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On Transport and Trade Facilitation:

**Maritime Transport and
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**Main events in IMO's work on
limitation and reduction of greenhouse gas
emissions from international shipping**

Information by International Maritime Organization (IMO)



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Background

1 Work on the prevention of air pollution and control of greenhouse gas emissions from ships engaged in international trade started within the International Maritime Organization (IMO) in the late 1980s. The first steps were outphasing of ozone depleting substances both as refrigerant gases and in fire fighting systems, later prevention of air pollution in form of cargo vapours and exhaust gas were targeted by, *inter alia*, adoption of strict limits for nitrogen oxides and sulphur oxides in ship exhaust gas. In recent years the focus has been on control of greenhouse gas (GHG) emissions from ships.

The 1997 MARPOL Conference

2 With a view to addressing the issue of GHG emissions from international shipping, the 1997 MARPOL Conference (September 1997) convened by the IMO adopted **Resolution 8 on "CO₂ emissions from ships"**, inviting:

- .1 the IMO Secretary-General to co-operate with the Executive Secretary of UNFCCC in the exchange of information on the issue of GHG emissions;
- .2 the IMO to undertake a study of GHG emissions from ships for the purpose of establishing the amount and relative percentage of GHG emissions from ships as part of the global inventory of GHG emissions; and
- .3 the Marine Environment Protection Committee (MEPC) of IMO to consider feasible GHG emissions reduction strategies.

2000 IMO GHG Study

3 As a follow-up to the above resolution, the **IMO Study on Greenhouse Gas Emissions from Ships** was completed and presented to the forty-fifth session of the MEPC (MEPC 45) in June 2000 as document MEPC 45/8. This Study estimated that ships contributed about 1.8% of the world's total anthropogenic CO₂ emissions.

4 The 2000 IMO GHG Study was undertaken by a consortium of internationally renowned research institutes and stated that there was no other mode of transport with a better energy-efficiency record than sea-transport on a tonne-mile basis. Nevertheless, the Study identified a number of areas with potential for reduction of CO₂ emissions.

- .1 Significant potential for reduction of emissions from shipping based on operational measures were identified. A range of the identified measures would require involvement from a range of players such as charterers, cargo owners and port operators as well as authorities. Operational measures, such as improved weather routing, reduced ballast voyages or optimal utilization of cargo space,

are not feasible to regulate by international standards or statutory rules. Larger port areas to be designated to store cargo for transshipment between smaller and larger vessels and developing of improved port infrastructure to speed up cargo operations to avoid congestion and waiting time are also among the measures that could have a noteworthy reduction potential.

- .2 Technical measures identified by the Study included improved hull shape, propeller design and efficiency improvement of marine diesel engines as well as waste heat recovery systems and the use of diesel-electric propulsion systems and the use of alternative fuels. Technical measures can be easier to implement and enforce through international standards than operational measures, and implementing these measures primarily through new vessels are more feasible for the shipping industry than retrofitting existing ships.
- .3 The Study indicated that technical and operational measures would have a limited potential for contributing to reduced over-all CO₂ emissions from ships if the increase in demand for shipping services and the requirement for increased speed and availability continued.
- .4 Shipping was confirmed by the Study to be a significant contributor in the development of environmental sustainable transport.

Assembly resolution on GHG policy and practices

5 In an effort to further address the issue of GHG emissions from ships, the IMO Assembly adopted (December 2003) **Resolution A.963(23) on “IMO Policies and Practices related to the Reduction of Greenhouse Gas Emissions from Ships”**, which:

- .1 URGES the MEPC to identify and develop the mechanism or mechanisms needed to achieve the limitation or reduction of GHG emissions from international shipping and, in doing so, to give priority to:
 - (a) the establishment of a GHG emission baseline;
 - (b) the development of a methodology to describe the GHG efficiency of a ship in terms of a GHG emission index for that ship. In developing the methodology for the GHG emission indexing scheme, the MEPC should recognize that CO₂ is the main greenhouse gas emitted by ships;
 - (c) the development of Guidelines by which the GHG emission indexing scheme may be applied in practice. The Guidelines are to address issues such as verification;
 - (d) the evaluation of technical, operational and market-based solutions;
- .2 REQUESTS the MEPC:
 - (a) to consider the methodological aspects related to the reporting of GHG emissions from ships engaged in international transport;
 - (b) to develop a work plan with a timetable;
 - (c) to keep this matter under review and to prepare consolidated statements on the continuing IMO policies and practices related to the limitation or reduction of GHG emissions from international shipping;

- .3 REQUESTS the IMO Secretariat to continue co-operating with the Secretariat of UNFCCC and the Secretariat of the International Civil Aviation Organization.

