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Mitigating Greenhouse Gas (GHG) Emissions from International Shipping in Post-Kyoto Climate Policy: Legal Issues and Challenges

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The international regime for climate change is embodied in the 1992 United Nations Framework Convention on Climate Change (UNFCCC) and the 1997 Kyoto Protocol. The Kyoto Protocol sets the mandatory quantified emissions limitation and reduction (QELAR) targets of greenhouse gases (GHGs) for Annexure I developed countries. However, it excludes the maritime transport sector from its purview and mandates the International Maritime Organisation (IMO) to address the issue of the mitigation of marine GHG emissions. Inter-governmental negotiations are underway in this regard, within the framework of the IMO's Marine Environment Protection Committee (MEPC). Presently, there is an impasse in the negotiations as nations have failed to arrive at a consensus on the contents of the regulatory framework for the mitigation of marine GHG emissions. This paper seeks to identify the legal issues and challenges in mitigating marine GHG emissions in post-Kyoto policy and to contribute to the ongoing debate on the challenges before the Conference of Parties (COP15)/Meeting of Parties (MOP5) of the Kyoto Protocol in addressing the issue of mitigation of marine bunker emissions. It provides an overview of the ongoing inter-governmental negotiations on post-Kyoto

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climate regime from the maritime transport perspective and reviews IMO's work on mitigating GHG emissions. It analyses the legal issues that add to the intricacies of bunker fuel negotiations due to limited jurisdiction of the countries in controlling emissions from maritime transport activities occurring outside their national borders. It looks at a number of legal issues, like "common but differentiated responsibilities (CBDR)," "flag of convenience" etc., that need to be resolved for evolving a mandatory regulatory framework for mitigation of marine GHG emissions.

Introduction

Ocean shipping is the dominant mode of transport for international cargo.[1] It is estimated that over 80 per cent of the world merchandise trade by volume is carried via the sea route. Therefore, maritime transport is considered as the backbone of international trade and globalisation.[2] Merchant ships are generally fitted with diesel engines onboard, which use low-sulphur high speed diesel (LSHSD). Although these engines are considered as one of the most fuel-efficient combustion machines, they still generate significant amount of environmentally harmful emissions.[3] It has been estimated that the emission of greenhouse gases (GHGs) by maritime transport is significant in terms of its contribution to total anthropogenic GHG emissions globally.[4] These estimates have been supported by various assessments made by inter-governmental organisations. An International Maritime Organisation (IMO) study on the emissions contribution of international marine bunkers has given the consensus estimate to be 2.7 per cent of the world's total carbon dioxide (CO_2) emissions. The Inter-governmental Panel on Climate Change (IPCC) has also assessed some aspects of shipping emissions on the climate[5] and potential future mitigation options.[6]

It is pertinent to mention that the international regime for mitigating GHG emissions has been embodied in the 1992 United Nations Framework Convention on Climate Change (UNFCCC)[7] and its 1997 Kyoto Protocol.[8] The Kyoto Protocol sets the mandatory quantified emissions limitation and reduction (QELAR) targets for the Annexure I developed countries.[9] However, it excludes the maritime transport sector from its purview. Article 2.2 of the Kyoto Protocol provides mandate to the IMO to address marine GHG emissions. In this regard, the IMO has adopted a strategy with regard to policies and measures, focussing mainly on development of a carbon dioxide (CO_2) emission indexing scheme for ships and further evaluation of the technical, operational and market-based solutions. However, implementation of

policies and measures to mitigate marine GHG emissions necessitates the need for a legal framework to regulate GHG emissions from international shipping. Although the IMO is working towards evolving a suitable regulatory framework for mitigating marine GHG emissions, there has been no consensus in the ongoing negotiations within the framework of IMO's Marine Environment Protection Committee (MEPC).

This paper seeks to examine the legal issues and challenges in mitigating marine GHG emissions in post-Kyoto policy and contribute to the debate on the challenges before the Conference of Parties (COP15)/Meeting of Parties (MOP5) of the Kyoto Protocol in addressing marine bunker emissions. It aims to provide an overview and analysis of the ongoing inter-governmental negotiations on post-Kyoto climate regime from the maritime transport perspective and reviews the IMO's work on mitigating GHG emissions.

International Regime for Climate Change

An Overview

The legal basis for international action to address the climate change problem[10] is embedded in the 1992 UNFCCC[11] and the 1997 Kyoto Protocol. This legal regime envisages the overall framework for an effective action to address climate change encompassing all countries and human activities. It also sets out the obligations and commitments of all the countries, categorised into Annexures I and II, and non-Annexure I parties, including mandatory commitments of Annexure I developed country parties, as inscribed in Annexure B to the Kyoto Protocol.

The ultimate objective of the climate change regime is to stabilise GHG emissions "at a level that would prevent dangerous anthropogenic interference with the climate system."[12] It entails the need to evolve policies and measures to take actions for mitigating climate change. Hence, the thrust of the climate change regime is on mitigation of GHG emissions from various sources, including maritime transport, in order to achieve its ultimate objective. The Kyoto Protocol provides legally binding QELAR targets for Annexure I developed countries to reduce their GHG emissions cumulatively by 5.2 per cent of their 1990 emission levels.[13] Interestingly, the Kyoto Protocol excludes maritime and aviation sectors from its scope and entrusts the IMO and International Civil Aviation Organisation (ICAO), respectively.

Salient Features

Comprehensive Regime Encompassing All Sectors

The UNFCCC adopted a comprehensive approach to mitigate GHG emissions by encompassing within their purview sources and sinks of all GHGs from all possible sectors. In the Kyoto Protocol negotiations, the participating countries opted to continue along similar lines, agreeing to economy-wide emission targets covering the six major GHGs, rather than separate protocols on energy, transportation, forestry etc. However, it excludes maritime and aviation sectors from its scope.

