

**CONCLUDING WORKSHOP FOR THE PROJECT TO
ENHANCE POLICY-MAKING CAPACITY UNDER
THE FRAMEWORK CONVENTION ON CLIMATE
CHANGE AND THE KYOTO PROTOCOL**

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**Greenhouse Gas Emissions from Ships - The Feasibility of
Controlling Emissions from Marine Bunker Fuels**

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Greenhouse Gas Emissions from Ships - The Feasibility of Controlling Emissions from Marine Bunker Fuels

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Introduction

On 11 December 1997 in Kyoto, Japan, the Third Conference of the Parties (COP-3) to the United Nations Framework Convention on Climate Change (UNFCCC) adopted a legal instrument containing legally binding targets for greenhouse gas emissions reduction to avert the threat of climate change, considerably strengthening the commitments contained in the Convention. The Kyoto Protocol mandates an aggregate emissions reduction target for industrialised countries of 5%. This looks meagre compared with the 60%-80% deemed necessary by the Intergovernmental Panel on Climate Change, but could represent 30% cuts for many countries of the main greenhouse gases by 2012. The Protocol contains “cutting edge” legal mechanisms such as emissions trading, joint implementation and the Clean Development Mechanism.¹

It also requires Parties to implement and elaborate policies and measures (PAMs), particularly those specified in Article 2 of the Protocol. Amongst the list of PAMs there are provisions requiring Parties to pursue limitation or reduction of emissions from aviation and marine bunkers by “working through the International Civil Aviation Organisation and the International Maritime Organisation”.²

The objective of this study is to examine the relatively neglected area of emissions from marine bunkers GHG (in particular CO₂). The Framework Convention on Climate Change will be looked at as well as measures currently being taken by the International Maritime Organisation (IMO) to fulfil the provisions of the Kyoto Protocol. The IMO Marine Environment Protection Committee (MEPC) is currently dealing with the issue in co-operation with the UNFCCC Secretariat. At its 42nd session in November 1998 - the second session after the adoption of the Kyoto Protocol in December 1997 - the MEPC considered proposals submitted by the United States and the International Chamber of Shipping, which will be examined below.

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This paper is structured as follows: Part I - Definitions and background; Part II - Options for limiting CO₂ emissions from shipping; Part III - Conclusion.

PART I – Definitions and background

Maritime transport

Shipping is by far the most prominent means of intercontinental goods transport and moreover is often the only method. Transport over water is the cheapest of all global transport media available: consequently, more than 95% of world trade moves by ship. According to the Intergovernmental Panel on Climate Change (IPCC), this medium is the least significant contributor of CO₂ per amount of product shipped³. Similarly, seaborne transport is much more energy-efficient than other modes of transport like air and road.⁴ Presently shipping accounts for just 2% of global CO₂ emissions. The relative smallness of this figure has led the to the marine industry dismissing the need for climate related actions.

The above analysis was based upon 1990 world fleet statistics. Then, the world fleet consisted of 424 million GT. or 667 million dwt. The world fleet of propelled sea-going merchant ships of not less than 100 GT. stood at 85 494 ships - the equivalent of 522.2 million gross tonnage with an average age of 19 years, as at December 1997. The world's cargo carrying fleet was 45 830 ships - 757.8 million Dwt (496.5 million GT.) with an average age of 18 years, as at December 1997.⁵

Definition of shipping

'Shipping' is not defined by the Convention establishing the IMO or by the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol 1978 relating thereto (MARPOL 73/78). The term 'shipping' usually means maritime transport, ships, or the loading on board a ship (of goods) although this is also defined as the merchant shipping fleet of a country, or the transportation of merchandise. Military vessels⁶ are excluded from the scope of this study.

Definition of bunker fuel

Bunkers are defined as "fuel consumed by the engines of a ship; compartments or tanks in a ship for fuel storage"⁷. Bunker fuels are fuels sold to any air or marine vessel engaged in

international transport.

Bunker fuel oils are blended products based on the residues from various refinery distillation and cracking processes. They are used in medium to large industrial plants, marine applications and power stations in combustion equipment such as boilers, furnaces and diesel engines. “Heavy fuel oil” is a general term for this range of products including: residual fuel oil, fuel oil n. 6, industrial fuel oil, marine fuel oil and black oil.⁸

The IMO

The International Maritime Organisation is a UN specialised agency responsible for measures to improve the safety of international shipping and to prevent marine pollution from ships. The Organisation purposes as summarised in Article 1(a) of the Convention establishing the IMO are: “to provide machinery for co-operation among Governments in the field of governmental regulation and practices relating to technical matters of all kinds affecting shipping engaged in international trade; to encourage and facilitate the general adoption of the highest practical standards in matters concerning maritime safety, efficiency of navigation and prevention and control of marine pollution from ships”.⁹

It has currently 156 Member States¹⁰. Its institutions comprise an Assembly, Council and five technical committees (Maritime Safety, Marine Environment, Legal, Technical Co-operation and Facilitation Committees). Contributions to the budget are based on a formula which is different from that used in other UN agencies. The amount paid by each Member State depends primarily on the tonnage of its merchant fleet. In 1998, its top contributors were Panama, Liberia, Japan, Greece, Bahamas, Cyprus, USA, Norway, Singapore and China.¹¹ All these countries have ratified the FCCC, except Liberia, which is neither a Party to the Convention nor a signatory to the Kyoto Protocol. So far China, Greece, Japan, Norway, Panama and the United States have signed the Kyoto Protocol.¹² Although they agree on many matters relating to shipping, these countries have very disparate interests in the context of climate change negotiations. China associates itself with the Group of 77 (G 77), while the EU Member States often fight as a bloc against Japan, the US and Norway and others (JUSSCANNZ).¹³ Bahamas is a member of the Alliance of Small Island States (AOSIS). Interestingly, Liberia and Panama are probably responsible for the largest quantity of emissions in terms of shipping.

