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Keywords

regulatory, initiatives, maritime, organization, industry, china, response, international, gas, shipping, emissions, greenhouse

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Greenhouse Gas Emissions from International Shipping: The Response from China's Shipping Industry to the Regulatory Initiatives of the International Maritime Organization

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Abstract

The International Maritime Organization (IMO) received its mandate to regulate shipping greenhouse gas (GHG) emissions from the Kyoto Protocol. However, the IMO Convention and the UN Convention on the Law of the Sea also provide it with competence in this area. In exercising its mandate, the IMO has developed regulatory initiatives. China's shipping industry is playing a growing role in the international shipping market, and its response to these initiatives will have a substantial effect on the future application of these regulations. This article analyses the GHG mandate of the IMO, examines the main outcomes achieved within the organization on this issue, and assesses the response from China's shipping industry to this issue. It concludes that the interests of the shipping industries from developing countries will need to be taken into account in the development of regulatory efforts if a consensus is to be achieved in the global reduction of GHG emissions from ships.

Keywords

greenhouse gas emissions - international shipping - International Maritime Organization (IMO) - shipping industry - China

Introduction

Climate change is a global issue that requires global responses. As one of the main contributions to climate change,¹ greenhouse gas (GHG) emissions have attracted mounting attention from the international community. One of the crucial global efforts to tackle climate change is the establishment of the international climate change regime, which comprises rules, norms, principles and procedures applicable to a range of activities.² International, regional and national regulations have been developed since the late 1970s to reduce GHG

*The author thanks Associate Professor Robin Warner and Professor Warwick Gullett for their valuable comments on earlier drafts. However, the author takes full responsibility for the content of the article.

¹ Intergovernmental Panel on Climate Change (IPCC), 'Fourth Assessment Report', 2007, available at http://www.ipcc.ch/publications_and_data/ar4/syr/en/contents.html, Synthesis Report, at 36.

² Xinyuan Dai, 'Global Regime and National Change' (2010) 10(6) *Climate Policy* 622-637. See also Patricia W. Birnie, Alan E. Boyle and Catherine Redgwell, *International Law and the Environment* (Oxford University Press, 3rd ed, 2009) at 336.

emissions.³ Among them, the United Nations Framework Convention on Climate Change (UNFCCC)⁴ and its Kyoto Protocol⁵ have served as the backdrop for subsequent efforts to promote the international climate change regime.

One shortcoming of the international climate change regime is that producers of GHG emissions from international shipping are exempt from liabilities under the Kyoto Protocol,⁶ notwithstanding that the contribution of GHG emissions from international shipping to climate change is significant and has been increasing.⁷ The 'Second IMO GHG Study 2009' states that in 2007, CO₂ emissions from international shipping reached 870 million tonnes, which covers 2.7% of the global emissions of CO₂.⁸ Furthermore, if no aggressive regulatory policies are introduced, CO₂ emissions from international shipping may grow by 150-250% by 2050 compared with 2007 due to projected growth in demand for maritime transport services.⁹ Given the urgency of emission reduction and the global nature of the shipping industry, a global approach must be employed to regulate GHG emissions from shipping. The UNFCCC and the International Maritime Organization (IMO) have responded to this imperative and begun to develop a regulatory framework.

Under the UNFCCC process, the UNFCCC's Subsidiary Body on Scientific and Technological Advice (SBSTA) and the Ad-Hoc Working Group on Long-term Cooperative Action (AWG-LCA) have contributed to global regulation on marine bunker fuels, the main source of emissions from international shipping. The main difficulty with including GHG

³ See, e.g., Convention on Long-Range Transboundary Air Pollution, 13 November 1979, 18 ILM 1442; Vienna Convention for the Protection of the Ozone Layer, 22 March 1985, 26 ILM 1529; Midwest Greenhouse Gas Reduction Accord, 15 November 2007, available at <http://www.c2es.org/us-states-regions/regional-climate-initiatives/mggra>; Clean Air Act of the United States of America, 17 December 1963, 42 USC 7401-7626.

⁴ United Nations Framework Convention on Climate Change (UNFCCC), 9 May 1992, 31 ILM 848.

⁵ Kyoto Protocol to the United Nations Framework Convention on Climate Change (Kyoto Protocol), 16 March 1998, 37 ILM 22.

⁶ 'International shipping' refers to 'shipping between ports of different countries', and excludes military and fishing vessels engaged on such voyages. Ø. Buhaug, J.J. Corbett, Ø. Endresen, V. Eyring, J. Faber, S. Hanayama, D.S. Lee, D. Lee, H. Lindstad, A.Z. Markowska, A. Mjelde, D. Nelissen, J. Nilsen, C. Palsson, J.J. Winebrake, W. Wu, and K. Yoshida, 'Second IMO GHG Study 2009' (International Maritime Organization (IMO), London, 2009) Definitions.

⁷ The 1997 Kyoto Protocol only listed six types of GHGs, namely CO₂, CH₄, N₂O, HFCs, PFCs and SF₆, but a seventh type of GHG, NF₃ was added to the category in the Durban Climate Change Conference in 2011. The GHG emissions from international shipping mainly constitute CO₂, CH₄, N₂O and HFC. *Outcome of the Work of the Ad-Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol at its Sixteenth Session*, Decision 1/CMP.7, Report of the Conference of the Parties serving as the Meeting of the Parties to the Kyoto Protocol on its Seventh Session, FCCC/KP/CMP/2011/10/Add.1 (15 March 2012); Kyoto Protocol Annex A.

⁸ Buhaug *et al.*, *supra* note 6, at 1. These data have been criticised since they do not take account of the global economic downturn since 2009. To provide a better foundation for IMO's future work, an update of the 2009 IMO Study of GHG emissions estimate from international shipping is currently being carried out and the final report is expected to be submitted to the IMO in 2014. *Report of the Expert Workshop on the Update of GHG Emissions Estimate for International Shipping (Update-EW)*, note by the Secretariat, MEPC 65th Session, Agenda Item 5, Doc MEPC 65/5/2 (4 March 2013).

⁹ Buhaug *et al.*, *supra* note 6, at 1.

emissions from international shipping in the Kyoto Protocol lies in the allocation of marine fuel emissions to different countries.¹⁰ In 1996 the SBSTA started to address this problem by identifying five options as the basis for future work on the allocation of emissions from aviation and marine bunker fuels,¹¹ but States failed to reach consensus on this strategy.¹² Due to the deadlock on the allocation issue, the UNFCCC delegated responsibility to the IMO to regulate the issue for shipping under Article 2(2) of its Kyoto Protocol and the IMO regularly reports its progress in regulating this matter to the SBSTA. Meanwhile, the AWG-LCA also discussed the issue of international bunker fuels in the context of paragraph 1b(iv) of the Bali Action Plan,¹³ cooperative sectoral approaches and sector-specific actions. However, under the AWG-LCA the Parties discussed regulatory principles and no substantial outcomes had been achieved before the AWG-LCA was terminated at the Doha Climate Change Conference in 2012. As a result, regulatory measures to reduce shipping GHG emissions currently mainly rely on the work of the IMO.

As a specialised agency of the UN, the IMO has recognised the problem of GHG emissions from ships and has responded to it based on its powers and assumed responsibilities under Article 2(2) of the Kyoto Protocol, as well as the Convention on the International Maritime Organization (IMO Convention) and the United Nations Convention on the Law of the Sea (LOSC).¹⁴ In contrast to the efforts made within the UN international climate change regime, there are high expectations of the IMO due to its mandate and past record in regulating a multitude of shipping-related technical matters. In particular, the newly adopted revised Annex VI of the International Convention for the Prevention of Pollution from Ships (MARPOL 73/78)¹⁵ and the guidelines produced by the IMO have assured the

¹⁰ Due to the global nature of international shipping, a ship emits GHGs throughout its voyage and this voyage involves several countries. It is thus difficult to include ship-based GHG emissions in the State-based Kyoto Protocol system, namely to allocate GHG emissions from international shipping to different countries.

¹¹ These options are: no allocation; allocation to the country where the bunker fuel is sold; allocation to the country of the transporting company, the country of registration of the aircraft/vessel, or the country of the operator; allocation to the country of departure or destination of the aircraft/vessel; and allocation to the country of departure or destination of the passenger/cargo. Sebastian Oberthür, 'Institutional Interaction to Address Greenhouse Gas Emissions from International Transport: ICAO, IMO and the Kyoto Protocol' (2003) 3(3) *Climate Policy* 191-205, at 193.

¹² *Ibid.* Oberthür asserts that this effort failed because under these options countries that would have been allocated substantial amounts of emissions from bunker fuels would be in a disadvantageous situation in international trade, and these options are not feasible in domestic implementation.

¹³ Bali Action Plan, Decision 1/CP.13, Report of the Conference of the Parties on its Thirteenth Session, FCCC/CP/2007/6/Add.1 (14 March 2008).

¹⁴ Convention on the Inter-Governmental Maritime Consultative Organization, 6 March 1948, 289 UNTS 3, amended and renamed as Convention on the International Maritime Organization (IMO Convention), 14 November 1975, 9 UTS 61; United Nations Convention on the Law of the Sea (LOSC), 10 December 1982, 1833 UNTS 3. A detailed discussion of this issue is in the next section.

¹⁵ International Convention for the Prevention of Pollution from Ships (MARPOL 73/78), 2 November 1973, 12 ILM 1319, as amended by the 1978 Protocol to the 1973 Convention, 17 ILM 546. To date, MARPOL 73/78 has adopted six annexes

international community of progress regarding the adoption of energy-efficiency measures in relation to GHG emissions from shipping.

Given the amended MARPOL Annex VI and guidelines adopted by the IMO, compliance with these measures by different countries, in particular the shipping industries from developing countries, will be significant for the reduction of GHG emissions from international shipping. This is because developing countries are the main Parties that opposed the adoption of the revised MARPOL Annex VI within the IMO, and the vessels flying the flags of developing countries (UNFCCC Non-Annex I States) account for over three-quarters of the global merchant fleet.¹⁶ The adopted IMO instruments, including the technical and operational measures, cannot be effectively implemented without compliance by the national shipping industries of these countries. Of these developing countries, China's response, in particular the response from its shipping industry, to the efforts made by the IMO will provide an important reference for progress in addressing GHG emissions from international shipping. This is because China is one of the largest developing countries and shipping nations, and its shipping industry shares many characteristics with those of other developing countries. Therefore, to some extent the response from China's shipping industry also represents the views from the shipping industries in other developing countries, in particular other major developing countries.¹⁷

The first part of this article examines the mandate and competence of the IMO in regulating GHG emissions from international shipping. Having established the central role of the IMO in providing a solution to the problem, the article then examines and assesses the IMO's efforts in reducing shipping GHG emissions, and the response from China's shipping industry.

IMO's Mandate and Competence to Regulate GHG Emissions from International Shipping

and their revisions, namely, Annex I. Oil (entered into force 2 October 1983), Annex II. Noxious Liquid Substances carried in Bulk (entered into force 6 April 1987), Annex III. Harmful Substances carried in Packaged Form (entered into force 1 July 1992), Annex IV. Sewage (entered into force 27 September 2003), Annex V. Garbage (entered into force 31 December 1988), and Annex VI. Air Pollution from Ships (entered into force 19 May 2005).

¹⁶ IMO, 'Main Events in IMO's Work on Limitation and Reduction of Greenhouse Gas Emissions from International Shipping', 2011, available at <http://www.imo.org/MediaCentre/resources/Pages/Greenhouse%20gas%20emissions.aspx>, at 27.

¹⁷ For the purpose of this article, current developing countries can be classified into three categories, namely major developing flag States, major Flag of Convenience (FOC) States, and other developing States. A detailed discussion on this grouping is provided below.

A debate on the origin of the IMO's mandate in regulating GHG emissions from ships has taken place within the IMO. The significance of this debate lies in two aspects. On the one hand, the generally accepted origin of the IMO's mandate could determine which principles may apply to the regulation of this issue. Generally if an international agreement gives the IMO a mandate, the principles reflected in that agreement should also apply to the regulation of the GHG issue by the IMO. On the other hand, this generally accepted origin of the IMO's mandate may determine what type of measures the IMO can adopt to tackle GHG emissions issue. This is because the IMO cannot regulate the GHG emissions issue with these types of measures which are by their nature beyond its competence. If these types of measures to address the GHG emissions issue are to be adopted, collaboration with relevant competent international institutions would be necessary. For this issue it can be argued that IMO may not be the sole competent international organization.