Institutionalisation of Climate Change Efforts

The legal framework for climate change also institutionalises[14] the inter-governmental negotiations for addressing climate change concerns in an incremental way by establishing an institutional framework.[15] The institutional framework for climate change consists of COP/MOP, as the 'supreme' decision-making body. The Subsidiary Body on Science and Technology Advice (SBSTA) and Subsidiary Body for Implementation (SBI) deal with the issues of implementation through a collective decision-making process[16] in consonance with fair representation of all country parties.[17] This institutional framework for decision-making under the Kyoto Protocol outlines the process by which future measures may be developed in order to limit global climate change. It facilitates consensus building among the sovereign states parties for taking decisions on climate change issues.[18]

Actions Based on the 'Common but Differentiated Responsibilities'

The principle of "common but differentiated responsibilities and respective capabilities" (CBDR and RC) is at the core of the UNFCCC and the Kyoto Protocol.[19] Obligations of the state parties as envisaged in Protocol with regard to addressing the problem of climate change are premised on this principle in the context of their respective contributions to global environmental degradation.[20] This underscores the historical fact that the developed countries are mainly responsible for the present level of accumulated GHGs in the atmosphere and, thus, need to bear more responsibility for their historical contributions since industrialisation and should take the lead in mitigation efforts, in accordance with CBDR and RC.[21]

The principle of CBDR and RC includes two elements – common and differentiated responsibilities.[22] It is also takes into account the respective capabilities of the state parties to bear the burden of GHG mitigation cost. It is recognised that the common responsibility stems from integral and interdependent nature of the Earth.[23] Hence, all states are required to participate actively in the formation and implementation of international law as a consequence of their common responsibilities for sustainable development.[24] However, common responsibility for climate change can never be separated from the differentiated responsibility.[25] In fact, both the developing and the developed countries are required to make policies and measures for taking actions to achieve the ultimate objective of the climate change regime.

It is well known that the largest share of the historical and current global emissions of GHGs has originated in the developed countries.[26] The Kyoto Protocol also stipulates that the developed countries should take the lead in combating climate change on the basis of the principle of CBDR and RC.[27] Accordingly, policies and measures aimed at reducing GHG emissions take into account the equitable contribution of each Annexure I developed country to the global efforts to achieve the ultimate objective of the climate change regime.[28] The contribution in the burden sharing for Annexure I developed countries has been concretised in accordance with the principle of CBDR and RC, in Annexure B to the Kyoto Protocol, which provides specific QELAR GHG targets for Annexure I developed countries and compliance with the targets is mandatory for the countries party to the Kyoto Protocol.

Legally Binding Commitments

The core of the Kyoto Protocol consists of legally binding commitments for limiting and reducing GHG emissions. In fact, the Kyoto Protocol is the first international instrument on binding emission reduction targets for GHG emissions.[29] These mandatory obligations strengthen and complement the mitigation obligations of Annexure I parties given in Article 4.2 (a) and (b) of the UNFCCC.[30] The Protocol requires the Annexure I developed country parties to reduce their GHG emissions by an average of 5.2 per cent from 1990 levels.[31] The specific target (or assigned amount) for each Annexure I developed country is set out in Annexure B of the Kyoto Protocol.[32] Further, Annexure I developed countries are also given the opportunity to reach their targets by the adoption of command-and-control regulations domestically or by using the Kyoto mechanisms in order to comply with their assigned emission levels.[33]

However, the Kyoto Protocol is only considered as a first step as it provides a limited time-frame – the year 2008 to 2012 – for achieving the ultimate objective of the UNFCCC. The first commitment period for mitigating GHG emissions, as envisaged by the Kyoto Protocol, will expire at the end of 2012. Hence, there is a need to adopt a post-Kyoto framework for climate change mitigation.

Individual and Joint Efforts

Interestingly, the climate change regime provides flexibility in its implementation. This is done by elaborating on the issue of inter-state cooperation in actions to be taken to address climate change. By stating that GHG emissions could be attained individually or jointly, the UNFCCC recognises that there could be some degree of cooperation between the parties to the Convention.[34] Importantly, under the Kyoto Protocol, Annexure I developed countries can meet their obligations 'individually' and 'jointly,'[35] that is, in addition to making domestic efforts to reduce their emission levels, these countries can meet part of their obligations by taking mitigation action together with other countries. This concept of joint implementation recognises that climate change is a global problem and thus, it could be argued that it is immaterial where emissions reductions are achieved. The Kyoto Protocol provides the legal basis for operationalisation of this concept by providing for three Kyoto mechanisms – joint implementation (JI), emissions trading (ET) and clean development mechanism (CDM).[36]

Market Based Kyoto Protocol Mechanisms

In the recent years, use of market mechanisms to achieve environmental goals has been gaining momentum. This is being done based on the market principles and regulatory functions with the objective to preserve and protect the environment.[37] The three Kyoto mechanisms are intended to provide flexibility to Annexure I developed countries to comply with their mandatory GHG QELAR targets, as inscribed in Annexure B, in the most cost-effective manner. A regulatory framework has also been designed to operationalise the Kyoto mechanisms, which has generated a carbon market for trading in certified carbon credits.[38]

Cost-Effectiveness

Cost-effectiveness is one of the fundamental principles essential for the realisation of the ultimate objective of the climate change regime.[39] The countries parties must pay

due attention to cost-effectiveness while carrying out their reduction and limitation obligations. The issue of cost-effectiveness played an important role in the further development of the climate change regime. The adoption and design of the three Kyoto mechanisms has been guided by this economic principle.

Review Mechanism

The Kyoto Protocol is only a first step towards achieving the ultimate objective of the UNFCCC as it will expire after 2012.[40] Hence, it is imperative to review the GHG mitigation commitments for the post-Kyoto period, as early as possible. In this connection, the climate change regime recognises the evolutionary nature of the climate change negotiation process. It envisages legal response to the issue of climate change as an on-going process, and not as a "once and for all" event. During the negotiations prior to the 3rd COP to the UNFCCC for adoption of the Kyoto Protocol in 1997, the international community was clearly aware that this agreement could only constitute a first step in the elaboration of an effective climate change regime.[41]

As a result, two provisions were included in the Protocol with a view to its further evolution through inter-governmental negotiations – Article 3(9), which provides for consideration of commitments for Annexure I developed countries for the period after 2012, and Article 9, which mandates a periodical review of the Protocol and its implementation. In addition, Article 4.2(d) of the UNFCCC also stipulates continuous review of the mitigation efforts until its objective is met, which probably would, in order to be reached, also include commitments for developing countries.[42] Under Article 7.2(a), the COP of the UNFCCC is empowered to review the implementation of the Convention and the Protocol regularly and to take appropriate decisions, within its mandate, to promote the effective implementation of the UNFCCC.[43]

Currently, Article 3(9) of the Kyoto Protocol provides the legal basis of inter-governmental negotiations on a future regime in the framework of the Protocol.[44] Article 7.2(a) of the UNFCCC provides the legal basis for the on-going negotiations under the "Bali Roadmap" for the post-Kyoto framework.