IMO Conventions

The Organisation has adopted 26 conventions on safety, pollution and legal aspects of international shipping. As regards marine pollution, IMO has adopted 5 conventions evidencing its involvement in environmental matters. Of these the most important one is MARPOL 73/78, which is intended to prevent marine pollution by the discharge of “harmful substances or effluents containing such substances.”¹⁴ The Convention covers pollution caused by accidental and operational oil discharges, by chemical goods in packaged form, sewage and garbage. In addition a new Annex VI to the Convention was adopted in 1997 to regulate air pollution from ships (not yet in force).¹⁵ This Annex, however, deals mainly with SOx emissions from ship exhausts and provides for a NOx Technical Code, but excludes CO₂ emissions. Parties must apply the Convention to their own vessels as well as to violations within their jurisdictions.¹⁶

The Marine Environment Protection Committee (MEPC) is responsible for the review and for monitoring the implementation of the conventions on marine pollution, including MARPOL 73/78. The MEPC is also responsible for dealing with GHG emissions from ships pursuant to the Kyoto Protocol provisions. However, this has not been considered a high priority item in the Organisation’s agenda to tackle pollution. At present, the MEPC is more concerned with harmful effects of ballast water and the use of antifouling paints, developing instruments for adoption in the near future.

When the Committee decided to develop a new Annex VI to MARPOL 72/78 on the Prevention of Air Pollution from Ships, climate change was not considered a high priority item on the Agenda of most IMO Member States.¹⁷ Some IMO members, in particular European States, were more concerned with ozone depleting substances and acidification caused by NOx and SOx. The Committee also concluded that it was not possible to reduce NOx and CO₂ emissions at the same time. Consequently, it decided to leave CO₂ outside the text of the new Annex and to consider appropriate measures at a later stage. However, by the time of the MARPOL Conference to adopt the new Annex VI, in September 1997, most IMO member States were also preparing to participate in the Kyoto Conference, in December.¹⁸ Therefore, the Committee adopted the rather vague Conference Resolution 8 (reproduced in the Annex to this paper and discussed in detail below). The resolution calls for a joint study, prepared by the IMO and the FCCC Secretariat, to examine emissions from ships as part of a global inventory of CO₂ emissions.

PART II – Options for limiting CO₂ emissions from shipping: Specific GHG emissions from shipping and reduction requirements

Emissions from shipping

CO₂ is the main greenhouse gas emitted by ships. In addition, bunker fuel contains large amounts of sulphur (3-4 %) resulting in 7.5-11.5 million tonnes per year of SO₂ emissions, which accounted for 7% of sulphur emissions from all sectors (Ofstedal *et al.*, 1996). Ships also emit about 9.3 million tonnes of NO_x per year (11-12 % of the world total from fossil fuel sources). Other gas emitted from ships less significant as a greenhouse gas/precursor is Volatile Organic Compound (VOC), accounting for 1.5 million tonnes per year (Ofstedal *et al.*, 1996).¹⁹

The UNFCCC/Kyoto Protocol

Article 2 of the Kyoto Protocol requires “Parties included in Annex I to 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 Organisation and the International Maritime Organisation, respectively.”

The “soft” legal character of article 2(2) and the shift of control of marine bunkers and aviation fuel to these organisations (and not the UNFCCC) may raise concerns as to the efficacy of these provisions. Nevertheless, it represents a positive step in international climate policy and co-operation.

Many environmental groups had advocated the coverage of these emissions under the Kyoto Protocol, but the Ad Hoc Group on the Berlin Mandate (AGBM) could not deal with the issue due to lack of time, and complex distributional and burden sharing issues.²⁰ Those environmental NGOs expressed concerns about the implications of these fast growing emissions, especially those from international aviation. At Buenos Aires, an NGO coalition expressed disappointment arguing that these emissions were given a ‘free ticket’ because they had to be dealt with by ICAO and the IMO. They argued this created one of the most visible loopholes in the Protocol²¹. Although these fears may be justified, it is important to remember the implications of emissions reductions to legal, economic, trade, technological and competition aspects related to shipping, not to mention the problems associated with the international character of shipping (including freight). The inclusion of the provisions of

article 2(2), albeit below environmentalists' expectations, still represents a step forward in international co-operation to curb emissions from bunkers.