Currently two views contribute to this debate. One view attributes the IMO's mandate in regulating GHG emissions from ships solely to the Kyoto Protocol. This view has been supported by many developing countries¹⁸ and some scholars.¹⁹ Article 2(2) of the Kyoto Protocol requests the Annex I States of the UNFCCC to 'work through the IMO' to limit or reduce their GHG emissions from ships. Whether this provision gives the IMO the exclusive mandate to regulate this GHG issue is open to debate and dependent on various interpretations of the term 'work through'. However, it 'establishes a formal link to the IMO' by authorising the IMO to regulate this GHG issue,²⁰ and implies that the IMO should 'take the lead' on this issue.²¹ Furthermore, the acceptance of this mandate by the IMO is

¹⁸ See, e.g., China, India, Brazil, Saudi Arabia and some other developing countries all hold that the IMO's mandate comes from the Kyoto Protocol. *Report of the Marine Environment Protection Committee on its 59th Session*, Statement by the Delegation of China on GHG Issues, Doc MEPC 59/24/Add.1 Annex 13 (2009) at para 1; *Report of the Marine Environment Protection Committee on Its Sixty-First Session*, MEPC 61st Session, Agenda Item 24, Doc MEPC 61/24 (6 October 2010) Annex 3.

¹⁹ See, e.g., Haifeng Wang, 'GHG Emissions from the International Goods Movement by Ships and the Adaptation Funding Distribution' in Zongwei Luo (ed), *Green Finance and Sustainability: Environmentally-Aware Business Models and Technologies* (Business Science Reference, Hershey, 2011) 274-290, at 275; A. Miola, M. Marra and B. Ciuffo, 'Designing A Climate Change Policy for the International Maritime Transport Sector: Market-Based Measures and Technological Options for Global and Regional Policy Actions' (2011) 39(9) *Energy Policy* 5490-5498, at 5492; Derya Aydin Okur, *The Challenge of Regulating Greenhouse Gas Emissions from International Shipping and the Complicated Principle of 'Common but Differentiated Responsibilities'*, 2012, available at <http://web.deu.edu.tr/hukuk/dergiler/dergimiz13-1/2-deryaaydinokur.pdf>, at 28; Jodie Moffat, 'Arranging Deckchairs on the Titanic: Climate Change, Greenhouse Gas Emissions and International Shipping' (2010) 24(2) *Australian and New Zealand Maritime Law Journal* 104-125, at 105.

²⁰ Bernd Hackmann, 'Analysis of the Governance Architecture to Regulate GHG Emissions from International Shipping' (2012) 12(1) *International Environmental Agreements: Politics, Law and Economics* 85-103, at 90.

²¹ James Harrison, 'Recent Developments and Continuing Challenges in the Regulation of Greenhouse Gas Emissions from International Shipping' (2012) *University of Edinburgh Research Paper Series*, available at <http://ssrn.com/abstract=2037038>, at 1.

consistent with the IMO Convention.²² Since then the IMO has reported its progress in regulating the GHG issue to the SBSTA under the UNFCCC on a regular basis, which could be regarded as one of its obligations in fulfilling this mandate.²³ Therefore, it is not reasonable to assert that the IMO's mandate has nothing to do with the Kyoto Protocol.²⁴ However, Article 2(2) is vague in that it does not recognise the explicit competence of the IMO, or define the precise measures that IMO might adopt to address the GHG issue. Therefore, in 2011 the International Chamber of Shipping (ICS) called on the participants in the Durban Climate Change Conference to give the IMO a clear mandate to reduce emissions through market-based measures.²⁵ However, this request was not addressed by the Durban conference. Given that a second commitment period under the Kyoto Protocol commenced on 1 January 2013, a universal climate agreement is to be adopted by 2015 and implemented from 2020.²⁶ The new agreement may take the form of a protocol, 'another legal instrument' or 'an agreed outcome with legal force' under the UNFCCC applicable to all Parties.²⁷ Although there are different views and interpretations on these forms of agreement,²⁸ the agreement will still be a part of the UNFCCC regime and be subject to the regulatory principles of the UNFCCC. For this reason, it is less likely that the IMO's mandate and competence in regulating the GHG issue, including the regulatory principles and scope, would be substantially changed, although it is possible that this mandate could be explicitly identified or even slightly modified. Another possibility is that no agreement under the UNFCCC will be achieved before 2015. In this case, a number of scenarios, including the adoption of an agreement outside the UNFCCC, could occur. Accordingly the current

²² IMO Convention Art 68. This provision stipulates that the IMO may take over functions or obligations within its scope from any other international organizations by means of international agreements.

²³ But Hackmann asserts that this cooperation between the UNFCCC and the IMO is 'reciprocal exchange of information and a reciprocal participation in relevant meetings', and both institutions are independent in their decisions. Hackmann, *supra* note 20, at 95.

²⁴ See, e.g., Karim and Alam assert that the IMO's mandate 'is not subject to the UNFCCC or to its Kyoto Protocol'. Md. Saiful Karim and Shawkat Alam, 'Climate Change and Reduction of Emissions of Greenhouse Gases from Ships: An Appraisal' (2011) 1(1) *Asian Journal of International Law* 131-148, at 147-148.

²⁵ Kevin Cooper, 'Reducing Shipping Emissions: An Overview of Recent International Initiatives', 25 September 2012, available at <http://www.safety4sea.com/analysis/89/134/reducing-shipping-emissions->.

²⁶ UNFCCC, 'The Doha Climate Gateway', 2012, available at http://unfccc.int/key_steps/doha_climate_gateway/items/7389.php.

²⁷ *Establishment of An Ad Hoc Working Group on the Durban Platform for Enhanced Action*, UNFCCC Decision 1/CP.17, Doc FCCC/CP/2011/9/Add.1 (2011) at para 2.

²⁸ See, e.g., 'another legal instrument' could be an amendment under Article 15, a new or an amended annex under Article 16, an amendment to the Kyoto Protocol, or an implementation agreement similar to a protocol; 'an agreed outcome with legal force' could be unilateral declarations by Parties, or COP decisions. Xolisa Ngwadla, Achala C. Abeyasinghe and Adéyêmi Freitas, 'The 2015 Climate Agreement: Lessons from the Bali Road Map', 2012, available at <http://www.eurocapacity.org/downloads/2015ClimateAgreement.pdf>, at 7-8.

discussion on the IMO's mandate to regulate the GHG issue may also be significantly influenced by these developments.

The other view about the origin of the IMO's mandate is that the IMO gets its global mandate from the IMO Convention, the LOSC and IMO Resolution 8, but not from Article 2(2) of the Kyoto Protocol. This view is held by the Sub-Division for Legal Affairs of the IMO,²⁹ and some scholars.³⁰ According to this view, Articles 1(a) and 64 of the IMO Convention provide the IMO with a global mandate and global competence 'in the field of shipping and the effect of shipping on the marine environment',³¹ in particular in relation to 'technical matters of all kinds affecting shipping engaged in international trade'.³² Articles 211(1) and 212(3) of the LOSC request States Parties to 'establish global rules, standards, and recommended practices and procedures' to prevent, reduce and control atmospheric and vessel-source marine pollution. In particular, these actions shall be conducted through diplomatic conferences or a competent international organization (the IMO). Therefore, the LOSC defines flag, coastal and port State jurisdiction, while the IMO specifies how member State jurisdiction should be exercised to meet IMO safety and shipping anti-pollution regulations.³³ Furthermore, Resolution 8 on 'CO₂ emissions from ships' was adopted by the MARPOL Conference of the Parties in 1997. This resolution requested the IMO to start its work on the reduction of GHG emissions from ships and has therefore been regarded as a key legal document underpinning subsequent regulatory efforts by the IMO. In addition, those who take the view that attributes the IMO's mandate to these three sources exclude Article 2(2) of the Kyoto Protocol as a source of the IMO's mandate relating to the GHG issue. It is asserted that there has been no precedent for any IMO treaty instruments adopting a common but differentiated approach similar to that incorporated in the Kyoto Protocol.³⁴ This argument, however, runs counter to the legal basis for the first view on the IMO's mandate to regulate the GHG emissions issue. Generally an organization which receives and accepts a mandate under an international agreement cannot question principles incorporated in that agreement simply based on its own previous practice which is incompatible with such principles.

²⁹ IMO, *supra* note 16, at 28.

³⁰ See, e.g., Karim and Alam, *supra* note 24, at 147-148; Oberthür, *supra* note 11, at 195.

³¹ IMO Convention Art 64.

³² IMO Convention Art 1(a).

³³ *Implications of the United Nations Convention on the Law of the Sea for the International Maritime Organization*, Doc LEG/MISC.6 (10 September 2008) at 13.

³⁴ IMO, *supra* note 16, at 28.

From an international law perspective, the above two views both have their legal bases. There is no clear hierarchy between the Kyoto Protocol and IMO Convention and the LOSC on the issue and it is open to debate which rules should prevail if there is a conflict between these treaties.³⁵ For this reason, it might be appropriate to strike a compromise between the two views. It is clear that the IMO Convention and the LOSC provide the IMO with general competence to regulate GHG emissions from ships, while the Kyoto Protocol gives the IMO a specific mandate to regulate this matter. The two interpretations of the IMO's mandate are thus consistent and the IMO can utilise both these competences to regulate GHG emissions from international shipping.

An important implication of the above compromise interpretation is that principles incorporated in the Kyoto Protocol and the IMO Convention will also apply to the regulation of the GHG issue, namely, the 'Common but Differentiated Responsibility' (CBDR) principle which runs through the UNFCCC and its Kyoto Protocol,³⁶ and the 'No More Favourable Treatment' (NMFT) principle incorporated in all IMO treaties.³⁷ The CBDR principle requires both developed and developing States to contribute to addressing environmental problems, and imposes the primary responsibility on developed States due to their different historical contribution to the problems and the differentiated capability of developed and developing States. This principle was first explicitly formulated in Principle 7 of the 1992 Rio Declaration on Environment and Development,³⁸ and has been widely accepted and endorsed in many conventions and treaties, such as the 1992 Convention on Biological Diversity,³⁹ the 1992 UNFCCC and its Kyoto Protocol. The NMFT principle refers to 'port States enforcing applicable standards in a uniform manner to all ships in their ports, regardless of flag'.⁴⁰ Under the IMO Convention, Article 1(b) describes the 'removal of discriminatory action' as one of the purposes of the IMO, and Article 3 treats the 'normal processes of international shipping business' as a recommended way to deal with shipping-related matters. Indeed these two Articles provide a legal basis for the NMFT principle. The

³⁵ Since the Kyoto Protocol, IMO Convention and the LOSC vary extensively in their context and scope, Article 30 of the Vienna Convention on the Law of Treaties cannot apply to addressing conflicts between these treaties. Vienna Convention on the Law of Treaties, 23 May 1969, 8 ILM 679. A general discussion on this GHG issue has been conducted elsewhere by the author. Yubing Shi, 'The Challenge of Reducing Greenhouse Gas Emissions from International Shipping: Assessing the International Maritime Organization's Regulatory Response' (2012) *Yearbook of International Environmental Law* (in press).

³⁶ See, e.g., UNFCCC Preamble para 6, Arts 3(1), 4; Kyoto Protocol Art. 10.

³⁷ See, e.g., MARPOL 73/78 Art 5(4).

³⁸ Rio Declaration on Environment and Development, 14 June 1992, 31 ILM 874.

³⁹ Convention on Biological Diversity, 5 June 1992, 31 ILM 818, Art 20(4).

⁴⁰ Buhaug *et al.*, *supra* note 6, at 20.

term NMFT was included in MARPOL 73/78 and applies to all annexes to the Convention. To date this principle has been consistently applied without exception to all 53 IMO treaty instruments currently in existence.⁴¹ To attract more participation in the reduction of the GHG emissions from shipping by developing countries, incorporating the CBDR principle into the current GHG reduction regime in this way represents a practical compromise.

How to incorporate both the CBDR and NMFT principles into the IMO's regulation of shipping GHG emissions is a difficult issue. To address this issue, two assumptions can be made. One is that the CBDR principle is State-based whereas the NMFT principle is ship-based, so there is no irreconcilable conflict between them. The other is that common responsibility and differentiated responsibility are two core elements of the CBDR principle and common responsibility has been incorporated into this issue via the NMFT principle,⁴² so the key to applying the CBDR principle is effective incorporation of differentiated responsibility. There are different interpretations of the implications of the CBDR principle, in particular the meaning of 'differentiated responsibility'. Due to the complexity of the issue of GHG emissions from shipping, the adoption of a broad interpretation of differentiated treatment would be practical. Based on current international environmental agreements, 'differentiated responsibility' consists of three categories, namely differentiated central obligations, differentiated implementation arrangements, and the granting of assistance, including financial and technological assistance.⁴³ Accordingly, the CBDR principle could be applied to the GHG issue in different ways depending on the nature of various measures for addressing this issue. Measures dealing with shipping GHG emissions within the IMO can be classified into three categories: technical measures, operational measures, and market-based measures (MBMs). In terms of technical and operational measures adopted by the IMO in 2011, strengthening effective transfer of technologies and financial assistance from developed countries to developing countries would constitute an application of the CBDR principle to this issue as indicated in the third category of differentiated responsibility.⁴⁴ As a requirement of the NMFT principle, port States exercise uniform control on all ships calling at their ports through participation in various Memoranda of Understanding (MOUs) on Port State

⁴¹ IMO, 'Status of Conventions: List of IMO Conventions and Their Amendments', 16 May 2013, available at <http://www.imo.org/About/Conventions/StatusOfConventions/Pages/Default.aspx>.