Marine Bunker Emissions and Climate Change

International shipping represents a substantial and growing source of emissions of air pollutants, including GHGs. These emissions are generated largely by the consumption

of fossil fuels in the maritime transport activities. The combustion of these fossil fuels creates significant emissions such as nitrogen oxides (NOx), sulphuric oxides (SOx) – both have been linked to a variety of public health problems[45] – and carbon dioxide (CO_2), which causes global warming.[46] The IPCC recently assessed some aspects of shipping emissions on the climate[47] and potential future mitigation options.[48]

Bunker fuel emissions from international shipping are not covered by the international regulatory framework as set out in the Kyoto Protocol.[49] Article 2.2 of the Protocol requires Annexure I parties to "pursue the limitation or reduction" of GHG emissions from the shipping sector through the IMO. Thus, GHG emissions from international bunker fuels are not subject to the Protocol's emission targets for Annexure B countries and need to be addressed through cooperation between the Secretariats of the Kyoto Protocol and the IMO. Accordingly, the two Secretariats have been cooperating on this issue since 1998. They have also been regularly exchanging the reports on the outcome of relevant sessions of the IMO and the Kyoto Protocol.[50] The IMO has also started research and discussions on the effects of international shipping on the global environment and the mitigation of GHG emissions. Moreover, the IMO has initiated the inter-governmental negotiations to pursue its environmental mandate for mitigation of the climate change.

IMO's Mandate on Climate Change

The IMO is a specialised UN agency for the maritime sector. It is a regulatory agency, which pursues its global mandate of safer shipping and cleaner oceans by adopting international maritime rules and standards that are implemented and enforced by state parties in the exercise of flag, port and coastal state jurisdiction. However, the IMO's environmental mandate[51] overlaps with the UN Convention on the Law of the Sea (UNCLOS) framework.[52] Therefore, it is important to understand the IMO's functions and responsibilities for the protection and preservation of the marine environment within the general framework of international law as reflected in UNCLOS.[53]

UNCLOS and Climate Change

The Preamble of the UNCLOS recognises the importance of the protection and preservation of the marine environment. According to the UNCLOS, "pollution of the marine environment" means:

> "*the introduction by man, directly or indirectly, of substances or energy into the marine environment, including estuaries, which results or is likely to result in such deleterious effects as harm to living resources and marine life, hazards to human health, hindrance of marine activities, including fishing and other legitimate uses of the sea, impairment of quality for use of sea water and reduction of amenities*."[54]

Part XII of the UNCLOS generally deals with the obligation of state parties with respect to the marine environment.[55] The starting point for Part XII is the general obligation under Article 192 to "protect and preserve the marine environment,"[56] also considered as the first comprehensive statement on the protection of marine environment in international law.[57] Further, the obligations of states to protect and preserve the marine environment under the UNCLOS may be considered as sufficiently broad to extend it to mitigating climate change.[58] Also, Article 212 of the UNCLOS can be reasonably interpreted to apply to the issue of air pollution, including climate change.[59]

IMO as an Implementing Agency of the UNCLOS

The UNCLOS provisions aim at the effective implementation of substantive safety and anti-pollution rules, but in the end they remain basically jurisdictional provisions, namely, provisions which regulate the features and extent of state jurisdiction but not the enforcement of measures regulated in other treaties.

In this regard, Article 212 of the UNCLOS provides that implementation of Part XII pertaining to pollution of the marine environment could be done through a competent international organisation. Thus, the IMO is the competent international organisation mandated to deal with marine pollution. Further, it is also competent to establish global rules and standards applicable to vessels on the prevention and control of marine pollution from or through the atmosphere within the framework of Articles 212(3)[60] and 222[61] of the UNCLOS.[62]

Role of the IMO in Combating Marine Pollution

The IMO plays a key role in combating marine pollution. After the International Convention for the Prevention of Pollution from Ships (MARPOL) was signed in 1973,[63] IMO's activities concerning environmental issues have so far centred on marine pollution. MARPOL deals with operational discharges of harmful substance such as

oil, chemicals, pollutants in packaged form, sewage and garbage. The Convention includes regulations aimed at preventing and minimising pollution – both accidental and that from routine operations – from ships. Currently, it includes six technical Annexures. MARPOL 1973/1978[64] did not cover air pollution until 1997, when a new Annexure VI on "Regulations for the Prevention of Air pollution from Ships" was adopted at a special conference. MARPOL Annex VI entered into force in May 2005.[65] While Annexure VI deals with SOx as well as NOx emissions and particulate matter, it does not cover CO_2 emissions. In fact, the issue of GHG emissions from ships has been considered by the IMO's Marine Environment Protection Committee (MEPC), separately, since 1997.[66]

IMO's Work on Climate Change

IMO Study on GHG Emissions

As mandated by Resolution 8, adopted by the COP to MARPOL 1973/1978 and by Article 2(2) of the Kyoto Protocol, the IMO undertook a study concerning GHG emissions from ships on the advice of the MEPC in 1999.[67] The primary objective of this study was to examine the potential for reduction of GHG emissions through different technical, operational, and market-based approaches.

The IMO study confirmed shipping to be a significant contributor in the development of environmentally sustainable transport and that it contributed 1.8 per cent of the world's total CO_2 emissions in 1996.[68] The study noted that there is potential for reduction of GHG emissions from ships through technical and operational measures. Additionally, it also identified long-term considerations in the feasible reductions through technical and operational alternatives and defined the cost-benefit ratios for such efforts. Reduction of speed has been identified as the single measure that results in the highest emissions reductions.