Co-operation between the Secretariats of IMO and UNFCCC

6 Following an invitation by UNFCCC, and as requested by the MEPC, there has been ongoing co-operation between the Secretariats of IMO and UNFCCC on the work of GHG emissions from international shipping concerning the use of bunker fuel oils since UNFCCC entered into force in 1994.

7 The issue of GHG emission has been considered by each session of the MEPC since 1997 and the outcome brought to the attention of the subsequent SBSTA session. Information regarding the deliberations within UNFCCC relevant to the work of IMO, and in particular within SBSTA, has been reported to the MEPC by the IMO Secretariat on a regular basis.

Voluntary Ship CO₂ Emission Indexing

8 MEPC 53 (July 2005) approved IMO's "**Interim Guidelines for Voluntary Ship CO₂ Emission Indexing for Use in Trials**" (MEPC/Circ.471). The objective of the Interim Guidelines was to establish a common approach for trials on voluntary CO₂ emission indexing, enabling shipowners and operators to evaluate the performance of their fleet with regard to CO₂ emissions. As the amount of CO₂ emitted from a ship is directly related to the consumption of bunker fuel oil, the CO₂ indexing also provides useful information on a ship's performance with regard to fuel efficiency.

9 The Administrations and the shipping industry are invited to promote the use of the Interim Guidelines in trials and report the outcome to the MEPC for consideration, taking into account:

- .1 operational experiences from trials of the index for different ship types, as reported to MEPC by the industry, organizations and Administrations;
- .2 progress in ISO regarding ship's CO₂ performance; and
- .3 any other relevant developments.

GHG module in GISIS

10 The outcome of trials from hundreds of ships has been submitted to IMO for information and MEPC 56 (July 2007) decided to establish a central database for the results of the voluntary Ship CO₂ Emission Indexing to make the data accessible for comparison and further studies. The Committee had observed that identical ships in seemingly similar trades produced different results and that the difference may result from different weather conditions or from operational differences concerning the specific utilization of individual ships involved in the trials. Issues such as the length of time spent waiting in port areas, the length of ballast voyages, whether the ship was fully laden during the trials or not, could all make a difference.

11 The central data base is established as a GHG module in IMO's Global Integrated Ship Information System (GISIS) and the IMO Secretariat is in co-operation with the member States having undertaken trials consecutively entering the received data. Member States were able to enter new data from early 2008 and the module is opened for public at www.imo.org/GISIS.

GHG work plan with timetable

12 As follow-up to resolution A.963(23), MEPC 55 (October 2006) approved a **“Work plan to identify and develop the mechanisms needed to achieve the limitation or reduction of CO₂ emissions from international shipping”**, inviting Member Governments to participate actively in the work.

13 The work plan culminates at MEPC 59 (July 2009) and contains, inter alia, improvement of the CO₂ indexing method described in paragraphs 8 and 9 above, establishment of CO₂ emission baseline(s), and consideration of technical, operational and market-based methods for dealing with GHG emissions from ships in international trade (the GHG work plan with timetable is set out as annex).

Fundamental principles for regulation of GHG emissions from ships

14 MEPC 57 (April 2008) acknowledged the importance of developing fundamental principles as a basis for future regulations and decided, by overwhelming majority, to take the below listed principles as its reference for further debate on GHG emissions from international shipping. A coherent and comprehensive future IMO framework should be:

- .1 effective in contributing to the reduction of total global greenhouse gas emissions;
- .2 binding and equally applicable to all flag States in order to avoid evasion;
- .3 cost-effective;
- .4 able to limit, or at least, effectively minimize competitive distortion;
- .5 based on sustainable environmental development without penalizing global trade and growth;
- .6 based on a goal-based approach and not prescribe specific methods;
- .7 supportive of promoting and facilitating technical innovation and R&D in the entire shipping sector;
- .8 accommodating to leading technologies in the field of energy efficiency; and
- .9 practical, transparent, fraud free and easy to administer.