Subsequent developments

The Fourth Conference of the Parties to the UNFCCC (COP-4) was held in Buenos Aires from 2-14 of November 1998. The Ninth session of SBSTA, the body entrusted to deal with emissions from international bunkers was held in conjunction with COP-4. As part of its conclusions, SBSTA requested the Secretariat provide information for its tenth session (due in July 1999) on emissions resulting from fuel sold to ships or aircraft engaged in international transport, taking into account the ongoing work of the IMO and ICAO. While noting the information provided by ICAO, SBSTA requested the Secretariat to invite representatives of the ICAO and IMO to report on their work to the SBSTA at its tenth session²². This is an important requirement. It establishes clearly a timetable for those organisations to report to SBSTA, thus establishing a link between the different fora. Furthermore, IMO members have indicated they prefer to deal with international shipping issues in order to prevent alternative international organisations/bodies imposing restrictions or reductions on emissions from ships. This clearly shows that as long as GHG remain high on the international agenda, they will also feature on the IMO's agenda.²³ This is one example of the "drag effect", referred to by Lee Kimball²⁴ (whereby the climate issue promotes action on other fronts).

Previous decisions by the COP on the issue of bunker fuels include decision 2/CP.3 on "Methodological issues related to the Kyoto Protocol adopted by the third COP reaffirmed that Parties should use the Revised 1996 Guidelines for National Greenhouse Gas Inventories of the Intergovernmental Panel on Climate Change to estimate and report on anthropogenic emissions by sources and removal by sinks of GHG not controlled by the Montreal Protocol". The decision implies that under the Guidelines, emissions from fuel sold to ships or aircraft engaged in international transport should not be included in national totals, but reported separately. Decision 9/CP.2 (Annex) on national communication by Annex I Parties contains information on emissions from international marine bunkers (containing a requirement to include separate projections for bunker fuels/ or information that facilitates international projections)²⁵.

Allocation and control of international bunker fuels

The issue of allocation of international bunker fuels has proved complex and problematic. The options listed below reflect the complexity of factors involved. SBSTA

(FCCC/SBSTA/1996/9/Add.2) discussed the implications of the allocation options in detail, taking into account the specific characteristics of the aviation and marine sectors. These options were as follows (Options marked with an asterisk were considered to be less practical because of data requirements or inadequate global coverage)²⁶:

1. No allocation, as at that time.
2. Allocation of global bunker sales and associated emissions to Parties in proportion to their national emissions.
3. allocation to Parties according to the country where the bunkers fuel is sold.
4. Allocation to Parties according to the nationality of the transporting company, or to the country where a ship or aircraft is registered, or to the country of the operator.
5. * Allocation to Parties according to the country of departure or destination of an aircraft or vessel. alternatively, the emission related to the journey of an aircraft or vessel could be shared by the country of departure and the country of arrival.
6. * Allocation to Parties to the country of departure or destination of passenger or cargo. Alternatively, the emissions related to the journey of passengers or cargo could be shared by the country of departure and the country of arrival.
7. * Allocation to Parties according to the country of origin of passengers or owner of cargo.
8. * Allocation to the Party of all emissions generated in its national space.²⁷

SBSTA also considered the following questions relevant to the allocation options for emissions from bunker fuels:

- a) Would it be feasible for the Party to control the emissions allocated to it?
- b) could the required data be generated with sufficient precision?
- c) Is the method based on the “polluter pays” principle?
- d) Is the method equitable?
- e) Does the allocation method cover all international emissions?
- f) Is the method suitable for all GHG?
- g) Should the method apply to both aviation and marine emissions?
- h) Does the method provide a suitable basis for making projections?

In addition, SBSTA considered important factors, such as²⁸:

- If international emissions are allocated to Parties, whether and how they would develop control measures (national or international level).
- If the Parties decide not to allocate bunker fuel emissions to specific Parties, the aviation and marine sector would still need to be considered in relation to Article 4.2 of the Convention (Art. 2 of the Kyoto Protocol on PAMs).

- Parties may also need to consider whether to apply allocations retrospectively or not.

The IMO mandate and efforts to combat air pollution from ships

In terms of the impact of shipping on air pollution in the late eighties, the IMO has focused principally on the use of CFCs and halons, emissions of volatile vapours, and emissions from ships' uptakes including incinerators, boilers and engines. With respect to uptake emissions the main concern has been to evaluate the combustion pollutants, nitrogen oxides (NOx) and sulphur oxides (SOx). Whilst the former needs to be tackled by engine designers, the later is related to fuel quality²⁹. It is then highly likely that the IMO's conclusions will affect the shipping industry significantly.

The Conference of the Parties to MARPOL 73/78 held in September 1997 adopted a new Annex VI on Regulations on the Prevention of Air Pollution from Ships. For example, the new Annex establishes a 4.5 % global SOx cap on the "sulphur content in any fuel oil used on board ships..."³⁰. After lengthy negotiation for a reduction of the preferred 5% threshold, the adoption of a 4.5% global SOx cap disappointing those seeking a more stringent targets to protect sensitive areas.³¹ The negotiations illustrate the pressure brought to bear by the oil industry lobby, the result of which is a target of dubious environmental value.