⁴² MARPOL 73/78 Art 5(4).

⁴³ Lavanya Rajamani, *Differential Treatment in International Environmental Law* (Oxford University Press, Oxford, 2006) at 191.

⁴⁴ Regulation 23 of the amended MARPOL Annex VI in 2011 stipulates the transfer of technology and financial assistance; however, this regulation is still very weak and thus needs to be strengthened. A detailed discussion on this issue is provided in the following section.

Control.⁴⁵ For this reason, it would be difficult to implement differentiated central obligations as indicated in the first category of differentiated responsibility with regard to the issue of GHG emissions from shipping.⁴⁶ Indeed this category of differentiated responsibility is often claimed by developing countries as the main form of the CBDR principle.⁴⁷ Meanwhile, the difficulty in applying the first category of differentiated responsibility to technical and operational GHG-reduction measures is also underpinned by the existence of Flag-of-Convenience (FOC) States.⁴⁸ Assume that developing flag States are exempt from complying with IMO GHG-reduction regulations, as implied by the first category of the CBDR principle; in these circumstances, shipowners from developed countries would probably opt for flagging their ships under these FOC States to avoid the stringent regulations and increased cost in their own States flowing from compliance with these regulations. As of 1 January 2012, ships registered in developing countries (including the ten major FOC countries) accounted for 83.03% of the world fleet by deadweight tonnage (dwt), which if combined with the FOC would render these GHG-reduction measures barely effective.⁴⁹ Theoretically a phased-in application of the CBDR principle to this GHG issue as indicated in the second category of differentiated responsibility would be feasible.⁵⁰ Indeed during the discussions within the IMO, some developing countries proposed this approach to postpone the application of

⁴⁵ Port State Control refers to 'the inspection of foreign ships in national ports to verify that the condition of the ship and its equipment comply with the requirements of international regulations and that the ship is manned and operated in compliance with these rules'. With the support of the IMO, to date various regional port State control organizations and agreements on Port State Control, namely the MOUs, have been signed to cover all of the world's oceans. IMO, *Port State Control*, available at http://www.imo.org/blast/mainframe.asp?topic_id=159.

⁴⁶ Some States proposed that combining both principles could be achieved by differentiating commitments for developed and developing countries based on certain routes of shipping without relying on the nationality of ships. However, due to various regional MOUs on port State control, in practice this proposal is not feasible. Miola *et al.*, *supra* note 19, at 5492.

⁴⁷ For instance, when China and India mentioned the application of the CBDR principle to this issue, they generally explained that only developed countries should commit themselves to compulsory GHG emission reductions from international shipping, while energy-efficiency measures should be voluntary for developing countries. *Report of the Marine Environment Protection Committee on Its Sixty-First Session*, MEPC 61st Session, Agenda Item 24, Doc MEPC 61/24 (6 October 2010) Annex 3, at 1-3.

⁴⁸ To date there is no uniform definition of the FOC. For example, Egiyan defines the FOC as 'national flags of those States in which shipowners register their ships so as to avoid: (a) financial obligations; and (b) the nature and conditions of shipping were their vessels registered in their own countries'; Griffin defines the FOC as 'flags of certain countries whose laws make it easy and attractive for ships owned by foreign nationals or companies to fly these flags'. G. S. Egiyan, 'Flag of Convenience' or 'Open Registration' of Ships' (1990) 14(2) *Marine Policy* 106-111, at 107; Andrew Griffin, 'MARPOL 73/78 and Vessel Pollution: A Glass Half Full or Half Empty?' (1994) 1(2) *Indiana Journal of Global Legal Studies* 489-513, at 506.

⁴⁹ United Nations Conference on Trade and Development (UNCTAD), 'Review of Maritime Transport', 2012, available at http://unctad.org/en/PublicationsLibrary/rmt2012_en.pdf, at 46.

⁵⁰ See Miola *et al.*, *supra* note 19, at 5492. For example, it was proposed that a three-phased approach could be employed to address this GHG issue, namely the set-up of a scheme for voluntary participation by the countries and ports as the first step, a scheme that covers all traffic in the ports of UNFCCC Annex I countries as the second step, and finally this scheme would be extended to cover all countries on a global level.

relevant regulations to developing countries.⁵¹ However, due to the concern for the FOC and the urgency of addressing this issue against the backdrop of global climate change, this option was not adopted by the IMO.

With respect to MBMs more options are available to incorporate the two principles. One possibility is to apply the CBDR principle to the issue by allocating differentiated central obligations to developed countries and developing countries so as to ensure ‘no net incidence on developing countries’,⁵² as indicated in the first category of differentiated responsibility. Currently some proposed MBMs incorporating both principles have been submitted to the IMO for further discussion.⁵³ This approach has also been supported by the UNFCCC Secretariat,⁵⁴ as well as by other countries and international organizations.⁵⁵ Since these MBM proposals also apply the NMFT principle, the effectiveness of these measures is unlikely be influenced by FOC States.

Another potential implication of any compromise reached on the application of both the NMFT and CBDR principles to the issue of GHG emissions from shipping could be that the IMO is the sole competent international organization for regulating technical and operational measures for ships in this context, but that its role in regulating the relevant MBMs depends upon the nature of specific measures and could be shared with other competent international organizations in this field. To date across the three types of GHG-reduction measures, the technical and operational measures have been adopted by the IMO alone. However, the MBMs currently being discussed within the IMO could be considered as being beyond the competence that the IMO has received from the IMO Convention and the LOSC. This is

⁵¹ *Comments on the Proposed Mandatory Energy Efficiency Regulations*, submitted by China, Saudi Arabia and South Africa, MEPC 62nd Session, Agenda Item 5, Doc MEPC 62/5/10 (5 May 2011) at para 14. In this document, the co-sponsors proposed a draft text which provided that, ‘the regulations of EEDI and SEEMP shall apply to ships of developing countries five years after the date of their entry into force’; or ‘shall be phased in over a period of eight years for ships built for developing countries and during the period of phasing in, developing countries shall only apply 50% of the required EEDI reduction rate’.

⁵² *Ensuring No Net Incidence on Developing Countries from A Global Maritime Market-Based Mechanism*, submitted by World Wide Fund for Nature (WWF), MEPC 63rd Session, Agenda Item 5, Doc MEPC 63/5/6 (22 December 2011).

⁵³ See, e.g., the Rebate Mechanism proposed by the International Union for Conservation of Nature (IUCN) has incorporated the CBDR and NMFT principles.

⁵⁴ *Report of the Marine Environment Protection Committee on Its Sixty-First Session*, MEPC 61st Session, Agenda Item 24, MEPC 61/24 (6 October 2010) Annex 6, at 2. At the 61st MEPC meeting, the UNFCCC Secretariat made a statement, which asserts that ‘[w]e have to commit ourselves to work on a solution which respects both principles, and allows each treaty regime to retain the integrity of its principles and practices’.

⁵⁵ See, e.g., Malaysia, Ethiopia and WWF support the adoption of both principles in addressing the GHG issue. *Report of the Marine Environment Protection Committee on Its Sixtieth Session*, MEPC 60th Session, Agenda Item 22, Doc MEPC 60/22 (12 April 2010) Annex 4, at 10; *Report of the Marine Environment Protection Committee on Its Sixty-First Session*, MEPC 61st Session, Agenda Item 24, Doc MEPC 61/24 (6 October 2010) Annex 3, at 11; *Ensuring No Net Incidence on Developing Countries from A Global Maritime Market-Based Mechanism*, submitted by WWF, MEPC 63rd Session, Agenda Item 5, Doc MEPC 63/5/6 (22 December 2011).

because some of these measures involve global emissions reduction from different sectors,⁵⁶ and also go beyond the scope of technical matters relating to shipping. Indeed paragraphs (b) and (c) of Article 1 of the IMO Convention give the IMO the competence to regulate commercial aspects of shipping aiming to remove discriminatory and ‘unfair restrictive practices’. However, due to the potential threat to the practice of free enterprise through the IMO’s regulating the commercial aspects of shipping, many States have united to limit the purposes of the IMO to technical aspects.⁵⁷ To date the IMO has never been allowed to exercise its full economic mandate.⁵⁸ Theoretically speaking, the mandate that the IMO has from the Kyoto Protocol also gives it the competence for such work. However, as mentioned earlier, the vagueness of this mandate leaves room for further interpretation. Therefore, it is possible that in the future in order to regulate MBMs involving out-of-sector emissions reduction and international trade, the IMO would collaborate with other international organizations, such as the UNFCCC or the World Trade Organization, due to their broader competence or expertise in international trade.

The IMO’s Regulatory Efforts in Reducing GHG Emissions from Ships

IMO started its work on the reduction of GHG emissions from ships in 1997 when it adopted Resolution 8 on ‘CO₂ emissions from ships’.⁵⁹ Since then, numerous discussions and negotiations on this issue have been held within the organization, in particular within the Marine Environment Protection Committee (MEPC) of the IMO. However, it was not until July 2011 that the first legally binding agreement on regulating the GHG issue was adopted. This agreement takes the form of an amendment to MARPOL Annex VI. It regulates the GHG issue from technical and operational perspectives. This section provides a general introduction to and assessment of the technical and operational measures adopted by the IMO,

⁵⁶ The third Intersessional Meeting of the Working Group on GHG Emissions from Ships grouped the MBMs proposals into two categories, namely ‘focus on in-sector’ and ‘in-sector and out-of-sector’. Based on this grouping, current MBM proposals involving out-of-sector emission reductions are the International GHG Fund, the Emissions Trading Scheme, the Port State Levy and the Rebate Mechanism. *Report of the Third Intersessional Meeting of the Working Group on Greenhouse Gas Emissions from Ships*, note by the Secretariat, MEPC 62nd Session, Agenda Item 5, Doc MEPC 62/5/1 (8 April 2011) Annex 3.

⁵⁷ G. P. Pamborides, *International Shipping Law: Legislation and Enforcement* (Kluwer Law International, Leiden, 1999) at 83.

⁵⁸ Although the Facilitation Committee of the IMO has regulated some matters involving elements of trade, the purposes of these regulations are generally to be achieved by technical means. See also Alan Khee-Jin Tan, *Vessel-source Marine Pollution: the Law and Politics of International Regulation* (Cambridge University Press, Cambridge, 2006) at 75.

⁵⁹ IMO, *supra* note 16, at 3. Resolution 8 requests the IMO to undertake a study on GHG emissions from ships and to consider feasible emissions reduction strategies.

as well as the proposed MBMs currently being discussed within the organization.

Technical and Operational Measures

On 15 July 2011, the 62nd MEPC meeting adopted the revised MARPOL Annex VI. Through adding a new Chapter 4 to Annex VI on Regulation on Energy Efficiency for Ships, the amendment makes mandatory the Energy Efficiency Design Index (EEDI) for new ships, and the Ship Energy Efficiency Management Plan (SEEMP) for all ships. As the main technical measure, the EEDI provides a specific figure representing a minimum energy-efficiency level for certain ship types and size segments, expressed in grams of CO₂ per ship's capacity-nautical mile (e.g., g/tonne nautical mile). The lower EEDI indicates a better energy efficiency of ship design. Regulations 20 and 21 divide it into Attained EEDI and Required EEDI,⁶⁰ and both of them are calculated by formulae based on the technical design parameters for a given ship.⁶¹ Based on the formula, the Attained EEDI should be less than or equal to the Required EEDI.⁶² The EEDI is a 'non-prescriptive and performance-based' mechanism,⁶³ according to which the ship designers and shipbuilders are free to choose the most cost-efficient technological solutions for the ship once the minimum energy-efficiency level required by the EEDI is achieved. A strong incentive is thus provided for the shipping industry to improve ship fuel consumption with updated technical developments. However, this mechanism is not a commercial incentive scheme. The EEDI is basically a 'hard rule', based on which substandard ships are not allowed to trade, although the way to meet this standard is left to the shipping industry. Furthermore, as a political compromise between developing and developed countries,⁶⁴ Regulations 19.4 and 19.5 provide that for some countries the actual commencement date of the EEDI may be postponed to six-and-a-half years from 1 January 2013.⁶⁵ This waiver clause applies to all flag States which prefer to give

⁶⁰ Attained EEDI refers to the EEDI value achieved by an individual ship in accordance with Regulation 20 of Chapter 4, MARPOL Annex VI; Required EEDI is the maximum value of attained EEDI that is allowed by Regulation 21 of Chapter 4 for the specific ship type and size. MARPOL Annex VI (2011) Regs 2.36-37.