15 A number of delegations expressed reservations on the principle stated in paragraph 14.2 above. The Committee agreed to further reflect on the issue of the principles with the intention to reach consensus at MEPC 58 (October 2008) and encouraged Member States to submit their views to that session. However, due to time constraint, MEPC 58 was unable to fully consider this matter and to reach a final agreement on the contested principle, so the consideration will continue at MEPC 59 (July 2009).

Application of GHG measures

16 A reoccurring debate within IMO is how the wording of Article 2.2 of the Kyoto Protocol should be interpreted and if the principle agreed under UNFCCC of ‘common but differentiated responsibility’ should apply to a GHG regime for international shipping rather than IMO’s basic principle of non-discriminatory regulation of all ships in international trade irrespective of flag and the principle of ‘no more favourable treatment’ of ships flying the flag of a non-party to any mandatory IMO treaty instrument.

17 Article 2.2 of the Kyoto Protocol reads:

“The Parties included in Annex I shall pursue limitation or reduction of emissions of greenhouse gases not controlled by the Montreal Protocol from aviation and marine bunker fuels, working through the International Civil Aviation Organization and the International Maritime Organization, respectively.”

18 A number of delegations have maintained the view that any GHG reduction measures to be adopted by IMO should only be applicable to Annex I parties to the UNFCCC and its Kyoto Protocol in accordance with the principle of ‘common but differentiated responsibility’. This principle was adopted by the UNFCCC and should be upheld in all international negotiations regarding climate change. In view of the different contributions to global environmental degradation, States should have common but differentiated responsibilities based on the Rio Declaration from 1992. These delegations have been unable to agree to mandatory emission reductions measures applicable to either all flag States or all ships and reasoned that developing countries (non-Annex I countries) cannot take on emission reduction commitments related to international shipping and that such measures on the part of developing countries should only be on a voluntary basis.

19 Other delegations have expressed the opinion that, given the global mandate of IMO, as regards safety of ships and the protection of the marine and atmospheric environment from all sources of ship pollution, the IMO regulatory framework on GHG emissions should be applicable to all ships, irrespective of the flags they fly. It has been stressed that, as three-quarters of the world’s merchant fleet fly the flag of developing countries not listed in Annex I to the UNFCCC, any regulatory regime on the reduction of GHG from shipping would become ineffective for the purpose of combating climate change, if applicable only to Annex I countries. IMO has its global mandate from the IMO Convention itself as well as from UNCLOS, and not from Article 2.2 of the Kyoto Protocol and that there is no precedence in any of the more than fifty IMO treaty instruments currently in existence where measures are applied selectively to ships according to their flag. On the other hand, there are several international environmental agreements which have a differentiated approach, such as The Montreal Protocol (on substances that deplete the ozone layer), yet when IMO has dealt with the same issues, the principle of differentiated approach has not been taken on board.

20 The Secretary-General has emphasized that the Committee should debate the issues thoroughly so that, in the end, balanced decisions would be made – an approach that only IMO, with its global membership and global mandate, could make on a global issue of global dimensions. He was of the view that the Committee should address the issue from IMO’s global mandate and competence. He queried what service would be rendered to the environment if the application of measures to eliminate or reduce greenhouse gas emissions was required of a developed country with a limited number of ships under its flag when developing countries with a large number of ships under their flag were not obliged to comply with the same measures.

Market-based mechanisms

21 Recognizing that technical and operational measures may not be sufficient to reduce the total amount of GHG emissions from international shipping, as global trade is projected to continue growing, market-based mechanisms have been considered by MEPC as called for by resolution A.963(23). A market-based mechanism would serve two main purposes; off-setting of growing ship emissions in other sectors and being an incentive for the industry to invest in more fuel efficient ships and to operate them more efficiently. In addition, the market-based mechanisms under consideration, e.g. a global fuel levy or an emission trading scheme for ships, could generate funds that could be used for different purposes such as adaptation and transfer of technology.