Implementation of new and improved technology has been identified as the second best approach to reduce emissions, in terms of technical emissions reduction potential.[69] The study also identified measures related to the hull and the propeller as general measures for energy savings. Measures related to machinery were identified in a variety of options that have varying effects on reduction of different components of emissions. It implies that reduction of one component may be a trade-off with regard to increased emissions of another component. However, the study cautioned that if the increase in

demand for shipping continues, technical and operational measures alone will not be able to prevent a total growth in emissions from ships.[70]

IMO Resolution A.963(23)

The IMO responded to its mandate on climate change under Article 2.2 of the Kyoto Protocol, concerning GHG emissions from ship, by adopting Resolution A.963(23),[71] at the 23rd Session of the IMO Assembly on December 5, 2003. With reference to Article 212 of the UNCLOS,[72] the Resolution invited IMO's MEPC to develop legally binding measures through the preparation of a new annexure to MARPOL.[73]

The CO_2 Index

With the view to enable action and to ensure that all potential solutions to deal with the growth of marine CO_2 emissions are explored, the IMO has developed and recently launched a CO_2 index for assessing emissions. The basic idea behind a CO_2 emission index is that it describes the CO_2 efficiency (fuel efficiency) of a ship, that is, the CO_2 emission per ton cargo per nautical mile. This index could, in the future, assess both the technical features (for example, hull design) and operational features of the ship (for example, speed). The objective of IMO's CO_2 index is to provide a formula by which the shipowner/operator can assess the emissions of a ship in relation to the transport work that has been performed. The emissions are calculated on the basis of total fuel consumption, including fuel used while a ship is berthed and during ballast voyages. The transport performed is calculated by multiplying a cargo unit by the distance travelled.

It is expected that the shipowners and operators will make use of this index to take advantage of all cost efficient ways of improving a ship's environmental performance. The IMO has also adopted a strategy with regard to policies and measures, focussing mainly on further development of a CO_2 emission indexing scheme for ships and further evaluation of technical, operational and market-based solutions. But it is still not clear as to how to make use of CO_2 as a measure to mitigate GHG emissions.

Market-Measures

The IMO study recommends that policy instruments to limit GHG emissions from international shipping sector should be cost-effective and, thus, a market-based approach should be followed for implementation of abatement measures.[74] In this regard, the

MEPC is considering possible market-based measures aimed at reducing GHG emissions from ships engaged in international trade. The important consideration is to find out whether such measures should be mandatory or voluntary for all states. There is also a need to resolve the issues pertaining to implementation of market-based measures. It is being argued by the non-Annexure I developing countries that such market-based measures should be made applicable to the Annexure I developing countries.

Legal Issues and Challenges

Overview

An IMO study estimated total CO_2 emissions from shipping in 2007 at 1.12 billion tons, or about 4 per cent of global CO_2 emissions from fuel combustion. By 2020, emissions from shipping are projected to increase by over 30 per cent to reach 1.47 billion tons. As these figures are considerably higher than existing estimates for emissions, the shipping sector may face increasing demands to address the issue of GHG emissions control.[75]

In the context of ongoing efforts by the international community to address the problem of climate change in accordance with the "2007 Bali Action Plan"[76], and in light of the mandate given to IMO in the Kyoto Protocol, the MEPC has maintained its momentum on the issue and made substantive progress in developing technical and operational measures to address such emissions, including the development of an energy efficiency design index for new ships and an energy efficiency operational index. The MEPC has also held a discussion on market-based measures, and has agreed to further discuss such measures at MEPC 59, to be held in July, 2009. For its deliberations on these matters, the estimates of CO_2 emissions from international shipping have been updated. The total CO_2 emissions from international shipping for 2007 have been estimated to be 843 million tonnes, or 2.7 per cent of global CO_2 emissions.[77]

Progress towards developing a mandatory regime to control GHG emissions by international shipping was made during the first inter-sessional meeting of IMO's Working Group on Greenhouse Gas Emissions from Ships, held in June, 2008.[78] The session was tasked with developing the technical basis for reduction mechanisms that may form part of a future IMO regime to control GHG emissions by international shipping. In particular, the inter-sessional meeting made progress on developing a mandatory CO_2 Design Index for ships and an interim CO_2 Operational Index, and held extensive discussions on best practices for voluntary implementation and economic

instruments with GHG-reduction potential. Major progress was made in developing measures to enhance energy efficiency in international shipping and thereby reduce GHG emissions at the second inter-sessional meeting of IMO's Working Group on GHG from Ships, held at IMO's London Headquarters during March 9-13, 2009.

Pillars of IMO's Work on Mitigation of Marine Bunker Emissions

There is a universally recognised importance and urgency to limit and control GHG emissions, including marine emissions. The present legal framework, as embodied in the Kyoto Protocol, will expire by 2009. Therefore, inter-governmental negotiations are being conducted for the post-Kyoto regime. But these negotiations do not include marine bunker emissions as this issue is required to be addressed by the IMO. Hence, in order to act in concert with broader international efforts to develop and adopt a post-Kyoto regime by 2009, negotiations are underway in the IMO with a view to evolve a mandatory regulatory framework for mitigating marine GHG emissions. The IMO's work on GHG emissions is mainly concentrated on evolving a consensus on technical, operational measures and possible market-based instruments to reduce GHG emissions from ships. It is apparent that a consensus among IMO's member states on these proposed measures is necessary for designing the necessary regulatory framework. The proposed measures may be described as the three pillars of IMO's work on the mitigation of GHG emissions by the international shipping (Fig. 1).

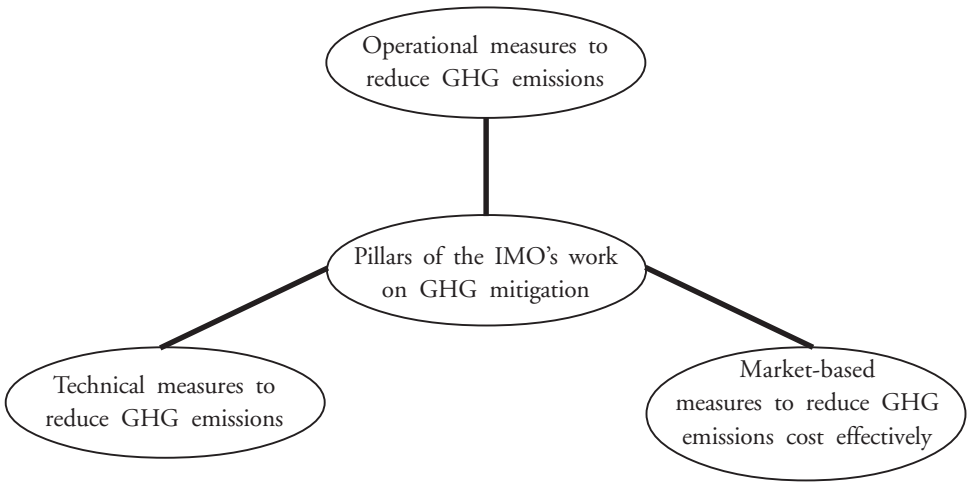

Fig. 1. Pillars of the IMO's work on mitigation of marine bunker emissions.