⁶¹ The formula of Required EEDI is indicated by Regulation 21 of MARPOL Annex VI; the formula of Attained EEDI is provided by its guidelines. *2012 Guidelines on the Method of Calculation of the Attained Energy Efficiency Design Index (EEDI) for New Ships*, Resolution MEPC.212(63), Doc MEPC 63/23 Annex 8 (2 March 2012) Art 2.

⁶² MARPOL Annex VI (2011) Reg 21.1.3.

⁶³ IMO, *supra* note 16, at 12.

⁶⁴ See, e.g., *Report of the Marine Environment Protection Committee on Its Sixty-First Session*, MEPC 61st Session, Agenda Item 24, Doc MEPC 61/24 (6 October 2010) Secs 5.32-5.33.

⁶⁵ This calculation is based on the delivery date of new ships. New ships in certain flag States will also be exempt from complying with the EEDI until 1 January 2017 based on their contract date. MARPOL Annex VI (2011) Reg 19.5.2.

a long lead time for phasing in the EEDI to ships registered under their flags. Due to technical difficulties, in July 2011 the EEDI only applied to seven ship types and excluded the application of ships with diesel-electric propulsion, turbine propulsion and hybrid propulsion,⁶⁶ but in May 2013 the application of the EEDI was approved by the 65th MEPC meeting to cover more ship types.⁶⁷

The SEEMP is an operational measure regulated through amendments to MARPOL Annex VI in 2011. It constitutes the other component of the energy-efficiency measures in addition to the EEDI. As a ship-specific energy management plan, the SEEMP provides a flexible mechanism for shipowners and ship operators to monitor ship and fleet efficiency performance over time in a cost-effective manner. The main objective of the SEEMP is to minimise shipping GHG emissions by means of reducing fuel consumption,⁶⁸ while the Energy Efficiency Operational Indicator (EEOI) is often utilised as a monitoring tool and to establish benchmarks related to ships' energy efficiency.⁶⁹ In contrast to the EEDI, the SEEMP applies to all existing and new ships of 400 gross tonnage and above. As a 'ship-specific' plan, the content of the SEEMP for a specific ship does not need approval by the flag State.⁷⁰

The newly adopted technical and operational measures by the IMO are a significant advance in regulating GHG emissions from ships. The adoption of these measures was a breakthrough in the lengthy deadlock of the negotiations between various countries on shipping GHG emissions within the IMO, and also confirmed the leading role of the IMO in regulating this issue.⁷¹ Since the EEDI and SEEMP regulations only entered into force on 1 January 2013, in practice compliance with these regulations by various States and their emissions-reduction potential cannot yet be evaluated. However, an IMO Assessment Report has concluded through scenario modelling that the estimated CO₂ emissions reduction due to combined EEDI and SEEMP will lead to significant emission reductions, if projected growth

⁶⁶ MARPOL Annex VI (2011) Regs 21, Tables 1,2; 19.3.

⁶⁷ IMO, 'IMO Marine Environment Protection Committee 65th Session Pushes Forward with Energy-Efficiency Implementation', 21 May 2013, available at <http://www.imo.org/MediaCentre/PressBriefings/Pages/18-MEPC65ENDS.aspx>.

⁶⁸ Zabi Bazari and Tore Longva, 'Assessment of IMO Mandated Energy Efficiency Measures for International Shipping', 31 October 2011, Doc MEPC 63/INF.2, Annex, Appendix 4, at 12.

⁶⁹ The EEOI can be applied to almost all new and existing ships, and is generally used to measure ships energy efficiency for each voyage or over a certain period of time. It enables ship operators to measure the fuel efficiency of a ship in operation and to gauge the effect of any changes in operation. Currently the EEOI is circulated to encourage shipowners and ship operators to use it on a voluntary basis.

⁷⁰ *Report of the Outcomes of the Intersessional Meeting of the Working Group on Energy Efficiency Measures for Ships*, MEPC 61st Session, Agenda Item 5, Doc MEPC 61/5/3 (7 July 2010) at para 2.24.

⁷¹ IMO, *supra* note 16, at para 99.

in world trade is not taken into consideration.⁷² Both the EEDI and the SEEMP highlight the importance of safe navigation of ships while also improving the energy efficiency of shipping.⁷³ Through this regulation, the EEDI and SEEMP requirements are linked to other IMO treaties on maritime safety and security, such as the 1972 Convention on the International Regulations for Preventing Collisions at Sea (COLREG).⁷⁴ This regulation provides a technological threshold for shipowners and ship operators. Additionally, the ‘freedom from prescription’ approach employed by both the EEDI and SEEMP has been supported by the global shipping industry, which to a significant extent will promote the implementation of these measures by the industry.⁷⁵

Notwithstanding the benefits of these technical and operational measures in reducing GHG emissions, some deficiencies remain and create challenges for future implementation of these measures. First of all, the effectiveness of these measures needs to be improved and strengthened. Regarding the EEDI, it only applies to certain types of new ships (covering 70% of emissions from new ships), and existing ships are not covered by the EEDI. This situation, if combined with the lenient timetable as introduced in the regulation and the projected growth in international trade,⁷⁶ would significantly reduce the effectiveness of the EEDI. The 65th MEPC meeting in May 2013 approved draft amendments to MARPOL Annex VI, with a view to adoption at the 66th MEPC meeting in March 2014, to extend the application of the EEDI to cover more ship types.⁷⁷ However, not all ship types and sizes have been included in the EEDI coverage. Meanwhile, the 65th MEPC meeting agreed to exempt cargo ships with ice-breaking capability from the EEDI requirements, which may further reduce the effectiveness of the EEDI. As to the SEEMP, the lack of reduction target-setting and monitoring weakens the effect of this measure.⁷⁸ This deficiency needs to be rectified by means of the provision of other incentives.⁷⁹ As a management plan, the SEEMP actually

⁷² Bazari and Longva, *supra* note 68, executive summary, at 8.

⁷³ See, e.g., MARPOL Annex VI (2011) Reg 21.5; *2012 Guidelines for the Development of A Ship Energy Efficiency Management Plan (SEEMP)*, Resolution MEPC.213(63), Doc MEPC 63/23 Annex 9 (2 March 2012) Reg 3.7.

⁷⁴ Convention on the International Regulations for Preventing Collisions at Sea, 20 October 1972, UKTS 77.

⁷⁵ See, e.g., at the 57th MEPC meeting, the International Chamber of Shipping (ICS) proposed five principles for guiding the amendment of MARPOL Annex VI, and one of them is that the ship operators should have the freedom to choose their compliance mechanism so as to protect the shipping industry from monopolistic situations. It treated the ‘freedom from prescription’ as the most effective means for stimulating future innovation. *The Revision of MARPOL Annex VI*, submitted by the International Chamber of Shipping (ICS), MEPC 57th Session, Agenda Item 4, Doc MEPC 57/4/28 (13 February 2008) at para 5.3.

⁷⁶ MARPOL Annex VI (2011) Reg 21.1-2, Table 1.

⁷⁷ IMO, *supra* note 65.

⁷⁸ Bazari and Longva, *supra* note 68, executive summary, at 7.

⁷⁹ *Ibid.*, Annex, at 15. The report lists some of the drivers for more effective use of the SEEMP, including high fuel and

entails no reduction requirement at all. To improve the effectiveness of the SEEMP, an IMO Assessment Report recommends that EEOI should be encouraged or mandated as a performance indicator for the SEEMP rather than maintaining its current voluntary status.⁸⁰

The lack of sufficient support from major developing countries also imposes challenges for the future implementation of the EEDI and SEEMP measures. Unlike many IMO treaties adopted by consensus, the amended MARPOL Annex VI was adopted by a majority of the member States present and voting based on Rule 27 of the Rules of Procedures of the MEPC.⁸¹ Some developing countries, such as Brazil, China, India, Saudi Arabia and the Bolivarian Republic of Venezuela, made statements opposing these amendments after they were adopted.⁸² To assist in the implementation of the EEDI and SEEMP measures, the 63rd MEPC meeting in March 2012 adopted four important guidelines.⁸³ According to the amendments and their guidelines, a four-phase implementation and two-stage survey and verification process of the EEDI has been put in place.⁸⁴ These arrangements give the shipping industry time to conduct necessary preparations, such as technology research and development and staff training, to ensure the smooth implementation of the EEDI. Furthermore, the amendments now provide for a four-step approach through the SEEMP to improve a ship's energy efficiency, namely planning, implementation, monitoring, and self-evaluation and improvement.⁸⁵ However, the main reason behind the opposition to these amendments from large developing countries is the lack of incorporation of the CBDR principle in the EEDI and SEEMP.⁸⁶ As discussed in the previous section, strengthening

carbon prices, more vigorous awareness building and cultural change on board ships, more collaboration between industry stakeholders and a solution to the issue of split incentives, and effective monitoring of SEEMP implementation via rigorous audits and reviews.

⁸⁰ Ibid, Annex, at 7.

⁸¹ IMO, *Basic Documents Volume I* (International Maritime Organization, London, 2010) at 113. The amendment was adopted by a vote of 49 parties in favour, 5 against, with 2 abstentions and 3 absences. The 5 countries voting against were Brazil, Chile, China, Kuwait, and Saudi Arabia. India was not a Party to MARPOL at the time of voting in July 2011, but has become a formal Party to MARPOL and Annex VI since 23 February 2012.

⁸² *Report of the Marine Environment Protection Committee on Its Sixty-Second Session*, MEPC 62nd Session, Agenda Item 24, Doc MEPC 62/24 (26 July 2011) Annex 20.

⁸³ These four guidelines are: *2012 Guidelines on the Method of Calculation of the Attained Energy Efficiency Design Index for New Ships* (EEDI Calculation Guidelines), Resolution MEPC.212(63), Doc MEPC 63/23 Annex 8 (2 March 2012); *2012 Guidelines for the Development of A Ship Energy Efficiency Management Plan* (SEEMP Guidelines), Resolution MEPC.213(63), Doc MEPC 63/23 Annex 9 (2 March 2012); *2012 Guidelines on Survey and Certification of the Energy Efficiency Design Index* (EEDI Survey and Certification Guidelines), Resolution MEPC.214(63), Doc MEPC 63/23/Add.1 Annex 10 (2 March 2012); *Guidelines for Calculation of Reference Lines for Use with the Energy Efficiency Design Index* (EEDI Reference Lines Guidelines), Resolution MEPC.215(63), Doc MEPC 63/23/Add.1 Annex 11 (2 March 2012).

⁸⁴ MARPOL Annex VI (2011) Regs 21, 5-9; EEDI Survey and Certification Guidelines Reg 4.1.1.

⁸⁵ SEEMP Guidelines Reg 4.

⁸⁶ *Report of the Marine Environment Protection Committee on Its Sixty-Second Session*, MEPC 62nd Session, Agenda Item 24, Doc MEPC 62/24 (26 July 2011) Annex 20.

effective transfer of technologies and financial assistance from developed countries to developing countries could constitute an application of the CBDR principle to the GHG issue. Regulation 23 of MARPOL Annex VI requires developed countries to promote the development and transfer of technology to developing countries in cooperation with other countries. However, this provision does not impose ‘concrete obligations’ on any State,⁸⁷ and stipulates that this technical cooperation is subject to national laws, regulations and policies.⁸⁸ It is likely that the transfer of technology from developed countries to developing countries will not be straightforward due to various domestic regulations on intellectual property protection in developed countries.⁸⁹ In developed countries, most energy-efficient technologies are owned by private shipping companies, so how to achieve the successful transfer of technologies in a cost-effective manner remains a difficult question.⁹⁰

To address the criticism from developing countries and triggered by a proposal submitted by South Africa,⁹¹ the 65th MEPC meeting in May 2013 adopted a MEPC Resolution on Promotion of Technical Co-operation and Transfer of Technology relating to the Improvement of Energy Efficiency of Ships. This Resolution explicitly recognises both the NMFT principle and the CBDR principle,⁹² and requests the Organization to provide technical assistance and funding for developing countries.⁹³ According to this Resolution, an expert working group will be established to facilitate the transfer of technology for ships.⁹⁴ However, this Resolution still does not impose concrete obligations to transfer such technology for any State, but rather underscores respect for intellectual property rights.⁹⁵ The protection of intellectual property rights has often been regarded as a formidable obstacle to

⁸⁷ Harrison, *supra* note 21, at 16.