Eight Conference resolutions were also adopted (in conjunction with Annex VI provisions), two of which provide for the NOx Technical Code. Resolution 8 covers CO₂ emissions from ships and recognises that Annex VI does not address CO₂ emissions from ships. It further notes that the global nature of climate change calls for the widest possible co-operation by all countries worldwide, and that the UNFCCC obliges Parties to anticipate, prevent or minimise the causes of climate change and mitigate its adverse effects. Therefore, it invites the IMO's Secretary General to co-operate with the Executive Secretary of the UNFCCC in the exchange of information on the issue of greenhouse gas emissions. It also invites IMO, in co-operation with the UNFCCC, to undertake a study of CO₂ emissions from ships in order to establish the amount and relative percentage of CO₂ emissions from ships as part of the global inventory of CO₂ emissions. The study should estimate emissions for the most recent year where they may be reasonably estimated and should also address how shipboard emissions and their relative percentage contribution to the global inventory may change in future years, in light of reductions to be made in other sectors as well as other trends that may be reasonably anticipated through sound scientific analysis. It further invites the MEPC to consider what reduction strategies may be feasible in light of the relationship between CO₂ and other atmospheric and marine pollutants, specially NOx since NOx emissions may exhibit

an inverse relationship to CO₂ reduction; and urges IMO Member States to participate in the study on CO₂ emissions referred to above and to propose appropriate strategies to the MEPC.³²

The objective of the 40th session (15-19 September 1997) of the MEPC was the establishment of a programme for the implementation of the new Annex VI, to consider priorities regarding the provisions of Article VI. These include: the completion of a study of CO₂ emissions from ships as part of total global emissions, in co-operation with the United Nations Framework Convention on Climate Change (UNFCCC); as well as the consideration of the feasibility of CO₂ reduction strategies in relation to other atmospheric and marine pollutants like NO_x.

MEPC 41 (30 March - 3 April 1998) noted that the Conference requested the Committee undertake a study, in co-operation with the United Nations Framework Convention on Climate Change, of CO₂ emissions from ships for the purpose of establishing the amount and relative percentage of CO₂ emissions from ships as part of the global inventory of CO₂ emissions (Conference Resolution 8); and to consider what CO₂ reduction strategies may be feasible in the light of the relationship between CO₂ and other atmospheric and marine pollutants, especially NO_x since NO_x emissions may exhibit an inverse relationship to CO₂ reduction (Conference Resolution 8).³³ On that basis, the Committee, at its 41st session instructed the drafting group on prevention of air pollution from ships to prepare a follow-up action programme list for the implementation of the new Protocol (Annex VI) and will liaise with the UNFCCC to this end. The group recommended the Secretariat invite the UNFCCC Secretariat to submit any additional information on the principles for reporting of CO₂ emissions from the transport sector. The drafting group also requested the Committee establish a drafting group at MEPC 42 to examine information on CO₂ emissions.³⁴

The texts of the 1997 Protocol to MARPOL 73/78 (including Annex VI) and the eight Conference resolutions were communicated to the UNFCCC Secretariat as support information, in particular for COP-3, held in 1997, in Kyoto, Japan. The documentation was submitted to the Subsidiary Body for Scientific and Technological Advice (SBSTA), which had called upon Parties to work through other relevant organisations, including the ICAO and the IMO to address climate change issues in their deliberations and requested these organisations provide reports on their work to future sessions of SBSTA (FCCC/SBSTA/1997/6, 29 August 1997).

The UNFCCC Secretariat submitted a copy of the “1996 Revised Guidelines for National Greenhouse Gas Inventories of the intergovernmental Panel on Climate Change to Estimate

and Report on Anthropogenic Emissions by Sources and Removal by Sinks of Greenhouse Gases not controlled by the Montreal Protocol” to the IMO Secretariat as part of the Organisations’ communications/exchange of information. According to the Guidelines:

1. emission based upon fuel sold to ships engaged in international transport should not be included in national totals, but should be reported separately;
2. Parties to the FCCC are encouraged to include separately projections of emissions from international bunker fuels and/or provide information which will facilitate international projection of bunker fuel emissions;
3. the SBSTA at its fourth session, in December 1996, considered emissions related to international bunkers. The information was partially based on national reporting and partially on information from other sources. These data suggest that in 1990 global bunker CO₂ emissions from aviation were about 435 Megatons and from the marine sector about 441 Megatons. The emission in each sector represented about 2 per cent of CO₂ emissions from all sources in 1990. In 1996 it was estimated that aggregate CO₂ emissions from bunker fuels represent about 2.8 per cent of the national emissions of the 22 Parties reporting emissions, based on national reports to SBSTA 4; and
4. the views expressed by MEPC 41 that “the requirements for CO₂ reduction should pertain to all ships without differentiation between Annex I and Annex II countries as adopted by the Kyoto Conference”, may be an inadvertent misunderstanding, since Annex II Parties are also Annex I Parties. Annex II Parties are, according to Articles 3.4 and 3.5 of the UNFCCC, Parties who have special commitments to assist developing country Parties to the Convention.

At the 42nd session of the IMO Marine Environment Protection Committee, the issue of greenhouse gases was also raised and the Committee noted that the Kyoto Conference of the UN Framework Convention on Climate Change, in 1997, had considered limitation or reduction of emissions from maritime transport as reflected in Article 2 of the Kyoto Protocol.

At the 42nd session, an informal drafting group on air pollution from ships was established to identify the parameters for the IMO study on CO₂ emissions from ships (amongst other tasks), based on a draft prepared by the United States. The Committee agreed to invite the IMO Secretariat to undertake a study on CO₂ emissions from ships by engaging a qualified consultant, who should liaise with relevant organisations and institutions and obtain data in order to avoid duplication. The purpose of this study is to examine possible GHG emissions reductions through different technical, operational and market-based approaches.