Challenges

Currently, the IMO is faced with challenges to design a mandatory regulatory framework for GHG emissions by international shipping. In this regard, an IMO Working Group on GHG Emissions was constituted in 2007. The terms of reference of this Working Group are to further address the market-based operational measures.[79] It is examining GHG emissions reduction options through different technical, operational, and market-based approaches.[80] So far, the IMO has failed to make any significant progress in negotiations on addressing GHG emissions from shipping. In fact, the IMO's attempts to evolve a consensus on the regulatory framework have been constrained due to the unique characteristics of the maritime transport sector. This has been further complicated because of IMO's inability to reconcile its environmental mandate with the principle of CBDR. The developing countries are opposed to any IMO initiative on climate change that fails to respect this principle. It is pertinent to note that the developing countries have been characterised a "non-Annexure I countries" under the Kyoto Protocol and, thus, are exempt from its mandatory QELAR targets. Also, about 67 per cent of the flag states (which offer "flag of convenience"; a unique characteristic of the international maritime transport) are non-Annexure I developing countries.[81]

Post-Kyoto Climate Policy and Marine GHG Emissions

Issues for Negotiation

The Post-Kyoto Protocol climate policy centres around the "Bali Action Plan."[82] It contemplates that post-Kyoto policy enhanced national and international action on mitigation of climate change will include discussions on "cooperative sectoral approaches and sector-specific actions to enhance implementation of Article 4(1) (c) of the UNFCCC."[83] However, these negotiations do not include the issue of marine bunker emissions, as the same has to be addressed by the IMO. Hence, to act in concert with broader international efforts to develop and adopt a post-Kyoto regime by 2009, negotiations are underway in the IMO with a view to evolve a regulatory framework for marine GHG emissions among the member countries. A consensus on the principle of CBDR is necessary for an agreement on the mandatory regulatory framework for the mitigation of GHG emissions by international shipping in order to operationalise these measures.

Flag of Convenience and the Principle of CBDR

The biggest issue for post-Kyoto climate policy towards the maritime transport sector is to find ways to overcome the drawbacks related to "flag of convenience,"[84] which necessitate designing a regulatory framework that can be adopted, accepted, implemented and enforced by all for mitigating marine GHG emissions. Shipping is, perhaps, the most international of all the world's great industries. The ownership and management chain surrounding any particular vessel can embrace many different countries; it is not unusual to find that the owners, operators, shippers, charterers, insurers and the classification society, are all of different nationalities and that none of these are from the country under whose flag the ship operates. However, the obligations of countries to mitigate GHG emissions have been differentiated in the international regime for the climate change in accordance with the principle of CBDR.

Hence, reconciling the demand of the shipping sector related to "flag of convenience" issue with the principle of CBDR is the most important issue for negotiating post-Kyoto climate policy.[85] This situation has become more complex with the developing countries demanding a solution to this issue as a pre-condition for agreeing to any mandatory regulatory framework for reducing GHG emissions by the shipping sector.

The Way Ahead

The IMO has given extensive consideration to the issue of GHG emissions from ships and is currently working in accordance with an ambitious work plan. However, no mandatory regulatory instrument for mitigating GHG emissions by international shipping has been adopted till date. The next session of the IMO's MEPC 59 will be held in July, 2009. At present, work on the limitation and reduction of GHGs from ships is underway at the inter-sessional meetings for presentation to MEPC 59, which is expected to agree to a package of measures aimed at increasing fuel efficiency of ship design and operation. The outcome of MEPC 59, in accordance with its action plan, will be presented at the COP15/MOP5 of the Kyoto Protocol to be held in Copenhagen in December, 2009. All these works are due to culminate in 2009 with the adoption of a binding instrument.

Therefore, the way ahead for the IMO is to have measures in place to control GHG emissions by international shipping before the first commitment period under the Kyoto Protocol expires by 2012. Much is needed in terms of defining how

international shipping will participate in the post-2012 climate regime. An effective programme of action to address mitigation of marine GHG emissions needs to be based on reliable information on current and future estimates of international shipping emissions taking into account realistic scenarios of the global economy. It will need to include a basket of measures to effectively mitigate adverse impacts of maritime transport on the global climate, and will need to include considerations on sustainable shipping, adaptation, funding and technology transfer as key elements in addressing climate change.

Conclusion

While international shipping contributes a relatively small share of global GHG, emissions from this sector are expected to grow significantly in the future. Hence, there is a need to agree on a mandatory regulatory framework to address the issue of mitigation of GHG emissions by international shipping. The IMO has been mandated by the Kyoto Protocol to design a regulatory framework to limit and reduce GHG emissions from ships. To achieve this goal, the IMO is trying to evolve a consensus on the possible technical, operational measures and market-based instruments. However, the IMO's recent attempts to design a GHG regulatory framework have been constrained by the unique characteristics of the shipping sector. It has been further complicated by the IMO's environmental mandate, which entails uniformity in sectoral climate policy for international maritime transport in their application to operators of all nationalities.

An assessment of the inter-governmental negotiations suggests that IMO's attempts to adopt a mandatory regulatory framework for marine GHG emissions have not been successful in building up a consensus among the member states on the issue. Given the global nature of the maritime sector, any regulatory regime for controlling GHG emissions should be globally enforceable. Further, the complexity of "flag of convenience" is a major obstacle in dealing with the issue of GHG emission abatements from ships. It also appears that a regulatory framework within the ambit of IMO jurisdiction may result in violations of the principle of CBDR, which is one of the pillars of the climate change regime as embodied in the UNFCCC and its Kyoto Protocol. All this makes the shipping sector as the most complex sector for international climate policy.

In these circumstances, it seems that the IMO will not be able to deliver anything by COP15 beyond technical and operational proposals to improve efficiency. It is, thus, apparent that any measures – technical and operational – adopted by the IMO

for addressing marine bunker emissions may not be sufficient to substantially bring down future emissions. Moreover, these mitigation measures need to take into account the principle of CBDR in formulating the obligations of states to limit and reduce GHG emissions by international shipping. It seems that it is difficult for the IMO to reconcile its mandate, as warranted under the Kyoto Protocol, with the principle of CBDR. Hence, this principle holds the key to evolve a consensus on the measures needed to address the issue of mitigation of GHG emissions from international shipping.