Update of the 2000 IMO GHG Study

22 MEPC 55 (October 2006) agreed to update the “IMO Study on Greenhouse Gas Emissions from Ships from 2000” (see paragraphs 3 and 4 above) to provide a better foundation for future decisions and to assist in the follow-up to resolution A.963(23). MEPC 56 (July 2007) adopted the Terms of Reference for the updating that has been divided into two phases:

- .1 Phase 1, covering a CO₂ emission inventory from international shipping and future emission scenarios, was considered by MEPC 58 (October 2008) (see below for further details); and
- .2 Phase 2, also covering greenhouse gases other than CO₂ and other relevant substances in accordance with the methodology adopted by UNFCCC, as well as the identification and consideration of future reduction potentials by technical, operational and market-based measures, will be submitted to IMO by April 2009 for consideration by MEPC 59 (July 2009).

Outcome of Phase 1 of the updated IMO GHG Study

23 As described in paragraph 22 above, the 2000 IMO GHG Study is currently being updated to facilitate future decisions and the work is undertaken by international consortium of renowned research institutions, co-ordinated by MARINTEK of Norway.

24 Following a tendering process targeting selected institutes, the contract to update the 2000 IMO GHG Study was awarded to an international consortium of ten entities comprising six of the 12 invited institutes. The consortium is co-ordinated by MARINTEK of Norway and is made up of the following institutes and individual key experts: CE Delft, The Netherlands; Dalian Maritime University, China (Peoples Republic of); David Lee, United Kingdom; Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR), Germany; DNV, Norway; Energy and Environmental Research Associates (EERA), United States of America; Lloyd’s Register-Fairplay Research, Sweden; MARINTEK, Norway; Mokpo National Maritime University (MNMU), Republic of Korea; National Maritime Research Institute (NMRI), Japan; and Ocean Policy Research Foundation (OPRF), Japan.

25 A steering Committee was established in December 2007 under the Chairmanship of Ms Petra Bethge (Germany), with Mr. Bin Okamura (Japan) as Vice-Chairman and with representatives from the following IMO Member States: Australia, Canada, China, Denmark, Greece, India, Iran (Islamic Republic of), the Marshall Islands, Nigeria, Panama, the Philippines, the Republic of Korea, the Russian Federation, South Africa, United Kingdom, the United States and Vanuatu. The Steering Committee will assist the Secretariat in the management of the update and it had input into the tendering process and approved the study outline. The Steering Committee will monitor and report progress of the study and confirm that the study meets the terms of reference before submission to the MEPC.

26 The update is being financed through voluntary external funding and, to date (1 November 2008), contributions have been received from Australia, Canada, Denmark, Germany, the Marshall Islands, the Netherlands, Norway, Sweden, United Kingdom and the Japanese Shipowners Association. In addition, valuable in-kind work for the Consortium is being undertaken by research institutes in China, Japan and the Republic of Korea.

27 MEPC 58 (October 2008) reviewed the Phase 1 report of the updated IMO Study on GHG emissions from ships and noted with interest, *inter alia*, the following findings:

- .1 CO₂ emissions from international shipping have been estimated both from activity data and from international fuel statistics. It was concluded that the activity-based estimates with the use of detailed activity data (for different ship sizes and types) gave a better assessment of global fuel consumption and CO₂ emissions from international shipping than fuel statistics, due to apparent under-reporting of marine bunker sales;
- .2 the consensus estimate for 2007 CO₂ emissions from international shipping (merchant ships above 100GT) amounts to 843 million tonnes CO₂ (2,7% of the world's total anthropogenic CO₂ emissions);
- .3 by also including domestic shipping and fishing vessels (ships above 100GT but still excluding naval vessels), the amount would increase to 1,019 million tonnes CO₂ (3,3% of the world's total anthropogenic CO₂ emissions); and
- .4 future emissions from international shipping have been estimated based on global developments outlined by the Intergovernmental Panel on Climate Change (IPCC). Assuming that there are no explicit regulations on CO₂ emissions from ships, CO₂ emissions are predicted in the base scenarios to increase by a factor of 2.4 to 3.0 by 2050. For 2020, the base scenario predicts increases ranging from a factor of 1.1 to 1.3. These predictions take into account significant efficiency improvements resulting from expected long-term increases in energy prices.