Consequently, the following points will be addressed in subsequent MEPC meetings (this is not an exhaustive list)³⁵:

1. the interrelationships of pollutants generated by shipboard systems (specific pollutants to be considered include CO₂, NO_x, Particulate Matter (PM), and Hydrocarbons (HC);
2. what GHGs reductions are most feasible through current technologies or market-based approaches;
3. what GHGs reductions are feasible through fuel switching/alternative power plant designs or other long-term measures;
4. how HC and NO_x contribute to the production of tropospheric ozone (a GHG), and whether GHG emissions from ships could be reduced by reducing HC and NO_x;
5. an estimate of the efficiencies to be gained, and emission reductions associated with technical and operational controls (including improved propeller maintenance, weather and current routing, slow-steaming and other).
6. the technical feasibility and cost benefit analysis associated with each of the controls considered. Benefits to be realised may include immediate and long-term cost savings to the industry achieved through more energy-efficient systems as well as emission reductions achieved by a given measure;
7. the identification of long term alternatives through research to determine their economic feasibility and environmental desirability in light of other factors involved with alternative fuels and propulsion systems. ‘Longer term alternatives that offer the most promise, pending further research should also be identified’;
8. the introduction of recent initiatives for improvement of ships safety and pollution protection, (e.g. double hull, High Speed Craft, etc.) which may have a negative effect on GHG emissions per tonne of fuel burned per tonne of cargo carries; and
9. a comparison of emissions from various modes of transport based on tonne miles (or kgs) of cargo shipped (considering different types of marine transport).

It is important to note that those involved in the drafting group are chiefly representatives from developed States subject to pressure from business/industry sectors (some participating as NGOs).

As shipping presently accounts for approximately 2% of total global CO₂ emissions, most delegates expressed doubts as to the feasibility of adopting effective measures for emission reduction. Nevertheless, the IMO has a mandate to deal with the issue and agreed to develop a policy document on greenhouse gas emissions from ships to be forwarded to the FCCC³⁶. The United States and other delegations offered financial support for a study proposed by the US

and established an informal drafting group to develop the Scope of Work on the IMO study on CO₂ emissions. This will be subject to funding and the available IMO budget. MEPC 43 will further examine the issue, although the result of the CO₂ is not expected until MEPC 44 in the year 2000³⁷.

Options considered - technical and operational controls for limiting CO₂ emissions from shipping.³⁸

Delegations to the MEPC 42 discussed the issue of CO₂ emissions reduction on the basis of two proposals submitted by the United States³⁹ and the International Chamber of Shipping (ICS)⁴⁰, the latter being a non-governmental organisation representing the interests of the shipping sector.

The US expressed the following views regarding GHG emissions associated with shipping:

1. reduction in the amount of fuel burned: March 1997 UNFCCC report noted the possibility of improving the fuel efficiency of existing ships. These include improved propeller maintenance, minimising drag through improved anti-fouling systems.
2. fuel switching (use of alternative fuels);
3. alternative power plant designs.

A fourth category, neither technical nor operational in nature, would involve a market-based incentive systems.

The use of anti-fouling paints to minimise drag as considered under Option 1, for example, may pose a threat to marine living resources - harmful effects of and alternatives to anti-fouling paints are being considered by the MEPC and an instrument is to be discussed and adopted by IMO members, possibly before any measure towards CO₂ emissions reduction is taken. The other options may promote lengthy discussions, due to the likelihood of conflicts of interest.

Moreover, the US delegation stated that, the efficiency of marine pollution systems relative to other transport media on a tonnage basis, combined with recent advances in marine engine design, suggested that any CO₂ emission reduction needed to be accomplished without a reduction in the volume of goods shipped in the marine sector.

The ICS, clearly concerned with loss of competitiveness and market disadvantages, stated that although ships were responsible for the carriage of 80% of world trade by volume, they

account for less than 2% of total global CO₂ emissions. Yet, according to ICS, an increase in seaborne trade generally results in a corresponding increase in CO₂ emission and world seaborne trade indicates that, since 1990, there has been a definite trend towards reduction in ships' CO₂ emission per tonne-mile of world seaborne trade. The ICS also believes that a slow steaming (reducing speed) may not result in a reduction of the total volume of CO₂ emissions for the same amount of goods transported; and indicated that technology has already been exploited in new designs of ships and engines.

Several delegations supported the American proposal to undertake a study on GHG emissions from ships before taking action⁴¹. In addition the Committee expressed the opinion that the IMO was the appropriate body to deal with the matter⁴². The ICS paper also received some support. The Russian Federation stated it did not accept that there was any justification for implementing urgently any restrictions on CO₂ emissions from ships⁴³. On the other hand, the representative of the European Commission affirmed that, in order to reach the Kyoto targets, all transport modes would be affected. Further the Commission submitted a copy of a communication which stated that measures on shipping should not be restricted to industrialised countries only.

The IMO has a clear mandate to deal with GHG emissions from ships. The MEPC recognised the IMO as the appropriate body to deal with the issue and agreed to develop a policy instrument to forward to the UNFCCC. The Committee will further consider CO₂ emissions from ships in future meetings (possibly at its 43rd session, to be held from 28 June to 2 July 1999, and most likely at its 44th session due in March 2000), in view of the outcome of the IMO study.