Moreover, the IMO's regulatory activities are spread over a wide range of maritime pollution issues and not focussed on GHG emissions alone. Further, unlike the almost universal membership of the UNFCCC, the IMO has only 168 countries as members. Hence, the IMO's multilateral framework for negotiating GHG emissions reduction targets will not suffice to evolve a consensus on marine GHG emissions. Therefore, it is high time to address the issue of mandatory mitigation of marine bunker emissions in the UNFCCC-Kyoto Protocol framework rather than the IMO. This requires a fresh look at the climate policy to address mitigation of marine bunker emissions in the ongoing inter-governmental negotiations for the post-Kyoto climate regime.

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Notes

1. International freight is dominated by international shipping. The bulk of international freight is carried aboard extremely large ships carrying bulk dry cargo (for example, iron ore), container freight or fuel and chemicals (tankers). It is estimated that international shipping supports 90 per cent of the world's trade by linking every country on earth, even those countries that are landlocked. Thus, the sea-lanes and supporting shore infrastructure are the lifelines of the modern global economy. See IMO, "Maritime Transport and the Climate Change Challenge," Multi-year Expert Meeting on Transport and Trade Facilitation, February 16-18, 2009, p. 1.
2. See UNCTAD, *Review of Maritime Transport 2008* (New York and Geneva: United Nations, 2008), p. 14.

3. Key compounds emitted from international shipping are carbon dioxide (CO_2), nitrogen oxides (NOx), carbon monoxide (CO), volatile organic compounds (VOC), sulphur dioxide (SO_2), black carbon (BC) and particulate organic matter (POM). Ship emissions have local, regional, and global impacts. At a local- and regional-scale, ocean-going ships impact human health through the formation and transport of ground-level ozone, sulphur emissions and particulate matter. Ship transportation, by generating CO_2, impacts climate change at the global level. See K.P. Capaldo et al., "Effects of Ship Emissions on Sulphur Cycling and Radiative Climate Forcing Over the Ocean," *Nature*, Vol. 400, 1999, pp. 743-746; O. Endresen et al., "Emission from International Sea Transportation and Environmental Impact," *Journal of Geophysical Research*, Vol. 108, 2003; J.J. Corbett et al., "Mortality from Ship Emissions: A Global Assessment," *Environmental Science and Technology*, Vol. 41, No. 24, 2007, pp. 8512-8518.
4. See O. Endresen, *ibid.*; James J. Corbett and Horst W. Koehler, "Updated Emissions from Ocean Shipping," *Journal of Geophysical Research*, Vol. 108, 2003, p. 4650.
5. See P. Forster et al., "Changes in Atmospheric Constituents and in Radiative Forcing," In: J.T. Houghton et al., Eds., *Climate Change 2007: Physical Science Basis* (Cambridge: Cambridge University Press, 2007), Chapter 2, pp. 129-234.
6. See Kahn-Ribiero et al., "Transportation and its Infrastructure," In: *Climate Change 2007: Mitigation of Climate Chan*ge (Cambridge: Cambridge University Press, 2007), Chapter 5, pp. 323-386.
7. See United Nations Framework Convention on Climate Change.
8. See Kyoto Protocol, *United National Treaty Series (UNTS)*, Vol. 2303, 1997, p. 148. Adopted on December 11, 1997; Entry into force: February 16, 2005; Status: 185 Parties.
9. For individual emission reduction targets of the developed countries, see Kyoto Protocol, *ibid.*, Annexure B.
10. The increasing usage of fossil fuels, which began in the latter half of the 18th century with industrialisation led to higher concentrations of CO_2 and other trace GHGs in the atmosphere. The long-term rise in atmospheric CO_2 closely follows the increase in anthropogenic CO_2 emissions that are a direct result of fossil fuel combustion, of which international shipping accounts for approximately 2.7 per cent. Climate change occurs because of rising concentration of GHG in the atmosphere causing "greenhouse effect." In general, long-lived CO_2 primarily dominates the greenhouse effect. The IPCC studies have attributed cause of climate change to human activities that generate anthropogenic GHG emissions. These human activities include shipping transport activities. See IPCC, *Climate Change 2007: Synthesis Report – Summary for Policymakers*, IPCC Fourth Assessment Report (AR4), 2007, pp. 5-6.
11. For a detailed analysis of the UNFCCC, see Daniel Bodansky, "The Framework Convention on Climate Change: A Commentary," *Yale Journal of International Law,* Vol. 18, 1993, pp. 451-558.

12. See the UNFCCC, Article 2.
13. This is calculated on the basis of the first communication report submitted by the Annexure I parties in accordance with Articles 4(2)(b), 12(2) and 12(5) of the UNFCCC. It is pertinent to note that although the Kyoto Protocol owes its origin to the UNFCCC, it has an independent legal status as a multilateral environmental agreement. The inter-governmental negotiations in the framework of UNFCCC on the "Berlin Mandate" concluded at the COP-3 in Kyoto in 1997, wherein the parties to the UNFCCC adopted the Kyoto Protocol. See UNFCCC, *ibid.*, Article 17; Kyoto Protocol, *ibid.*, Annexure B.
14. The institutional arrangements of MEAs have become increasingly perceived as crucial to their effectiveness. For details see Bharat H. Desai, *Institutionalising International Environmental Law* (New York: Transnational Publishers, Inc, 2004); Robin R. Churchill, Geir Ulfstein, "Autonomous Institutional Arrangements in Multilateral Environmental Agreements: A Little-Noticed Phenomenon in International Law," *American Journal of International Law*, Vol. 94, 2000, p. 623.
15. For the international law-making process, see Desai, *ibid.*; Allyn Taylor and Daniel Bodansky, *The Development of the WHO Framework Convention on Tobacco Control: Legal and Policy Considerations*, WHO Background Paper, November 1998.
16. For the rules for decision-making process, see Draft Rules of Procedure of the Conference of the Parties and its Subsidiary Bodies, *FCCC/CP/1996/2*, May 22, 1996. Till date although the rules have not been adopted by the COP, they continue to be applied, with the exception of draft Rule 42: 'Voting', see *FCCC/CP/1995/7*, Paragraph 10, available at http://unfccc.int/resource/docs/cop2/02.pdf
17. For more on decision-making framework, see Catrinus J. Jepma, Mohan Munasinghe, *Climate Change Policy: Facts, Issues and Analyses* (Cambridge: Cambridge University Press, 1997), p. 83.
18. See, *ibid.*, p. 83.
19. See the UNFCCC, Article 3(1).
20. The Rio Declaration is one of five agreements coming out of the United Nations Conference on Environment and Development (also called the "Earth Summit") in Rio de Janeiro in June 1992. Although a non-binding, or "soft law" instrument, the Rio Declaration sets forth important principles of international environmental law, especially sustainable development. See the Rio Declaration, UN Doc. *A/CONF.151/26*, Vol. I, 1992; see also *International Legal Materials*, Vol. 31, 1992, p. 874, Principle 7.
21. In reality, it is difficult to assess cause and effect, and to determine adequate compensation with regard to historical contribution of developed countries to enhanced anthropogenic greenhouse effect leading to the problem of climate change. For details see, Claudia Kemfert and Richard S.J. Tol, "Equity, International Trade and Climate Policy," *International Environmental Agreements: Politics, Law and Economics*, Vol. 2, 2002, pp. 23-48.