The full report may be found at the IMO website:

http://www.imo.org/home.asp?topic_id=1737

Latest GHG considerations within IMO - Outcome of MEPC 58

28 The fifty-eighth session of IMO's Marine Environment Protection Committee (MEPC 58) was held in London, from 6 to 10 October 2008. MEPC 58 continued to consider a follow-up to resolution A.963(23) on "IMO Policies and Practices related to the Reduction of Greenhouse Gas Emissions from Ships".

The first Intersessional meeting of the Working Group on GHG Emissions from Ships

29 MEPC 58 considered the outcome of the first Intersessional Meeting of the Working Group on Greenhouse Gas Emissions from Ships that was held in Oslo, Norway, in June 2008. The week-long session had further developed the CO₂ Design Index for new ships; continued the review of the CO₂ operational index; and addressed best practices for fuel efficient operation of ships as well as possible market-based measures to reduce GHG emissions from ships.

Technical and operational GHG measures

30 MEPC 58 agreed to change the terms "Design CO₂ Index" to "Energy Efficiency Design Index"; and "Operational CO₂ Index" to "Energy Efficiency Operational Index".

31 MEPC 58 maintained its momentum and made substantive progress in developing technical and operational measures to address GHG emissions from ships, including:

- .1 development of the **Energy Efficiency Design Index** (EEDI) for new ships and approved the usage of the interim Guidelines on the method of calculation for trial purposes with a view to further refinement and improvement. MEPC 58 invited

delegations and industry observers to disseminate the Interim Guidelines on the EEDI to the maritime community at large, so that adequate experience could be gained on its adequacy as a tool to improve energy efficiency for new ships;

- .2 continued review of the **Energy Efficiency Operational Index** (MEPC/Circ.471) but was unable to finalize the work due to time constraint and established an intersessional correspondence group co-ordinated by Japan to further advance the work with a view to finalization at MEPC 59; and
- .3 further development of the basis for a fuel efficiency management tool and **guidance on best practices for fuel-efficient operation of ships** and agreed that the guidance text had been finalized and could be used in conjunction with the ship's Energy Efficiency Management Plan under consideration.

Market-based Measures

32 MEPC 58 undertook a considerable debate on a possible Emission Trading Scheme, a global levy on fuel and other hybrid market-based schemes for ships in international trade. The majority of delegations that spoke on the matter opposed the development of any market-based measures intended for the reduction of GHG emissions from ships as long as the issue of "Common but differentiated responsibility" was not resolved in full recognition of article 2.2 of the Kyoto Protocol. Other delegations were of the view that the issue on market-based measures was still at a preliminary stage and further information and studies were needed on such a highly complex matter.

33 MEPC 58 agreed to dedicate sufficient time to hold an in-depth discussion at MEPC 59 and requested delegations to provide as much information as possible with a view to facilitating a focused debate.

The Second Intersessional GHG Meeting

34 In view of the tasks still outstanding, MEPC 58 agreed that the intersessional GHG Working Group should be re-convened to carry out further work before MEPC 59. The Committee approved Terms of Reference for the meeting that will be held at IMO Headquarters from Monday, 9 March to Friday, 13 March 2009 and is instructed as follows:

"Taking into account the outcome of MEPC 58:

- .1 regarding the Energy Efficiency Design Index for new ships, consider towards finalization:
 - .1 the Energy Efficiency Design Index formula, taking into account any trial application of the Index by calculation;
 - .2 the regulatory text using annex 6 to document MEPC 58/4 as a basis, including baseline (MEPC 58/4/8 and MEPC 58/4/34);
 - .3 the verification procedure; and
 - .4 any necessary associated guidelines;
- .2 consider towards finalization the review of the interim guidelines on the Energy Efficiency Operational Index (MEPC/Circ.471);

- .3 consider towards finalization the introduction of a management tool for all ships, taking into account the Ship Efficiency Management Plan considered during MEPC 58;
- .4 consider towards finalization the guidance on best practices and other voluntary operational measures including reference text to be incorporated in the regulatory framework;
- .5 consider possible impacts on the shipping sector from the measures envisaged; and
- .6 present a written report to MEPC 59.”