The European Union and the reduction of CO₂ in transport

The European Commission submitted an information document containing a communication on issues related to Transport and CO₂ to MEPC 42. The communication⁴⁴ was adopted by the Commission and presented to the Council of the EU and the European Parliament for discussion in view of the targets agreed at the Kyoto Protocol. It contains elements for curbing CO₂ emissions growth in transport, taking into account existing policies, which already include a reduction of GHG, but does not deal with the question of "sectoral repartition" of the Kyoto target. This issue will be dealt with in the context of a comprehensive strategy in the light of the Community's post Kyoto strategy, on which the Commission intends to publish a text before the summer of 1999.⁴⁵

As regards shipping, the EC communication recognises that seaborne transport is much more energy-efficient than other modes of transport like air and road. According to estimates from the Services of the Commission, the promotion of maritime transport, in particular short sea shipping within the EU, represents a potential for modal shift⁴⁶ in the EU, including its peripheral Member-States. A Commission communication (COM/95317, 5 July 1995), outlined the potential for short sea shipping as an environmentally friendly mode, and identifies the gaps to be filled to make maritime transport a more attractive solution. The Commission supported efforts undertaken by the IMO and believes that any measures adopted by the Organisation should not be restricted to the shipping industry of industrialised countries (Annex I Countries to the Kyoto Protocol)⁴⁷. The Commission, expressing concern with the Kyoto Protocol deadlines, favoured the establishment of an appropriate framework outside Annex VI of MARPOL 73/78⁴⁸.

Given that the harmful impact of pollution is felt by all States, it may be desirable to include all parties of the IMO in the debate irrespectively of their level of development and consequently whether they would have to reduce their own emissions. However, this does not square with the division of Annex I and Developing Countries established by the FCCC/Kyoto Protocol and the principle of common but differentiated responsibilities.

International policy tools to address marine bunker emissions

Currently, there are no provisions for emission user charges or emission charges from ships, at the international level.

Maritime transport emission user charges

A 1997 OECD study considered different ways in which a marine bunker charge could be implemented, including rates (\$5, \$25 and \$125 per tonne of carbon) and methods of collection, which might influence the ease of implementation, potential for avoidance, and GHG impacts of the measure⁴⁹. The study also mentions some alternatives which might be more feasible in reducing GHGs in international maritime transport. These measures include the application of alternative fees and charges, e.g., port fees related to energy efficiency; regulations on ship technology; voluntary agreements with shipbuilders and operators; best practice programmes; technology prizes. The study's approach takes into account the potential impact of a marine bunker charge on CO₂ emissions from ships; the economic costs associated with the charge; trade, employment and competition; the rationale for common

action to implement a charge; possible approaches that Annex I Parties might take to implement such a charge in common; and other policy issues.

The study concluded that although a carbon charge on marine bunker fuels could internalise social costs resulting from CO₂ emissions from maritime transport, it could only be feasible, fair and economically efficient if globally imposed and if all other transport modes paid their social costs. The study also recognised that a bunker charge would not necessarily lead to significant net GHG emission reductions, mainly due to the likelihood of avoidance strategies and modal shifts⁵⁰. Moreover, it considered that such a charge could have a negative impact on international trade, and would therefore need to be carefully negotiated on a multilateral basis.

The OECD study put forward some broad-based proposals such as Replications of Successful Measures; Agreements to Take Action in the Transport Sector Toward an Aim or Target; Co-ordination to Implement the Same or Similar Measures; Specific Policies and Measures Implemented Together.

Nevertheless, any approach to reducing GHG from marine bunkers might be influenced by the SBSTA/COP on bunker allocation. If emissions remain unallocated or allocated to an international category, mitigation is likely to depend on common action.⁵¹

The international legal dimension: Use of charges at the IMO

Currently, neither the Convention establishing the IMO nor MARPOL 73/78 provide for the application of environmental taxes/charges on international shipping. At the MEPC 42, the Norwegian Delegation submitted an information paper proposing a tool for environmental differentiation of dues and fees for ships.⁵² This reflected a systematic approach to be developed and eventually implemented by Norway. The purpose of such a tool was to give technical and operational guidelines to ships and their owners in order to prepare for environmentally based dues and fees. Its purpose is also to reward ships applying standards above the minimum standards currently applied by the existing conventions. The Committee took note of that information, but refrained from deciding on any action at that stage. Nevertheless, this proposal is worthy of further detailed consideration.

PART III - Conclusion

The maritime sector is, at present, a very small contributor of CO₂ in terms of total global emissions. Difficulties associated with possible measures involve trade issues, such as the loss of competitiveness and different interests from Parties, the shipping industry and the oil industry. These difficulties include, for example, the question of who would bear the costs of imposition of fees or other measures to curb CO₂ emissions. The effectiveness of the application of charges to marine bunkers or ships has not yet been proved. While technical options may not bring a large/significant emission reduction, the use of charges may not prove acceptable to ship owners or to those who ultimately would bare the costs. The different governance structures and membership of the UNFCCC and IMO make it difficult to forge joint plans.

It is not yet clear whether countries are willing to develop an international policy instrument to curb CO₂ emissions from ships. However, the IMO Marine Environment Protection Committee will continue to liaise with the UNFCCC in order to pursue its mandate to combat CO₂ emissions, thus keeping the issue on its Agenda. Moreover, further studies will be undertaken, followed by discussions within the IMO framework over the next couple of years.