⁸⁸ MARPOL Annex VI (2011) Reg 23.2.

⁸⁹ Harrison, *supra* note 21, at 17.

⁹⁰ This question does not occur in the International Convention for the Control and Management of Ships’ Ballast Water and Sediments (BWM Convention) adopted by the IMO in 2004, where there are similar technological standards. This is because the IMO was not mandated by the Kyoto Protocol to adopt the BWM Convention and accordingly only the NMFT principle applies to this matter instead of the CBDR principle. Therefore, Article 13 of the BWM Convention only stipulates technical assistance and co-operation generally rather than facilitating the transfer of technology from developed countries to developing countries with the recognition of the CBDR principle. International Convention for the Control and Management of Ships’ Ballast Water and Sediments, 13 February 2004, IMO Doc BWM/CONF/36.

⁹¹ See, e.g., *Report of the Marine Environment Protection Committee on Its Sixty-First Session*, MEPC 61st Session, Agenda Item 24, Doc MEPC 61/24 (6 October 2010) Annex 5, at 1; *Amendment to Draft Compromise MEPC Resolution on Promotion of Technical Co-operation and Transfer of Technology relating to the Improvement of Energy Efficiency of Ships*, submitted by South Africa, MEPC 65th Session, Agenda Item 4, Doc MEPC 65/4/33/Corr.1 (16 May 2013).

⁹² *Promotion of Technical Co-operation and Transfer of Technology relating to the Improvement of Energy Efficiency of Ships* (Resolution MEPC.229(65)), Doc Resolution MEPC.229(65) (17 May 2013) Preamble paras 3-4.

⁹³ Resolution MEPC.229(65) Art 1.

⁹⁴ Resolution MEPC.229(65) Art 3.

⁹⁵ Resolution MEPC.229(65) Art 4.

the transfer of technologies,⁹⁶ which, if combined with the non-binding nature of a Resolution, would make the implementation of this Resolution by developed countries difficult. Therefore it appears that a market-based approach to technology acquisition might be a better option for developing countries. Indeed Article 66(2) of the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS)⁹⁷ requires developed country parties to 'provide incentives to enterprises and institutions in their territories for the purpose of promoting and encouraging technology transfer to least developed country members in order to enable them to create a sound and viable technological base'. However, research indicates that even based on comparatively lax criteria, only 22% of reported initiatives by developed countries fulfilled Article 66(2).⁹⁸ Accordingly this mechanism has been the subject of a number of criticisms for its lack of effectiveness in transferring technologies from developed countries to developing countries.⁹⁹ Among many reasons behind this lack of effectiveness,¹⁰⁰ insufficient financial incentive is one of the key factors. For this reason, the establishment of a global technology acquisition fund¹⁰¹ financed by developed countries, either within the shipping industry or under a broader UNFCCC regime, might contribute to addressing this problem. Alternatively this fund could also be linked to the MBM proposal on the International GHG Fund. However, it remains unclear whether this proposal is feasible and cost-effective, and to what extent it would be accepted by most countries.

MBMs

⁹⁶ Nitya Nanda and Nidhi Srivastava, 'Clean Technology Transfer and Intellectual Property Rights' (2009) 9(3) *Sustainable Development Law & Policy* 42-69, at 46.

⁹⁷ Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS), Annex 1C of the Marrakesh Agreement Establishing the World Trade Organization, 15 April 1994, 33 ILM 1125.

⁹⁸ Meanwhile the commencement year for developing countries that are party to the WTO to adopt TRIPS has been postponed from 2006 to 2013, and even to 2016 for some countries as it relates to protections for pharmaceuticals. It is thus difficult to get relevant data on the TRIPS-based transfer of technologies from developing countries. Amanda Watson, 'Does TRIPS Increase Technology Transfer to the Developing World? The Empirical Evidence' (2011) 20(3) *Information & Communications Technology Law* 253-278, at 271,273.

⁹⁹ See, e.g., Wei Guo, 'The TRIPS Agreement Does Little to Promote the Development of Technology Transfer to Developing Countries' (2009) 3(3) *Management Science and Engineering* 20-27; Nanda and Srivastava, *supra* note 96, at 46. But Navraj Singh asserts that intellectual property rights protection is only a relatively peripheral factor contributing to the ineffectiveness of climate technology transfer. Ghaleigh Navraj Singh, 'Barriers to Climate Technology Transfer - The Chimera of Intellectual Property Rights' (2011) 5(2) *Carbon & Climate Law Review: CCLR* 220-233, at 233.

¹⁰⁰ These reasons include the lack of financial means by developing countries, lack of intellectual property rights (IPR) protection in developing countries, monopoly created by IPR-based market power, and so on. Nanda and Srivastava, *supra* note 96, at 43-44; Navraj Singh, *supra* note 99, at 229-231.

¹⁰¹ Nanda and Srivastava, *supra* note 96, at 46.

MBMs are one of the main tools of environmental policy,¹⁰² and have been employed by many countries to regulate adverse environmental impacts resulting from anthropogenic activities. The objective of MBMs is to address the market failure of ‘environmental externalities’.¹⁰³ This is achieved either by ‘incorporating the external cost of production or consumption activities through taxes or charges on processes or products’, or by ‘creating property rights and facilitating the establishment of a proxy market for the use of environmental services’.¹⁰⁴ Where MBMs are designed to internalise the external cost of GHG emissions from international shipping by means of a GHG Fund or different emission trading schemes, they will provide the polluters (shipowners and ship operators) with an economic incentive to reduce their GHG emissions.¹⁰⁵ In this sense, these types of MBMs are also consistent with the polluter-pays principle.¹⁰⁶

MBMs have been controversial since they were formally put forward in the ‘2000 IMO GHG Study’. The IMO has endeavoured to promote MBMs by enhancing understanding of them through publishing various reports.¹⁰⁷ Due to the possible negative impact of MBMs on their shipping industries, many developing countries oppose the use of MBMs in tackling shipping GHG emissions.¹⁰⁸ However, it is anticipated that MBMs will in time be adopted by the IMO or other international institutions to reduce GHG emissions from ships. First, recent research indicates that using the EEDI and SEEMP alone will not achieve absolute emission reduction, due to projected growth in world trade.¹⁰⁹ While there is still room for improvement on current energy-efficiency measures and relevant work is being conducted

¹⁰² Environmental policies are often classified as command-and-control, market-based, education, provision of information, and voluntary measures. Thomas Dietz and Paul C. Stern, ‘Exploring New Tools for Environmental Protection’ in Thomas Dietz and Paul C. Stern (eds), *New Tools for Environmental Protection: Education, Information, and Voluntary Measures* (National Academies Press, Washington, 2002) at 4.

¹⁰³ Environmental externalities ‘refer to the economic concept of uncompensated environmental effects of production and consumption that affect consumer utility and enterprise cost outside the market mechanism’. OECD, ‘Environmental Externalities’, 4 March 2003, available at <http://stats.oecd.org/glossary/detail.asp?ID=824>.

¹⁰⁴ OECD, ‘Market-based Instruments’, 23 July 2007, available at <http://stats.oecd.org/glossary/detail.asp?ID=7214>.

¹⁰⁵ Generally the shipping industry responds quickly to economic instruments and the associated change in transportation costs, and registration with FOC States by most of the world shipping fleets is an example. See Garyfalia Nikolakaki, ‘Economic Incentives for Maritime Shipping relating to Climate Protection’ (2013) 12(1) *WMU Journal of Maritime Affairs* 17-39, at 20.

¹⁰⁶ Harilaos N. Psaraftis, ‘Market-based Measures for Greenhouse Gas Emissions from Ships: A Review’ (2012) 11(2) *WMU Journal of Maritime Affairs* 211-232, at 213.

¹⁰⁷ To date some IMO-commissioned reports have been published, including the 2000 IMO GHG Study, 2009 Second IMO GHG Study, 2009 Scientific Study on International Shipping and Market-based Instruments, and 2010 Feasibility and Impact Assessment Report. Some IMO-sponsored reports are under way, such as an update of the 2009 GHG Emissions Estimate, and a report on possible impacts on consumers and industries in developing countries.

¹⁰⁸ See, e.g., *Uncertainties and Problems in Market-based Measures*, submitted by China and India, MEPC 61st Session, Agenda Item 5, Doc MEPC 61/5/24 (5 August 2010).

¹⁰⁹ Bazari and Longva, *supra* note 68, executive summary, at 8.

within the IMO, a technical breakthrough is unlikely to be achieved soon, given the intricacies of ship types and shipping features. Currently global emissions are ‘considerably higher’ than the level consistent with the 2° Celsius target for reduction in global warming to be achieved in 2020, and this trend continues.¹¹⁰ Under the circumstances, it might be a better choice for the international shipping industry to explore more options rather than waiting for the effects of applying energy-efficiency measures to appear. Second, as discussed earlier, from an international law perspective, it is logical to apply both the CBDR and NMFT principles in future MBMs, and proposals applying the principles have been submitted to the IMO by different countries and non-governmental organizations.¹¹¹ As shown from the comments by some developing countries, the core debate within the MEPC centres on the CBDR principle not being reflected in many MBM proposals. Once this problem is addressed, it may be possible to adopt MBMs acceptable to most countries.

To date various MBM proposals have been discussed and debated within the IMO and further modified by relevant countries and organizations. Currently seven types of MBM options are available. They are:

- GHG Fund, one option was proposed by Cyprus, Denmark, the Marshall Islands, Nigeria and the International Parcel Tankers Association (IPTA), and the other option was proposed by the Clean Shipping Coalition (CSC);¹¹²
- Port State Levy, proposed by Jamaica;¹¹³
- Efficiency Incentive Scheme (EIS), proposed by Japan and the World Shipping Council (WSC);¹¹⁴

¹¹⁰ United Nations Environment Programme (UNEP), 'The Emissions Gap Report 2012: A UNEP Synthesis Report', November 2012, available at <http://www.unep.org/pdf/2012gapreport.pdf>, executive summary, at 1. The 2° Celsius target refers to the target of limiting an increase of global mean surface temperature warming by no more than 2° Celsius relative to pre-industrial temperatures by 2100. Joeri Rogelj, William Hare, Jason Lowe, Detlef P. van Vuuren, Keywan Riahi, Ben Matthews, Tatsuya Hanaoka, Kejun Jiang and Malte Meinshausen, 'Emission Pathways Consistent with a 2°C Global Temperature Limit' (2011) 1(8) *Nature Climate Change* 413-418, at 413.

¹¹¹ For example, WWF suggested that a MBM that is both global and differentiated was possible to develop, incorporating both the CBDR and the NMFT principles simultaneously, and it also put forward a specific revenue allocation scheme for different countries. *Benefits and Possible Adverse Impacts of Market-based Instruments*, submitted by WWF, MEPC 58th Session, Agenda Item 4, Doc MEPC 58/4/39 (15 August 2008). This approach was also adopted by the Scientific Study on International Shipping and Market-based Instruments, a study led by the University of Cambridge in partnership with Cambridge Econometrics, MARINTEK, Manchester Metropolitan University, and Deutsches Zentrum für Luft-und Raumfahrt e.V. *Scientific Study on International Shipping and Market-based Instruments*, MEPC 60th Session, Agenda Item 4, Doc MEPC 60/INF.21 (15 January 2010).

¹¹² This proposal is to establish a global reduction target for international shipping, set by either UNFCCC or IMO. Emissions above the target line would be offset largely by purchasing approved emission reduction credits. The offsetting activities would be financed by a contribution paid by ships on every tonne of bunker fuel purchased.

¹¹³ This proposal aims to levy a uniform emissions charge on all vessels calling at their port, based on the amount of fuel consumed by the vessel on its voyage to that port (not bunker suppliers). The CBDR principle could be achieved through a self-administered national or regional fund and/or some international mechanism.