22. Philippe Sands, *Principles of International Environmental Law*, 2nd ed. (Cambridge: Cambridge University Press, 2003), pp. 217-218.
23. See the Rio Declaration, *ibid*., the Preamble.
24. Yoshira Matsui, "Some Aspects of the Principle of 'Common but Differentiated Responsibilities'," *International Environmental Agreements: Politics, Law and Economics*, Vol. 2, 2002, pp. 151-171.
25. See, *ibid*., Yoshira, p. 154; Phillipe Sands, "International Law in the Field of Sustainable Development," *British Yearbook of International Law*, Vol. 64, 1994, pp. 343-44.
26. See the UNFCCC, the Preamble.
27. See, *ibid.*, Article 3.
28. See, *ibid.*, Article 4.2(a).
29. See Meinhard Doelle, *From Hot Air to Action, Climate Change, Compliance and the Future of International Environmental Law* (Toronto: Carswell, 2005), p. 24.
30. The Berlin Mandate was adopted as a result of the review under Article 4.2(d) of the commitments of Annexure I developed countries as contained in Article 4.2(a) and (b) of the UNFCCC. See UNFCCC, "The Berlin Mandate," *Decision 1/CP.1, FCCC/CP/1995/7/Add.1*, 1995.
31. See Kyoto Protocol, Article 3(1).
32. See, *ibid*., Annexure B.
33. See Kyoto Protocol, *ibid*.; Michael Grubb, "International Emissions Trading Under the Kyoto Protocol: Core Issues in Implementation," *Review of European Community and International Environmental Law*, Vol. 7, No. 2, 1998, pp. 140-146.
34. See Kyoto Protocol, *ibid.*, Article 4.2(b).
35. See, *ibid*., Article 3(1).
36. See, *ibid.*, Articles 6, 12 and 17.
37. See Sunil Kumar Agarwal, 'Introduction,' *Trade-Related Environmental Measures in Multilateral Environmental Agreements* (New Delhi: Jawaharlal Nehru University, 2004), Unpublished M.Phil. Dissertation, pp. 15-16.
38. See Sunil Kumar Agarwal, "Regulatory Framework for the Kyoto Protocol Mechanisms," *Mitigating Global Climate Change: A Legal Study on the Kyoto Protocol Mechanisms* (New Delhi: Jawaharlal Nehru University, 2009), Unpublished Ph.D. Thesis, Chapter 3, p. 109.
39. See Kyoto Protocol, *ibid*., Article 3(3).
40. See, *ibid*., Article 3(9).
41. See Depledge, J., 2000, "Tracing the Origins of the Kyoto Protocol: An Article-by-Article Textual History," *UN Doc. FCCC/TP/2000/2*, November 25, p. 52 f.
42. The first review under Article 4.2(d) of the adequacy of mitigation measures and policies of Annexure I developed countries, in accordance with Articles 4.2(a) and (b), led to the adoption of the Kyoto Protocol.
43. See the UNFCCC, *ibid.*, Article 7.2(a).

44. See Camilla Bausch and Michael Mehling, 2007, "Tracking Down the Future Climate Regime: An Assessment of Current Negotiations Under the UN," *Climate Change Legal Review*, Vol. 1, pp. 4-16.
45. Increased risk of premature death from pulmonary diseases and worsened respiratory diseases. See UNCTAD, *ibid*., p. 118.
46. See IPCCC Report, *ibid*.
47. See Forster et al., *ibid*.
48. See Kahn-Ribiero et al., *ibid*.
49. IMO, 2008, Marine Environment Protection Committee (MEPC), *Report of the Marine Environment Protection Committee on its 57th Session*. MEPC 57/21, April 7. See also the website of UNFCC at *http://unfccc.int/methods_and_science/emissions_from_intl_transport/items/1057.php*
50. See IMO, 2009, "Prevention of Air Pollution from Ships," *MEPC 59/4*, February 5, p. 1.
51. Environmental concerns were not part of the IMO mandate till 1975. However, the famous *Torrey Canyon* accident in 1967 resulted in a complete paradigm shift in favour of environmental concerns. By the mid-1970s, the issue of protection of the marine environment was recognised as being important enough to become permanent part of the IMO work programme. In 1975, the 9th IMO Assembly adopted Resolution A. 358 (IX) to amend Article 1 of the IMO Convention to add to the list of purposes "the prevention and control of marine pollution from ships" and to establish new Marine Environment Protection Committee (MEPC). See, IMO, *Resolution A.358 (IX): Amendments to IMCO Convention*, 1975 (Adopted by IMO Assembly on November 14, 1975).
52. Article 293 of the UNCLOS specifically opens the door to a progressive interpretation of the UNCLOS obligations by bringing in other sources of international law not inconsistent with the UNCLOS.
53. See the UNCLOS, *U.N.T.S.,* Vol. 1833*,* p. 397, Adopted on December 10, 1982; Entry into force: November 16, 1994.
54. See the UNCLOS, Article 1(4).
55. For a description of the history of the negotiations on the key provisions of the UNCLOS dealing with protection of the marine environment, see Myron H. Nordquist, *United Nations Convention on the Law of the Sea 1982: A Commentary*, Vol. 1 (Dordrecht and Boston: Martinus Nijhof Publishers, 1985).
56. Article 192 is considered to reflect customary international law. See J.L. Hafetz, "Fostering Protection of the Marine Environment and Economic Development: Article 121(3) of the Third Law of the Sea Convention," *American University International Law Review*, Vol. 15, 2000, p. 583, at p. 598.
57. See M.L. McConnell et al., "The Modern Law of the Sea: Framework for the Protection and Preservation of the Marine Environment?" *Case Western Reserve Journal of International Law*, Vol. 23, 1991, p. 83, at 84. See also Hafetz, *ibid*., p. 297.