Perhaps, the most significant danger in altering the status quo as it stands in terms of international shipping is that new measures to curb CO₂ emissions may simply result in a modal shift to more carbon intensive forms of transport (air and road). This would be highly undesirable given shipping is clearly the least polluting mode of transport currently in use. Therefore, any change must examine the implications of stringent regulations on the marine sector, the whole transport sector or system. However, within the broader goal of global emissions reduction, Article 2(2) of the Kyoto Protocol is a positive step and a development that should be nurtured and mirrored elsewhere.

ANNEX
Resolution 8
CO₂ emissions from ships

THE CONFERENCE,

HAVING ADOPTED the Protocol of 1997 to amend the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto (the 1997 Protocol),

RECOGNIZING that CO₂ emissions, being greenhouse gases, have an adverse effect on the environment.

RECOGNIZING FURTHER that Annex VI of MARPOL 73/78 does not address CO₂ emissions from ships,

NOTING that parties to the United Nations Framework Convention on Climate Change (UNFCCC) have recognized the adverse effects of greenhouse gases to the atmosphere and that these gases originating from international shipping and aviation contribute to the global inventory of emissions,

NOTING FURTHER that the UNFCCC has recognized that the climate system should be protected for the benefit of present and future generations of mankind; that the global nature of climate calls for the widest possible co-operation by all countries world-wide; and that the UNFCCC obliges parties to anticipate, prevent or minimize the causes of climate change and mitigate its adverse effects,

1. INVITES the Secretary-General of the Organisation to cooperate with the Executive Secretary of the UNFCCC in the exchange of information on the issue of emissions of greenhouse gases;
2. INVITES the Organization, in cooperation with the UNFCCC, to undertake a study of CO₂ emissions from ships for the purpose of establishing the amount and relative percentage of CO₂ emissions from ships as part of the global inventory of CO₂ emission. The study should estimate emissions for the most recent year where they may be reasonably estimated and should also address how shipboard emissions and their relative percentage contribution to the

global inventory may change in future years, in light of reductions to be made in other sectors as well as other trends that may be reasonably anticipated through sound scientific analysis;

3. INVITES FURTHER the Marine Environment Protection Committee to consider what CO₂ reduction strategies may be feasible in light of the relationship between CO₂ and other atmospheric and marine pollutants, specially NO_x since NO_x emissions may exhibit an inverse relationship to CO₂ reduction; and

4. URGES Member States of the Organization to participate in the study on CO₂ emissions referred to above and propose any appropriate strategies to the Marine Environment Protection Committee.

ENDNOTES

¹ F. Yamin, *The Kyoto Protocol: Origins, Assessment and Future Challenges* in Review of European Community and International Environmental Law (RECIEL), volume 7, Issue 2, 1998, p.113, ed. Blackwell. This article provides insights on the Protocol negotiations as well as analyses its provisions.

² Id. Above. See also article 2(2) of the Kyoto Protocol.

³ Climate Change 1995, Impacts, Adaptations and Mitigations of Climate Change: Scientific-Technical Analysis, p.693, Contribution of Working Group II to the Second Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge University Press.

⁴ Climate Change 1995, Impacts, Adaptations and Mitigations of Climate Change: Scientific-Technical Analysis, p.693, Contribution of Working Group II to the Second Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge University Press. See also *A Practical Guide to Marine Fuel Oil Handling, MEP Series, Volume 3, part 19*, C. Leigh-Jones, Pub. by the Institute of Marine Engineers: thermal efficiency of diesel engines in motorships achieved over 50% in the 1990s (p.12).

⁵ World Fleet Statistics, December 1997, Lloyds Register of Shipping.

⁶ MARPOL 73/78 does not apply to “any warship, naval auxiliary or other ship owned or operated by a State and used, for the time being only on government non-commercial service...”, Article 3(3).

⁷ The Marine Encyclopaedic Dictionary, by E. Sullivan, 5th edition, LLP, 1996.

⁸ Concawe - Product Dossier n. 98/109 - Heavy Fuel Oils - Concawe, Brussels, May 1998.

⁹ <http://www.imo.org/imo/structur.htm>, as at 4/12/98.

¹⁰ Id. 9 above.

¹¹ id. note 7.

¹² Status of ratification as at 7/10/98 (FCCC) and 2/3/1999 (Kyoto Protocol), in www.unfccc.de as at 7/3/99.

¹³ See F. Yamin, as note 1 above, p.114.

¹⁴ See MARPOL 73/78, Article 1(1), Article 2(2) defines ‘harmful substance’ as “any substance which, if introduced into the sea, to create hazards to human health, to harm living resources and marine life, to damage amenities or to interfere with other legitimate uses of the sea, and includes any substance subject to control by the present Convention”. In addition, Article 2(3)(a) provides that discharge in relation to such substances means “any release howsoever caused from a ship and includes any escape, disposal, spilling, leaking, pumping, *emitting* or emptying.”(Emphasis added).

¹⁵ Regulation 2(3) defines ‘emission’ as “any release of substances subject to control by this Annex from ships into the atmosphere or sea”.

¹⁶ See P. Birnie and A. Boyle, *Basic Documents on International Law and the Environment*, Clarendon Press - Oxford, 1995, p.189. MARPOL 73/78 applies to “ships entitled to fly the flag of a Party to the Convention; and ships not entitled to fly the flag of a Party but which operate under the authority of a Party” (Article 1(1)(a) and (b)).