¹¹⁴ According to this proposal, all new ships, except for those which meet pre-set EEDI thresholds, and existing ships are required to make payment contributions based on the amount of the bunker fuel consumed/purchased and the degree to which the ship's efficiency falls short of a specific standard. Funds collected go to an International GHG Fund and its Parties

- Ship Efficiency and Credit Trading (SECT), proposed by the United States;¹¹⁵
- Global Emissions Trading System (ETS) for international shipping, three options proposed by Norway (Germany was later added as a co-sponsor), United Kingdom, and France, respectively;¹¹⁶
- Penalty on Trade and Development, proposed by Bahamas;¹¹⁷ and
- Rebate Mechanism (RM) for a market-based instrument for international shipping, proposed by the International Union for Conservation of Nature (IUCN).¹¹⁸

These MBM proposals can be grouped into three categories, namely environmental fee-related MBM proposals, tradable permit scheme-related MBM proposals, and hybrid MBM proposals. Of the seven MBM options, GHG Fund, Port State Levy, and Penalty on Trade and Development belong to the category of environmental fee-related MBMs. They provide the polluter with an incentive to reduce GHG emissions in order to pay lower fees which take the form of a contribution, a levy, or a penalty. The three types of ETS are tradable permit scheme-related MBMs, which seek to reduce GHG emissions through setting a global cap/reduction target and allocating emissions allowances. The Efficiency Incentive Scheme and Ship Efficiency and Credit Trading can be regarded as hybrid MBMs with the EEDI as a benchmark, whereas the Rebate Mechanism is a hybrid MBM built into any other MBM.

A number of assessments on the pros and cons of these MBM proposals have been conducted by various States and research institutions.¹¹⁹ However, no MBM proposals have been widely accepted by most countries. Countries' preferences for different MBM options

decide how to allocate the revenue either to long-term in-sector reduction or to a Fund to be established under UNFCCC.

¹¹⁵ Subject all ships to mandatory energy-efficiency standards. As one means of complying with the standard, an efficiency-credit trading programme would be established, and these standards would become more stringent over time. Currently this proposal becomes an optional addition to a phased approach energy-efficiency proposal newly submitted by the United States.

¹¹⁶ This proposal aims to set a sector-wide cap on net emissions from international shipping. A number of allowances (Ship Emission Units) corresponding to the cap would be released into the market each year via a global auctioning process. The units could then be traded.

¹¹⁷ This proposal holds that the imposition of any costs should be proportionate to the contribution by international shipping to global CO₂ emissions. The reduction will apply to individual ships and not Member States, and developing States will not be faced with a penalty on trade and development. Currently Bahamas has modified this MBM proposal into a technical and operational proposal, but this option as a MBM still remains.

¹¹⁸ This proposal aims to compensate developing countries for the financial impact of a MBM. It could be either applied to any maritime MBM which generates revenue (add-on option) or integrated with the International Maritime Emission Reduction Scheme (IMERS) (integrated option).

¹¹⁹ See, e.g., *Grouping and Evaluation of Proposed MBMs*, submitted by Greece, Intersessional Meeting of the Working Group on GHG Emissions from Ships 3rd Session, Agenda Item 3, Doc GHG-WG 3/3 (24 February 2011); *The Evaluation on the Relative Strengths and Weaknesses of the Reduction Mechanisms Employed by the MBM Proposals*, submitted by the Republic of Korea, Intersessional Meeting of the Working Group on GHG Emissions from Ships 3rd Session, Agenda Item 3, Doc GHG-WG 3/3/1 (25 February 2011); *Full Report of the Work Undertaken by the Expert Group on Feasibility Study and Impact Assessment of Possible Market-based Measures*, MEPC 61st Session, Agenda Item 5, Doc MEPC 61/INF.2 (13 August 2010).

vary widely. The GHG Fund is predicted to have a low administrative cost.¹²⁰ It has been welcomed by most of the global and national shipping industry associations.¹²¹ The Rebate Mechanism serves as ‘the only differentiation option being currently considered to compensate less developed countries [for] the costs/impacts of a global MBM scheme’,¹²² and thus incorporates the CBDR principle. To date global shipping associations generally have been opposed to ETS, whereas the shipping associations in some of the UNFCCC Annex I States have supported it.¹²³

The Response from the Shipping Industry in China

Undoubtedly, the regulatory measures that have been adopted by the IMO, such as the EEDI and SEEMP, or MBMs possibly to be adopted in the future, will increase transportation costs for the shipping industry, and may also have an impact on international trade.¹²⁴ These impacts will be greater for UNFCCC Non-Annex I States (developing countries) than UNFCCC Annex I States (developed countries).¹²⁵ Therefore, whether the shipping industry in a country can absorb these higher costs will influence to a significant extent their compliance with these measures. Compared to the development of the shipping industries in

¹²⁰ *Full Report of the Work Undertaken by the Expert Group on Feasibility Study and Impact Assessment of Possible Market-based Measures*, MEPC 61st Session, Agenda Item 5, Doc MEPC 61/INF.2 (13 August 2010) at 14-16. This report shows that the increased cost for the GHG Fund is the lowest among current MBM proposals except for the Penalty on Trade and Development proposed by the Bahamas.

¹²¹ See, e.g., the International Chamber of Shipping, and the shipowners Associations in Greece and the Republic of Korea announced that their preferred MBM is GHG Fund- or levy-related. *Operational Energy Efficiency of New and Existing Ships*, submitted by the International Chamber of Shipping (ICS), MEPC 64th Session, Agenda Item 5, Doc MEPC 64/5/11 (27 July 2012) at para 11; Union of Greek Shipowners, ‘Prevention of Environmental Pollution by Ships: Regulation and Compensation Regimes and Industry Standards’, 2011, available at <http://www.nec.gr/default.asp?t=anakoinoseisDetails&id=13>, at 29; Sang-Yoon Lee and Young-Tae Chang, ‘Shipping Companies’ Awareness and Preparedness for Greenhouse Gas Regulations: A Korean Case’ in Theo Notteboom (ed), *Current Issues in Shipping, Ports and Logistics* (UPA University Press, Antwerp, 2011) 25-50, at 44.

¹²² *Report of the Third Intersessional Meeting of the Working Group on Greenhouse Gas Emissions from Ships*, note by the Secretariat, MEPC 62nd Session, Agenda Item 5, Doc MEPC 62/5/1 (8 April 2011) Annex 2, at 57.

¹²³ See, e.g., the Round Table of International Shipping Associations opposed any ETS in that it would be ‘unworkable’ for the shipping industry. Round Table of International Shipping Associations, ‘Round Table Associations Position Paper on GHG+MBMs’, 22 February 2012, available at https://www.bimco.org/About/Press/Press_Releases/2012/2012_02_22_Round_Table_MBM.aspx.

The national shipowners associations in Australia, Belgium, Norway, Sweden and the United Kingdom released a discussion paper in 2009 supporting a global cap-and-trade ETS to reduce GHG emissions from international shipping. See Australian Shipowners Association, Royal Belgian Shipowners’ Association, Swedish Shipowners’ Association, Norwegian Shipowners’ Association, and British Shipping, ‘A Global Cap-and-Trade System to Reduce Carbon Emissions from International Shipping’, 2009, available at <http://www.asa.com.au/wp-content/uploads/uploads/Joint-Industry-ETS-Discussion-PapervFINAL1.pdf>.

¹²⁴ See Kevin P. Gallagher, ‘International Trade and Air Pollution: Estimating the Economic Costs of Air Emissions from Waterborne Commerce Vessels in the United States’ (2005) 77(2) *Journal of Environmental Management* 99-103, at 103.

¹²⁵ Haifeng Wang, ‘Economic Costs of CO₂ Emissions Reduction for Non-Annex I Countries in International Shipping’ (2010) 14(4) *Energy for Sustainable Development* 280-286, at 285.

UNFCCC Annex I States, the development of these industries in UNFCCC Non-Annex I States generally started later and has lagged behind in many respects. Given the challenges involved in the reduction of GHG emissions from ships, the shipping industries in these Non-Annex I countries are facing barriers resulting from historical, financial and technological gaps. This section takes China as an example to examine the responses from the shipping industries in UNFCCC Non-Annex I States.

An Introduction to China's Shipping Industry

China has a lengthy continental coastline of approximately 18,000 kilometres.¹²⁶ A number of excellent natural ports are located around the coast; in 2003 the coastal areas contributed 50% of China's GDP and constituted 80% of the country's international trade value.¹²⁷ Until 2010, over 90% of China's imports and exports were moved by international shipping.¹²⁸ These advantageous natural resources, together with preferential policies by central and local governments, have made possible the rapid development of China's shipping industry. As at 1 January 2012, China controlled the fourth-largest owned fleet (in dwt) in the world with 2060 vessels registered in China and 1569 registered in other flag States.¹²⁹ The dwt controlled by China in that year covered 8.91% of the world total.¹³⁰ Established in 1961, the China Ocean Shipping (Group) Company (COSCO) is the first Chinese international shipping company. However, only after 1978, when China adopted its reforms and opening-up policies, has China's international shipping sector started its rapid development.¹³¹ In 2010 China's shipbuilding sector ranked first in the world in three categories, namely its accomplished shipbuilding output, volume of new ship orders and holding orders, which covered 43%, 54% and 41% of the world market, respectively.¹³² According to research jointly undertaken by Lloyd's Register, QinetiQ, and the University of Strathclyde, by 2030, the China-owned fleet will probably reach 19-24% of the world fleet, rivalling Greece and other European

¹²⁶ This section only discusses the mainland China, excluding Chinese Hong Kong, Macau, and Chinese Taipei.

¹²⁷ Weijie Gao, 'Development Strategy of Chinese Shipping Company under the Multilateral Framework of WTO', 2003, available at <http://www.cosco.com/en/pic/forum/654923323232.pdf>.

¹²⁸ Xinchun Rong, 'Development and Evolution of China's Shipping Industry (1949-2010)', 31 October 2012, available at <http://economy.guoxue.com/?p=7575> (in Chinese).

¹²⁹ UNCTAD, *supra* note 49, at 41.

¹³⁰ *Ibid.*

¹³¹ Gao, *supra* note 127, at 2.

¹³² Yuzhen Xie, Shuohui Zhang, and Junsong Han, 'The Impacts of the EEDI on the Chinese Shipbuilding and Shipping Industries' (2011) 11 *China Maritime* 23-26, at 24 (in Chinese).

countries.¹³³ As a UNFCCC Non-Annex I State, China has promoted its shipping industry to a high level in terms of its shipbuilding capability and shipping fleet.

The shipping associations in China mainly include the China Classification Society (CCS), the China Association of the National Shipbuilding Industry (CANSI), and the China Shipowners Association (CSA). Due to China's unique political structure, work on the reduction of GHG emissions from ships is dominated or guided by the government, mainly implemented by shipping companies, supported by the shipping industry, and participated in by the public.¹³⁴ Most shipping companies, in particular large-scale companies, are state-owned. This situation means that the response of the shipping industry in China is often consistent with the positions of the Chinese government.

In 2009, the Chinese government announced its GHG emissions control target, before the 2009 Copenhagen climate change conference. It stated that it would cut its CO₂ emissions per unit of GDP by 40% to 45% by 2020 from the 2005 level. Against this backdrop, on 12 March 2012, the Ministry of Industry and Information Technology of the People's Republic of China released a 'Development Plan for the Ship Industry during the 12th Five-Year Plan (2011-2015)', which seeks a greater role for China's shipping industry around the world by making it 'powerful' rather than simply 'big'. To reach this goal, this document claims that the current structure of the shipping sector needs to be optimised and upgraded, its technological innovation and overall quality should be improved, and the energy efficiency requirement in the ship design and shipbuilding should be strengthened.¹³⁵ As a follow-up to this Development Plan, China's shipping industry was allocated its sector-reduction target by the Ministry of Transport. This target requires the shipping companies to reduce their energy consumption and CO₂ emissions per unit turnover by 15% and 16%, respectively, from the 2005 level by the end of 2015.¹³⁶ Although GHG emissions from international shipping are excluded from this target, China's shipping industry still pays much attention to the efforts of the IMO in reducing shipping emissions. This is because the shipbuilding sector, as a key sector of China's shipping industry participating in international business, must comply with

¹³³ Lloyd's Register QinetiQ, and University of Strathclyde, 'Global Marine Trends 2030', 2013, available at <https://www.dropbox.com/sh/ysc3kkspzxs6de/n9hnb3CQf/GMT2030%20LowRes.pdf>, at 83.

¹³⁴ Jianhua Zhu, 'Approaches for the Reduction of Greenhouse Gas Emissions from Ships in China' (2010) 1 *Research on Waterborne Transportation* 1-4, at 1 (in Chinese).

¹³⁵ Ministry of Industry and Information Technology of the People's Republic of China, 'Development Plan for the Ship Industry during the 12th Five-Year Plan (2011-2015)', 2012, available at http://www.china.com.cn/policy/txt/2012-03/12/content_24876042.htm, at 5-6 (in Chinese).