58. Meinhard Doelle, "Climate Change and the Use of the Dispute Settlement Regime," *American University International Law Review*, Vol. 15, 2000, p. 583, at p. 597; see Myron H. Nordquist, *ibid*., pp. 12-13.
59. Article 212 obligates states to adopt laws and regulations and take other necessary measures "to prevent, reduce and control pollution of the marine environment from or through the atmosphere."
60. Article 212 of the UNCLOS relates to pollution from or through the atmosphere. Article 212(3) provides for establishment of global and regional rules, standards through a competent international organisation (IMO) and provides the legal basis for MARPOL Annexure VI (1997) with the development of an IMO strategy for GHGs emissions from ships.
61. Article 222 is about enforcement measures to be taken by states with respect to air pollution. It entails duty on the part of the state to adopt national laws and regulations to implement applicable rules and standards in consonance with international rules and standards. Hence, it is a duty of state parties to MARPOL VI to implement it.
62. GHG emissions result in marine pollution as defined in Article 1 of the UNCLOS.
63. The MARPOL Convention is the main international convention covering prevention of pollution of the marine environment by ships from operational or accidental causes. It is a combination of two Treaties adopted in 1973 and 1978, respectively, and updated by amendments through the years. As the 1973 MARPOL Convention had not yet entered into force, the 1978 MARPOL Protocol absorbed the parent Convention. The combined instrument is referred to as the International Convention for the Prevention of Marine Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto (MARPOL 1973/1978), and it entered into force on October 2, 1983 (Annexures I and II).
64. MARPOL was adopted on November 2, 1973 at the IMO and it covered pollution by oil, chemicals, and harmful substances in packaged form, sewage and garbage. The Protocol of 1978 relating to the 1973 International Convention for the Prevention of Pollution from Ships (1978 MARPOL Protocol) was adopted at a Conference on Tanker Safety and Pollution Prevention in February 1978 held in response to a spate of tanker accidents in 1976-1977. (Measures relating to tanker design and operation were also incorporated into the 1978 Protocol relating to the UN Convention on the Safety of Life at Sea, 1974.)
65. As of June 30, 2008, it has been ratified by 51 countries, representing approximately 80.36 per cent of the gross tonnage of the world's merchant fleet; See Summary of Status of IMO Conventions, June 30, 2008, available at www.imo.org
66. See IMO, 2009, Maritime Transport and the Climate Change Challenge, Multi-year Expert Meeting on Transport and Trade Facilitation, February 16-18, p. 1.
67. See IMO, 1999, "Prevention of Air Pollution from Ships, Progress Report on Follow-up Activities," *MEPC 43/10/2*.
68. See IMO, 2000, "Study of Greenhouse Gas Emissions from Ships," Issue No. 2, March 31.
69. See IMO study, *ibid*.

70. See IMO study, *ibid*.
71. The resolution specifically asks the MEPC to undertake the following tasks:
    - The setting of a GHG emissions baseline;
    - The development of a methodology for monitoring and reporting GHG efficiencies of ships in the form of a GHG Index;
    - The development of guidelines for how such a GHG Index can be implemented; and
    - The evaluation of technical, operational and market-based measures to reduce GHGs from ships.
72. Article 212 obligates states to adopt laws and regulations and take other necessary measures "to prevent, reduce and control pollution of the marine environment from or through the atmosphere." These obligations are sufficiently broad to extend it to mitigating climate change; See, Meinhard Doelle, Climate Change and the Use of the Dispute Settlement Regime of the Law of the Sea Convention, *Ocean Development and International Law* (2006), Vol. 37, Issue 3-4, pp. 319-338.
73. Article 212 of UNCLOS can be reasonably interpreted to apply to the issue of air pollution. Within the framework of Articles 212(3) and 222 of the UNCLOS, the IMO is competent to establish global rules and standards applicable to vessels on the prevention and control of marine pollution from or through the atmosphere.
74. See IMO Study, *ibid.*, p. 21.
75. See MEPC, *Report of the Marine Environment Protection Committee on its 56th Session*, *Report on the Outcome of the Informal Cross Government/Industry Scientific Group of Experts Established to Evaluate the Effects of the Different Fuel Options Proposed Under the Revision of MARPOL Annexure VI.* MEPC 56/23, July 30, 2007; See Annexure to MEPC, *Review of MARPOL Annexure VI and the NOx Technical Code*, MEPC 57/4, January 30, 2008, UNCTAD Report, p. 119.
76. See UNFCCC, 2007, "Bali Action Plan," *1/CP.13,UNFCCC/CP/2007/6/Add.1*.
77. See Annex to MEPC, *Review of MARPOL Annexure VI and the NOx Technical Code*, MEPC 57/4, January 30, 2008, UNCTAD Report, p. 119.
78. For the method of the Inter-sessional Working Group, see IMO, "Guidelines on the Organization and Method of Work of the Maritime Safety Committee and the Marine Environment Protection Committee and their Subsidiary Bodies," *MSC-MEPC.1/Circ.2*, May 27, 2008.
79. See IMO, "Report of the Marine Environment Protection Committee on its 57th Session", *MEPC/57/21.doc*, April 7, 2008, Annexure 7, p. 145.
80. See Lloyd's Register, 2008, "The Report of the First Inter-sessional Meeting of the Working Group on GHG Emissions from Ships," *Marine Services*, July 2.
81. See IMO, 2009, "Maritime Transport and the Climate Change Challenge: Latest GHG Consideration Within IMO," Multi-year Expert Meeting on Transport and Trade Facilitation, *Note by the IMO*, February 16-18.

82. See "Bali Action Plan," *ibid*.
83. See UNFCCC, "Bali Action Plan", Paragraph 1(b)(iv), *ibid*.
84. Due to the complexity of international shipping, particularly ship registration and ownership, it is very difficult to draw a clear line between the ships of Annexure I countries and those of non-Annexure I countries on the basis of the flags the ships are flying.
85. See IMO, 2008, "Prevention of Air Pollution from Ships: Application of the Principle of "Common but Differentiated Responsibilities" to the Reduction of Greenhouse Gas Emissions from International Shipping," Submission by India and China, *MEPC 58/4/32*, August 15.