¹⁷ The Committee prepared a draft Assembly resolution on the establishment of a new annex to MARPOL 73/78 on air pollution from ships at its 30th session (1990). The draft resolution included substances covered by the Vienna Convention/Montreal Protocol on Substances that Deplete the Ozone Layer, but did not cover CO₂ emissions. Accordingly, the IMO Assembly adopted Resolution A.719(17) on 6 November 1991. The UK and Germany raised the issue of CO₂ emissions from shipping, at MEPC 32 (MEPC 32/12), in March 1992. The British delegation stated that consideration should be given to monitoring and forecasting CO₂ emissions from shipping and to the difficulty of allocating responsibilities to individual States. The German delegation felt that deeper consideration was necessary. The Committee at its thirty-second session agreed to establish a formal link with the work undertaken by the Organisation for Economic Co-operation and Development (OECD) under the umbrella of the IPCC, and that CO₂ should not be included as an element of the draft Annex VI of MARPOL 73/78- doc. MEPC 39/INF.5. At MEPC 39, the Committee recalled that the then Draft Annex VI to MARPOL 73/78 did not cover CO₂, but endorsed the development of a draft resolution on the issue - see MEPC 39/13, 10-14 March 1997.

¹⁸ The Authors would like to thank the IMO Secretariat for the information provided.

¹⁹ As in *Special Issues in Carbon/Energy Taxation: Marine Bunker Fuel Charges - Annex I Expert Group on the United Nations Framework Convention on Climate Change, Working Paper n.11*, OCDE/GD(97)77, OECD, Paris.

²⁰ F. Yamin, *id.*, p.116.

²¹ B. Schell, *Bunker fuels –back on the agenda*, Hotspot – Climate and energy policy news from

Europe, Issue Five, December 1998, Climate Network Europe.

²² FCCC/SBSTA/1998/9, para. 2(I).

²³ The author would like to thank the IMO Secretariat, in particular, Mr. Kohn and his team for information provided.

²⁴ L. Kimball, *Linkages in International Environmental Governance: How to Advance a Systematic Analysis of the International Institutional Implication of Climate Change (draft)* - EU Project on How to Enhance Policy Making Capacity under the Climate Change Convention - March 1999.

²⁵ FCCC/CP/1996/Add.1, p.25.

²⁶ MEPC 39/INF.5.

²⁷ MEPC 39/INF.5, Annex I, p. 5.

²⁸ MEPC 39/INF.5 as above.

²⁹ *Bunkers - An Analysis of the Practical, Technical and Legal Issues*, C. Fisher and J. Lux, second edition, Lloyd's of London Press (LLP), 1994, p.178.

³⁰ Annex VI of MARPOL 73/78, Regulation 14(1).

³¹ For detailed discussion 'An Effective Regime for Sulphur Emissions from ships' - submitted by Friends of the Earth International to MEPC - MEPC 38/9/6 - 4 April 1996.

³² Conference Resolution 8 in MP/CONF.3/35.

³³ MEPC 41/8, 21 November 1997.

³⁴ MEPC 41/WP.5, 1 April 1998.

³⁵ MEPC 42/ WP. 11 - ANNEX 2 - Draft Scope of Work - IMO Study on Greenhouse Gas Emissions from Ships.

³⁶ MEPC 42/22 - Report of the Marine Environmental Protection Committee on its Forty-Second Session, IMO, 16 November 1998 para 9.18, p.35.

³⁷ MEPC 42/22, para 9.19.

³⁸ MEPC 42/9/2.

³⁹ MEPC 42/9/2.

⁴⁰ MEPC 42/9/4 and 42/INF.36.

⁴¹ MEPC 42/22, para. 9.12.

⁴² *id.* 41 above.

⁴³ MEPC 42/22, para. 9.10.

⁴⁴ Communication from the Commission to the Council, The European Parliament, The Economic and Social Committee and the Committee of the Regions **on Transport and CO₂ - Developing a Community Approach** - COM (1998) 204 final, Brussels, 31.03.1998, attached to IMO document MEPC 42/INF 22.

⁴⁵ MEPC 42/INF.22, 14 August 1998.

⁴⁶ "A 1% modal shift from road freight transport to shipping would allow a reduction of CO₂ emissions from transport by 0.2% (own calculations of the Services of the Commission)", in COM (1998)204, as 41 above, p.12.

⁴⁷ See 44 above - COM (1998)204, para. 2.5, p.13.

⁴⁸ *Id.* 44 above.

⁴⁹ OECD/GD(97)77 - **SPECIAL ISSUES IN CARBON/ENERGY TAXATION: MARINE BUNKER FUEL CHARGES - Annex I Expert Group on the United Nations Framework Convention on Climate Change**, Organisation for Economic Co-operation and Development, Paris,1997 -study prepared by L. Michaelis (OECD Secretariat) working with the Annex I Expert Group on the UNFCCC.

⁵⁰ A possible bunker charge that is not matched by fuel price increases for other transport modes, could reduce the price advantage of maritime transport in relation to those modes. Although there is no real alternative to maritime trade, some consignments, e.g. high value, are increasingly shipped by air and other means of transport. A marine bunker charge could lead to the decrease in maritime freight and an increase in road and air transport that might result in increased CO₂ emissions. See OECD study, as 46 above, p. 9.

⁵¹ *Id.*, as above.

⁵² MEPC 42/17/2 - Formal Safety Assessment Including Environmental Indexing of Ships - submitted by Norway - IMO - 4 September 1998.