¹³⁶ Zonghui Xie, 'Jointly Establish A Green Industry Chain for the Shipping Industry', *China Waterborne Transportation Newspaper*, 22 September 2011, available at <http://www.zgsyzz.com/Article/ShowInfo.asp?ID=5318> (in Chinese).

the IMO rules so as to meet the requirements of its current and potential customers. This probably also explains why China did not object to the amended Annex VI to the MARPOL to avoid the application of the Regulation¹³⁷ although Article 16(2)(g)(ii) of the MARPOL would have allowed it to do so.¹³⁸ Another benefit is that while complying with international rules the industry can also meet its domestic reduction target.

Developing countries can roughly be classified into three categories – major developing flag States, major FOC States,¹³⁹ and other developing States – based on their regulatory interests. The views from the shipping industries in these countries on the GHG issue differ. As discussed earlier, major FOC States are usually more interested in obtaining income from registering foreign ships than effectively managing the ships flying their flags. Since the cost for complying with the energy-efficiency measures and MBMs will be borne by foreign shipowners and ship operators, these FOC States are not overly concerned with these regulations,¹⁴⁰ and the numbers of ships owned by their own nationals are often negligible. Major developing flag States are mainly importing countries, such as China, India, Brazil, South Africa and Saudi Arabia. Most of these countries have a large owned fleet,¹⁴¹ and their international trade can be easily affected by the IMO's regulatory measures.¹⁴² For these reasons the shipping industries in these countries have actively participated in the IMO's regulatory discussions and contributed to this regulatory process. Apart from the above two types of developing countries, the other developing countries are in the third category. Generally these countries do not have long coastlines and lack competitive shipping industries. Although some of these countries suffer from adverse climate change impacts and

¹³⁷ *Report of the Marine Environment Protection Committee on Its Sixty-Second Session*, MEPC 62nd Session, Agenda Item 24, Doc MEPC 62/24 (26 July 2011) Annex 20, at 2. In 2011 China lodged a statement to the MEPC 62 Report. The report provides that 'the Chinese delegation opposes the adoption of this amendment and [is] in no position to acknowledge and accept the amendment'. However, China gave up its right to object to the amendment and only Brazil and Finland objected due to the obstacles in their domestic legislation.

¹³⁸ Article 16(2)(g)(ii) of MARPOL 73/78 provides that '...the amendment deemed to have been accepted in accordance with the foregoing conditions shall enter into force six months after its acceptance for all the Parties with the exception of those which, before that date, have made a declaration that they do not accept it or a declaration under subparagraph (f)(ii), that their express approval is necessary'. See also Harrison, *supra* note 21, at 19.

¹³⁹ Based on the groupings established by the UNCTAD, major FOC States refer to those countries where more than 90 per cent of their flagged ships by tonnage are owned by foreign nationals. UNCTAD, *supra* note 49, at 46.

¹⁴⁰ An example is that major FOC States, such as Panama and Liberia, have seldom submitted proposals to the IMO although they voted for the proposed regulation of the energy efficiency measures in July 2011. *Report of the Marine Environment Protection Committee on Its Sixty-Second Session*, MEPC 62nd Session, Agenda Item 24, Doc MEPC 62/24 (26 July 2011) at para 6.110.

¹⁴¹ For example, as of 1 January 2012 China and South Korea owned the fourth- and fifth-largest fleets in the world, respectively; India, Brazil and Saudi Arabia owned, respectively, the sixteenth-, twenty-first-, and twenty-second-largest fleets in the world. UNCTAD, *supra* note 49, at 41.

¹⁴² Tao Wang and Jim Watson, 'China's Carbon Emissions and International Trade: Implications for Post-2012 Policy' (2008) 8(6) *Climate Policy* 577-587, at 585.

their shipping industries are thus more willing to accept stringent regulatory measures,¹⁴³ they rarely express their views on these issues in global fora. For the purpose of this article, the views of China's shipping industry on the GHG issue are examined. These views also reflect to a significant extent the responses of the shipping industries in other major developing countries.

Response to the Technical and Operational Measures

Generally China's shipping industry has different views towards proposed technical, operational and MBMs under discussion within the IMO. As far as the technical and operational measures are concerned, the shipping industry welcomes the efforts of the IMO and agrees that the IMO is the most competent institution to regulate this issue. Representatives from shipping companies actively participated in the discussions on the proposed EEDI and SEEMP, and submitted their proposed modification of the EEDI formula to the IMO through the Chinese government. After the adoption of the energy efficiency rules by the IMO in July 2011, the CCS released its Rules for Green Ships on 10 July 2012, the first rules of this kind in the world,¹⁴⁴ as well as the Attained EEDI Calculation Guide and EEDI Verification Guide. These rules serve as the industry's guidelines for compliance with IMO regulations through the incorporation of the EEDI and SEEMP requirements into China's domestic ship classification. They provide information that China's shipbuilding industry will abide by international shipbuilding standards in building its ships for international buyers. As discussed earlier, Regulation 19 of *MARPOL* Annex VI allows all flag States, including the Chinese government, to postpone their implementation of the EEDI Regulation till the year 2019. However, it appears that China's shipbuilding industry will not utilise this right due to the fierce competition in the international shipbuilding market. Even before the adoption of Rules for Green Ships by the CCS, the French classification society had issued an EEDI Certificate, the first such certificate in Asia, to a bulk carrier with 63,500 dwt built by the SinoPacific Shipbuilding Group.¹⁴⁵ In practice, however, Chinese shipping

¹⁴³ Wang, *supra* note 125, at 285; *Report of the Marine Environment Protection Committee on its 58th Session*, Doc MEPC 58/23 (16 October 2008) Annex 9, at 21. A statement lodged by the delegation of Vanuatu provides that 'some Pacific Micro States are already scheduled to disappear. This is the reason why Vanuatu, although classified as a least developing State, is in favour of a global solution'.

¹⁴⁴ China Classification Society (CCS), 'Green Ships Recognising the EEDI', 2012, available at <http://www.ccs.org.cn/ccswz/font/fontAction!moudleIndex.do?moudleId=61> (in Chinese). The Rules for Green Ships entered into force on 1 October 2012.

¹⁴⁵ Takungpao, 'New Ship Built by SinoPacific Shipbuilding Group First Obtained the EEDI Certificate', 24 February 2012, available at http://www.csoa.cn/xuliebd/jienengjp/201202/t20120224_1198135.html (in Chinese).

companies often reduce their GHG emissions by employing large vessels and slowing down their speed, a strategy which is said to be commonly utilised by other large shipping companies, such as the Maersk Line.¹⁴⁶

In common with China's shipping industry, the shipping industries in many other UNFCCC Non-Annex I States hold similar views on the role of the IMO in regulating technical and operational measures on this issue. For instance, the South Korean shipbuilding sector has been very supportive of the efforts of the IMO in regulating energy efficiency measures to reduce GHG emissions from ships. It participated in the IMO discussions on the proposed EEDI and provided a new concept approach and formula for EEDI covering the various types of propulsion systems and power generation systems through the South Korean government.¹⁴⁷ However, the Indian shipping industry asserts that the UNFCCC, which backs the CBDR principle, should be the central body regulating this issue, and that the IMO should be responsible to the UNFCCC for this purpose.¹⁴⁸

While China's shipbuilding industry has responded positively to the newly adopted EEDI and SEEMP Regulation by the IMO, it also recognises that these new rules, in particular the EEDI, have imposed great challenges on it. First, as stated by the Chinese delegation at the IMO, the CBDR principle that it asserted during the IMO negotiations has not been reflected 'in a full and objective manner' within the amended MARPOL Annex VI in 2011.¹⁴⁹ The consequence of this is that the CBDR principle, confirmed as a basic principle in the global climate change regime by the UNFCCC and its Kyoto Protocol, has been further weakened in the shipping arena from the technical perspective. Although technically it is more feasible to apply the NMFT principle in this regard, ignoring the historical contribution to GHG emissions by developed countries will lead to an unfair extra burden for the shipping industry in developing countries, including China. Regarding this position of insisting on the incorporation of the CBDR principle into the GHG issue, China's shipping industry is not alone. A number of UNFCCC Non-Annex I States, including Brazil, Cuba, India, Peru, Saudi Arabia and the Bolivarian Republic of Venezuela, have expressed similar views and have

¹⁴⁶ Erde Wang, 'Agreement Achieved through Reduction Negotiations and China Is to Start Its Reduction in 2019', *21st Century Business Herald* (Beijing), 26 July 2011, available at <http://stock.sohu.com/20110726/n314586469.shtml> (in Chinese).

¹⁴⁷ *Proposal for New Concept Approach to EEDI for New Ships*, submitted by the Republic of Korea, Intersessional Meeting of the Greenhouse Gas Working Group 2nd Session, Agenda Item 2, Doc GHG-WG 2/2/12 (6 February 2009).

¹⁴⁸ Anil Devli, 'Overview of the Shipping Sector in India', 1 April 2011, available at <http://www.ahlers.com/images/news/2011/overview%20of%20the%20shipping%20sector%20in%20india%20%28mr%20anil%20devli%29.pdf>, at 8.

¹⁴⁹ *Report of the Marine Environment Protection Committee on Its Sixty-Second Session*, MEPC 62nd Session, Agenda Item 24, Doc MEPC 62/24 (26 July 2011) Annex 20, at 1.

been supported by their shipping industries.¹⁵⁰

Second, China's shipping industry supports its government in opposing the technical and operational measures being regulated in the form of MARPOL Annex VI. It takes the view that CO₂ is not technically a pollutant, and therefore should not be regulated in Annex VI of MARPOL in which severe air pollutants are addressed.¹⁵¹ In particular GHGs are currently not regulated as a type of pollution in Chinese domestic law. The Air Pollution Prevention and Control Law of China (adopted in 1987 and amended twice in 1995 and 2000, respectively) does not regulate GHGs and is currently under discussion for another revision. It is predicted that GHGs will not be regulated in the upcoming revision of this law due to pressure from various national industries. This opinion was supported by some UNFCCC Non-Annex I States when the issue was discussed within the IMO.¹⁵² Nevertheless, given the fact that energy efficiency measures have been adopted, these member States will need to update their domestic law so as to comply with the IMO instrument.

Third, it will be more costly for China's shipping industry to achieve the regularly upgraded EEDI standards. New Chapter 4 of MARPOL Annex VI provides a four-phased reduction schedule. During the period 2013 to 2025, the EEDI reference line parameters for relevant ship types and reduction rates, as well as the time periods, will be reviewed and amended regularly to reflect the latest status of technological development.¹⁵³ However, it is often recognised that China's shipping industry is 'big but not powerful' and China 'does not have sufficient say in global shipping pricing'.¹⁵⁴ A report by the CANSI reveals that, in comparison with European countries, the USA, Japan and the Republic of Korea, the Chinese shipbuilding sector aims at building middle- and low-level vessels and lacks core technologies and capability in its Research and Development (R&D), which objectively

¹⁵⁰ See, e.g., *Report of the Marine Environment Protection Committee on Its Sixtieth Session*, MEPC 60th Session, Agenda Item 22, Doc MEPC 60/22 (12 April 2010) at para 4.44; Devli, *supra* note 148.

¹⁵¹ *Report of the Marine Environment Protection Committee on Its Sixtieth Session*, MEPC 60th Session, Agenda Item 22, Doc MEPC 60/22 (12 April 2010) Annex 4, at 2.

¹⁵² This view has been supported by Brazil, India, Saudi Arabia and the Bolivarian Republic of Venezuela. For example, the delegation of Saudi Arabia stated that '[MARPOL] was for the prevention of pollution into the marine environment. Greenhouse gas emissions are not classified by the UN as pollutants'. *Report of the Marine Environment Protection Committee on Its Sixty-Second Session*, MEPC 62nd Session, Agenda Item 24, Doc MEPC 62/24 (26 July 2011) Annex 20, at 3.

¹⁵³ MARPOL Annex VI (2011) Reg 21(6).

¹⁵⁴ Suranjana Roy Bhattacharya, 'Chinese Shipping Industry Is Big but Not Powful', *Gulf News*, 19 July 2010, available at <http://gulfnnews.com/business/opinion/chinese-shipping-industry-is-big-but-not-powerful-1.656076>. According to this analysis, two factors contribute to the weak status of the Chinese shipping industry in global shipping pricing. One is that the Chinese shipping industry is not familiar with maritime arbitration, insurance and claims, and the other lies in its lack of core competitiveness as regards shipping information, ship brokering, financing and leasing.

makes its profit rate quite low.¹⁵⁵ In order to meet the EEDI requirements and reduce shipping costs, a three-party conference, participated in by Chinese ship owners/operators, shipbuilders, and classification societies, was held in Beijing in November 2011. The main topic of the conference was to research, design and build green ships jointly so as to maintain and promote the competitiveness of China's shipping industry. Aside from the increased cost in relation to R&D, China's shipbuilding companies may need to purchase some of the energy-efficient technologies from other countries. In practice it is difficult for them to get technologies through the transfer of technology arrangement as indicated in Regulation 23 of MARPOL Annex VI, due to the classification of 'newly industrialised [developing] country' imposed on China by some economists.¹⁵⁶ This increased cost, including extra investment in more energy-efficiency technologies, will apply to all countries, in particular UNFCCC Non-Annex I States. However, due to different technological and financial situations, the pressures on the shipping industries from these countries will be different.

