warming, the IMO as an international organization governing international shipping should contribute to the resolution of this global problem. Specifically, it is incumbent upon the IMO to accelerate discussions on $CO_2$ emissions that are attributable to the activities within its scope of governance.

3 International shipping is performed in a single global market, and relations are complex involving shipowners, operators, shippers (at both the shipping origin and destination), as well as other parties. Although a correspondence group will report to MEPC 57 on specific proposed methods of addressing GHG emissions from international shipping, the issues will in any event require deeper discussion in the future.

4 At the same time, improving the energy efficiency of ships to be built in the future and replacing ships one by one with those emitting lower levels of $CO_2$ would have practical results in restraining total GHG emissions from international shipping. Given these beneficial results, a framework must be established as soon as possible to promote these initiatives.

**Need to formulate a practical international index for improving the energy efficiency of individual ships**

5 In order to improve the energy efficiency of ships to be built in the future, an index for evaluating energy efficiency is essential. However, the energy efficiency of ships being built today is contractually guaranteed upon delivery of each ship, based on main engine power output and speed in calm water. Such calculations do not take into account reduced speed due to waves and wind experienced under actual sea conditions. Needless to say, the longer the main engine runs the more energy the ship will use.

6 All ships are subject to reduced speeds resulting from increasing wave height and changes in wave direction. As is recognized widely in the marine transportation industry, the design of the ship affects this reduction in speed (and the corresponding increase in energy used) considerably. It means the difference in $CO_2$ emissions between ships becomes significant as the wave height becomes higher. For example, among the four Pure Car Carrier (PCC) vessels indicated in Figure 1, whose basic specification and operational condition are almost identical, the difference in $CO_2$ emissions between the ships with the highest and lowest levels of performance is estimated to reach 6,000 tons per year even at significant wave height 2m (Beaufort scale BF5), based on the Yoshikazu Tanaka's document[1] .The problem for individual shipowners is that such differences in energy efficiency between individual ships can be ascertained only after using the ships in actual transportation, in the form of differences in fuel consumptions.

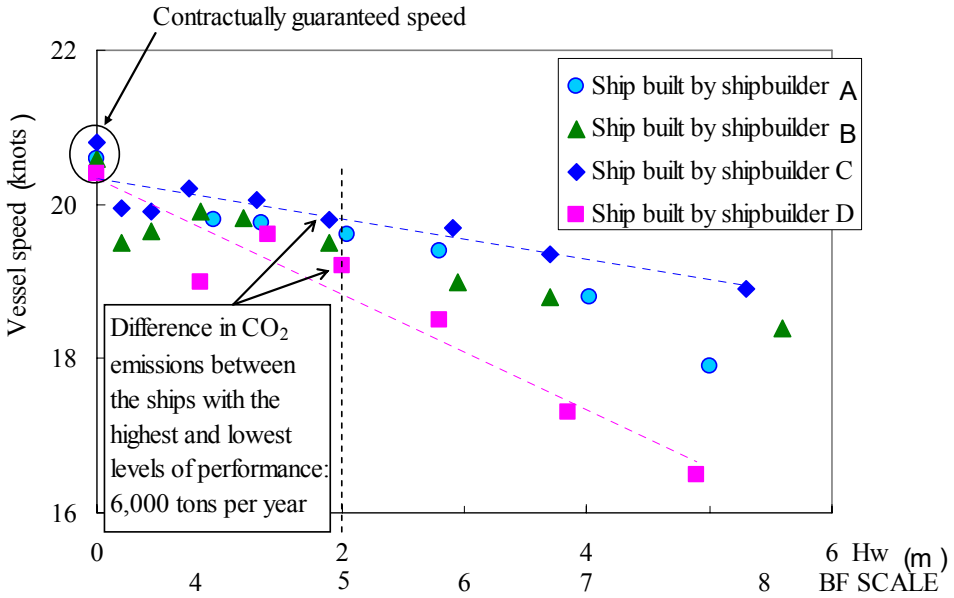


**Figure 1 Comparison of pure car carrier (PCC) vessels**

1 Yoshikazu TANAKA (2003) "Economical Speed and Life Cycle Value of Ship" Japan Towing Tank Conference, The Society of Naval Architects of Japan

7 Given the rising costs of fuel oil for ships, the demand for high energy efficiency in vessels has been growing rapidly among shipowners. Accordingly, providing a reasonable and practical index showing energy efficiency per ship under actual sea conditions would facilitate shipowners to choose more energy-efficient vessels.

8 Moreover, encouraging this evaluation among shipowners would encourage progress in energy-conservation technologies in the shipbuilding industry. This progress would in turn lead not only to the restraint of GHG emissions from international shipping but also to improved economic efficiency throughout the industry.

9 At the same time, since currently available energy-efficiency indices based on speed in calm water provide only limited information, these indices do little to facilitate the construction of more energy-efficient vessels, regardless of the potential demand among shipowners for such vessels. What is worse, the private-sector's efforts to improve energy efficiency per ship in actual sea conditions are neither recognized nor evaluated appropriately. Progress in energy-conservation technologies in this field may be, as a result, unduly limited.

10 Given all of the foregoing, in order to make progress in controlling GHG emissions from international shipping, it is essential to develop a practical international standard index that will indicate energy efficiency per ship in actual operational conditions.

**Formulating a practical index to indicate energy efficiency per ship**

11 In Japan, development of a practical $CO_2$ emissions index per unit shipping capacity is now underway, as a means of indicating energy efficiency per ship based on actual operational conditions. Formulation of this index is based on the following three requirements:

.1 the index must allow assessment of ship performance at the design stage, to enable confirmation by the shipping company of the $CO_2$ emissions index per unit shipping capacity for each ship prior to concluding a contract for a given new ship;

.2 the index must be simple and capable of broad application to all new ships built; and

.3 in light of the fact that the decline in shipping efficiency in waters differs considerably by type of ship and by individual ships, the index must promote efforts by shipowners, shipbuilders, suppliers and others to reduce $CO_2$ emissions, by reflecting as accurately as possible the energy efficiency when the ship is in actual use.

12 Methods to simulate the degree of decline in a ship's efficiency in actual sea conditions on an individual-ship basis are currently being developed in Japan. In the near future, by working to improve and ensure the reliability of such simulation through verification in actual sea conditions using actual ships, for which design data and other information are available, a guideline will be completed that reflect, as accurately as possible, energy efficiency per ship in actual operation.

**Action requested of the Committee**

13 The Committee is invited to:

.1 recognize that improving the energy efficiency of individual new ships to be built in the future would be very effective in controlling GHG emissions from international shipping;

.2 consider the establishment of a framework for a $CO_2$ emissions index per unit shipping capacity for new ships, focusing on use per individual ship, as an index to measure such improvements; and

.3 note Japan's intention to contribute to the prompt establishment of such international indices by providing the data and expertise which have been accumulated through the projects described in paragraphs 11 and 12 above.