Correspondence Group on GHG Related Issues

35 MEPC 58 noted that the Intersessional Correspondence Group on Greenhouse Gas Emissions from Ships (co-ordinated by Australia and the Netherlands) would continue working with the following Terms of Reference:

“Taking into consideration available relevant information, the Intersessional Correspondence Group on Greenhouse Gas Emissions from Ships is instructed to:

- .1 prepare detailed proposals on the measures identified in the Correspondence Group report (MEPC 57/4/5 and MEPC 57/4/5/Add.1), which have not been identified for further consideration by the GHG Working Group; and
- .2 present a final report to MEPC 59.”

Shipping and sustainable development

36 There is no doubt that shipping is a **clean, green, environmentally-friendly and very energy-efficient mode of transport**. Overall, it is only a small contributor to the total volume of atmospheric emissions. Nevertheless, significant reductions in harmful emissions from ships and increases in fuel efficiency have been achieved over the past decades through enhancements in the efficiency of engine and propulsion systems and improved hull design. Larger ships and a more rational utilization of individual vessels have also contributed significantly to reducing the amount of energy needed to transport a given unit of cargo.

37 Shipping is a very positive force in sustainable development, making a massive contribution to global prosperity with only a marginal negative impact on the global environment. Both the poor and the rich benefit from seaborne trade. Moreover, due to the nature of shipping, developing countries can and do become major participants in the industry itself and, by so doing generate income and create national wealth.

28 IMO will continue to work on reducing harmful emissions from shipping, a **transport industry that is vital to world trade and sustainable development**, and will continue to keep SBSTA updated on the progress made.

ANNEX

WORK PLAN TO IDENTIFY AND DEVELOP THE MECHANISMS NEEDED TO ACHIEVE THE LIMITATION OR REDUCTION OF CO₂ EMISSIONS FROM INTERNATIONAL SHIPPING

1 The Marine Environment Protection Committee, at its fifty-fifth session, held from 9 to 13 October 2006, considered the required follow-up actions in technical and methodological perspective to resolution A.963(23) on IMO Policies and Practices Related to Reduction of Greenhouse Gas Emissions from ships.

2 The Committee agreed to the following work plan with timetable in accordance with paragraph 2(b) of resolution A.963(23), having recognized that CO₂ is the main greenhouse gas emitted by ships. The Committee will carry out its work in this regard taking into consideration the work plan with the timetable.

WORK PLAN

- 1 CO₂ Emission Indexing Scheme (action 1(b) of resolution A.963(23)):
 - .1 Member States and the industry to continue to carry out trials in accordance with MEPC/Circ.471 and submit the results to MEPC; and
 - .2 Improve indexing method set out in MEPC/Circ.471.
- 2 CO₂ emission baseline(s) (action 1(a) and (b) of resolution A.963(23)):
 - .1 Consider methodology for CO₂ emission baseline(s) in terms of efficiency;
 - .2 Evaluate the methodology referred to in paragraph 2.1 by accumulated data on CO₂ emission;
 - .3 Draft proposal(s) on CO₂ emission efficiency baseline(s); and
 - .4 Explore other types of baseline(s), if necessary.
- 3 Consider technical, operational and market-based methods for dealing with GHG emissions (action 1(d) of resolution A.963(23)).

TIMETABLE

Above work items should be conducted according to the following timetable.

Item	MEPC 55 Oct. 06	MEPC 56 July 07	A 25 Nov. 07	MEPC 57 Mar. 08	MEPC 58 Oct. 08	MEPC 59 July 09
1.1	O	O		O	O	
1.2					O	O
2.1		O		O	O	O
2.2				O	O	O
2.3					O	O
2.4					O	O
3		O		O	O	O