Last but not least, the Chinese shipping industry is concerned about whether the EEDI benchmark, a technological standard, will become a type of trade barrier for developing countries.¹⁵⁷ This concern is not groundless. On the one hand, currently the core energy-efficient technologies in shipbuilding are primarily controlled by a few developed countries or regional blocs like the EU, and China does not have sufficient say in the drafting of the EEDI formula and reference line.¹⁵⁸ On the other hand, the setting of this floatable and upgrading EEDI standard actually raises the trading threshold for ships from most developing countries. Based on the mandatory EEDI requirements, substandard ships might be detained, fined by port States or even not allowed to trade.¹⁵⁹ This concern has been shared by the shipping industries from many UNFCCC Non-Annex I States. Due to its disadvantages in relation to shipping technologies when compared to other countries, the shipping industry in India has taken the view that the newly adopted EEDI and SEEMP are 'not so benign'.¹⁶⁰ This might be true with regard to the decreased number of orders that India's shipping industry has obtained in recent years. To change this situation, the Shipyards Association of

¹⁵⁵ Rong, *supra* note 128.

¹⁵⁶ International Monetary Fund (IMF), 'World Economic Outlook, April 2011', 2011, available at http://www.ioha2012.net/?page_id=1945. See also Government of Canada, 'Explanatory Notes--Asian Newly Industrialized Countries (NICs)', 14 June 2012, available at <http://www.ic.gc.ca/eic/site/tdo-dcd.nsf/eng/00042.html>.

¹⁵⁷ Rong, *supra* note 128.

¹⁵⁸ *Ibid.*

¹⁵⁹ Wang, *supra* note 146.

¹⁶⁰ Devli, *supra* note 148, at 9.

India (SAI) suggested that domestic shipowners support Indian shipyards by placing their orders at home.¹⁶¹ To expand its global market share in the shipping industry, the Indian government has taken various measures, including introducing a shipbuilding subsidy scheme and transfer of technology,¹⁶² to promote its shipping industry. Facing the stringent EEDI requirements, shipping associations like the Indian Coastal Conference Shipping Association (ICCSA) encourage their member companies to employ qualified vessels. For example, the Shipping Corporation of India Ltd. (SCI) has made it a rule that the EEDI should be implemented at the design stage for its ships so as to reduce GHG emissions from ships.¹⁶³ It seems that the shipping industries in major developing countries have attempted to comply with the energy-efficiency measures adopted by the IMO. Nevertheless, due to their lack of energy-efficient technologies, the shipping industries in these developing countries still need the effective transfer of technologies as discussed earlier to strengthen their capacity in implementing their obligations under the amended MARPOL Annex VI.

It is concluded that China's shipping industry supports the efforts of the IMO in adopting the EEDI and SEEMP measures. Before these measures were adopted, China's shipping industry contributed to the improvement of these measures by participating in various IMO discussions through the Chinese government. After the adoption of these measures, China's shipping industry responded quickly and enacted its own rules to incorporate them into China's ship classification requirements, although these measures will potentially impose significant implementation and cost pressures on the industry. Due to similar financial and technological situations, the response from China's shipping industry has been supported and followed by many UNFCCC Non-Annex I States.

Response to the MBMs

In contrast to the EEDI and SEEMP, MBMs are regarded as an even 'bigger challenge' by the Chinese shipping industry.¹⁶⁴ First, the Chinese shipping industry believes that it is premature to adopt any MBMs because there are still many uncertainties and problems relating to

¹⁶¹ Peter Clarkson, 'Indian Yards Ask Government Action', 6 April 2009, available at <http://www.globmaritime.com/news/shipbuilding-a-repair/4401-indian-yards-ask-government-action>.

¹⁶² *Ibid.*, at 386-396.

¹⁶³ The Shipping Corporation of India Ltd. (SCI), 'Global Compact Initiative', 2012, available at <http://www.shipindia.com/pdf/MediaSpeak/COPfor2012-5c80e7.pdf>, at 7.

¹⁶⁴ Wang, *supra* note 146.

them,¹⁶⁵ and China's shipping sector also needs more time to conduct research to enhance its understanding of this issue. The influential Round Table of International Shipping Associations asserts that MBMs 'are not justified at this particular time'.¹⁶⁶ Meanwhile, to secure benefits to the shipping industries in developing countries, China's shipping industry holds that a policy arrangement on financial, technological and capacity-building support from developed countries for the implementation of the EEDI and SEEMP by developing countries should be in place before a MBM is adopted.¹⁶⁷ In view of these factors, to date the Chinese shipping industry has not explicitly expressed its preference for any of the currently proposed MBMs. This view has been supported by many UNFCCC Non-Annex I States. The Indian National Shipowners' Association (INSA) believes that proposed MBMs will bring about 'adverse outcomes' for developing countries and does not welcome the adoption of any MBMs by the IMO.¹⁶⁸

Second, consistent with the position of the Chinese government, China's shipping industry supports the leading role of the IMO in regulating technical related issues, but doubts the competency of the IMO to regulate MBMs. From its point of view, the IMO Convention gives IMO competence to regulate technical issues but not trade-related issues. As a trade-related measure, MBMs should be decided by the UNFCCC.¹⁶⁹ Additionally, if a MBM needs to be adopted in the future, China's view is that the CBDR principle needs to be incorporated.¹⁷⁰ While the Indian shipping industry shares Chinese shipping industry view that the IMO's competence is limited to technical and operational matters,¹⁷¹ Malaysia and the World Wide Fund for Nature (WWF) support the incorporation of both the CBDR and NMFT principles into the issue.¹⁷² In particular, the WWF has worked out specific schemes

¹⁶⁵ *Uncertainties and Problems in Market-based Measures*, submitted by China and India, MEPC 61st Session, Agenda Item 5, Doc MEPC 61/5/24 (5 August 2010).

¹⁶⁶ Round Table of International Shipping Associations, *supra* note 123.

¹⁶⁷ *Further Work on GHG Emissions from Ships*, submitted by Brazil, China, India, Peru, Saudi Arabia and South Africa, MEPC 64th Session, Agenda Item 5, Doc MEPC 64/5/9 (27 July 2012) at para 8.6.

¹⁶⁸ Devli, *supra* note 148, at 9.

¹⁶⁹ *Report of the Marine Environment Protection Committee on its 59th Session*, Statement by the Delegation of China on GHG Issues, Doc MEPC 59/24/Add.1 Annex 13 (2009) at para 5.

¹⁷⁰ See *Application of the Principle of "Common but Differentiated Responsibilities" to the Reduction of Greenhouse Gas Emissions from International Shipping*, submitted by China and India, MEPC 58th Session, Agenda Item 4, Doc MEPC 58/4/32 (15 August 2008).

¹⁷¹ Devli, *supra* note 148, at 8.

¹⁷² *Report of the Marine Environment Protection Committee on Its Sixtieth Session*, MEPC 60th Session, Agenda Item 22, Doc MEPC 60/22 (12 April 2010) Annex 4, at 10; *Ensuring No Net Incidence on Developing Countries from A Global Maritime Market-Based Mechanism*, submitted by WWF, MEPC 63rd Session, Agenda Item 5, Doc MEPC 63/5/6 (22 December 2011).

in an attempt to incorporate both principles into MBM proposals.¹⁷³

Third, China's shipping industry opposes unilateral actions, in particular the proposed inclusion of the shipping GHG emissions into an EU ETS. If this happens and the EU ETS which includes GHG emissions from international shipping comes into force before July 2019, the lead period that China's shipping industry may get to phase in changes from Regulation 19 of MARPOL Annex VI will become meaningless. In this case, an EU ETS may charge all ships calling at the ports of their member States, regardless of the flag that these ships are flying. In other words, the waiver that a flag State gives the ships flying its flag based on Regulation 19 of MARPOL Annex VI may not be recognised by an EU ETS. Also, due to waning demand and higher costs resulting from the global financial crisis since 2009 and China's over-capacity, China's shipping industry, in particular its shipbuilding sector, is currently experiencing a recession. According to statistics from China's Ministry of Industry and Information Technology, in 2012 the completed shipbuilding output and holding orders were 60,210,000 dwt and 106,950,000 dwt each, which, compared with 2011, had decreased by 21.4% and 28.7%, respectively.¹⁷⁴ Under the circumstances, any unilateral reduction actions will further increase shipping costs and weaken the development momentum of China's shipping industry, while at the same time the authority of IMO's current work will also be diminished.¹⁷⁵ To date the EU has attributed its unilateral actions to the slow and unsatisfactory regulatory process of emissions reductions under the relevant international authorities. On 1 January 2012 the EU included the emissions from the international aviation industry into the EU ETS due to slow progress within the International Civil Aviation Organization (ICAO). In December 2012 the EU suspended this policy due to improved performance by ICAO, or perhaps because of strong opposition from many countries, including the US, Russia, China and India. In the same year, the EU published a consultation document asking for views on how best to reduce GHG emissions from ships so as to finally include GHG emissions from international shipping in an EU ETS.¹⁷⁶ Once shipping GHG emissions are included in the EU ETS, the co-existence of two regulatory mechanisms, namely the EU ETS and potential IMO MBMs, will make implementation and

¹⁷³ *Draft Legal Text on Uses of Financing Generated from A Maritime MBM*, submitted by WWF, MEPC 64th Session, Agenda Item 5, Doc MEPC 64/5/10 (27 July 2012).

¹⁷⁴ Ministry of Industry and Information Technology of the People's Republic of China, 'In 2002 National Accomplished Shipbuilding Output Exceeds 60000000 DWT and New Orders Decreased by 40%', 14 January 2013, available at <http://www.miit.gov.cn/n11293472/n11293832/n11294132/n12858417/n12858628/15121853.html> (in Chinese).

¹⁷⁵ Nengye Liu, 'New Development of International Law on the Reduction of Greenhouse Gas Emissions from Shipping' (2011) 34(9) *World Maritime Shipping* 11-13, at 12 (in Chinese).

¹⁷⁶ Will Nichols, 'EU Launches Attempt to Deliver Shipping Emissions Trading Scheme', 24 January 2012, available at <http://www.businessgreen.com/bg/news/2140997/eu-launches-attempt-deliver-shipping-emissions-trading-scheme>.

compliance by developing States shipping industries doubly difficult.

In summary, as far as the proposed MBMs are concerned, the shipping industry in China takes the view that they are premature at this stage, and if they are to be adopted, they should be decided by the UNFCCC rather than the IMO. To secure benefits to China's shipping industry, the CBDR principle should be incorporated into any MBMs that are adopted. To date China's shipping industry has not expressed any preference among the current MBM proposals. The global shipping industry has expressed similar attitudes to China's shipping industry in that these measures are not mature at this stage, whereas some national shipping industries in UNFCCC Annex I States support the MBMs and have expressed their preference among current MBM options.

Conclusion

Given the tight schedule for limiting global warming to 2° Celsius in tackling climate change, the reduction of GHG emissions from international shipping as an important contribution to achieving that target has drawn mounting attention from the international community. From an international law perspective, the IMO Convention and the LOSC provide the IMO with general competence to regulate GHG emissions from international shipping, while the Kyoto Protocol provides the IMO with a specific mandate to regulate this matter. These competences make it possible for the IMO to apply both the CBDR and NMFT principles in addressing GHG emissions from international shipping.

The newly adopted energy-efficiency measures by the IMO represent a significant advance in reducing shipping GHG emissions from technical and operational perspectives. Although the CBDR principle has not been fully reflected in these measures, a certain flexibility has been provided to encourage their implementation by the shipping industry. China's shipping industry has adopted a positive attitude in initially complying with these measures, although it asserts that there will be significant challenges in future implementation. To date seven types of MBM proposals have been discussed within the IMO in order to achieve more GHG emissions reductions from international shipping as a supplement to the energy-efficiency measures already in place. Consistent with the views of some global shipping associations, China's shipping industry claims that MBMs are premature at this stage. Furthermore, China's shipping industry asserts that the CBDR principle should be incorporated if MBMs are to be adopted.

The response from China's shipping industry to the IMO's regulatory efforts has been supported by many other developing countries. As more developed countries and global shipping organizations come to accept the application of both the CBDR and NMFT principles to the GHG issue, in particular the MBM proposals, it seems that finding ways to incorporate both principles into the issue under discussion will be the next step.