

# ARRANGING DECKCHAIRS ON THE TITANIC: CLIMATE CHANGE, GREENHOUSE GAS EMISSIONS AND INTERNATIONAL SHIPPING

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## Abstract

*In 1988 the World Meteorological Organisation and the United Nations Environment Programme established the Intergovernmental Panel on Climate Change to assess 'the scientific, technical and socioeconomic information relevant for the understanding of the risk of human-induced climate change'. Subsequently, in 1992, the United Nations (UN) proposed a framework for dealing with climate change, the United Nations Framework Convention on Climate Change (UNFCCC). UNFCCC divides UN member states into developed (Annex I) and developing (non-Annex I) nations. In 1997, the Kyoto Protocol (KP) was agreed as a practical attempt to put the aspirations of UNFCCC into effect. GHG emissions reduction targets were only set for Annex I nations under the UNFCCC concept of 'common but differentiated responsibilities'; this precludes allocation of national ownership of GHG emissions from activities of an international character, specifically international shipping and aviation. Article 2(2) of KP assigns responsibility for these to Annex I nations through the International Civil Aviation Organization and the International Maritime Organization (IMO). In this paper, I have endeavoured to reconcile the implications of GHG emissions, climate change and international shipping with IMO's mandate under KP.*

## 1 Introduction

The notion of global warming caused by human activity was first promulgated in 1938 by engineer and inventor GS Callendar.<sup>1</sup> The human activity which most contributes to global warming is the burning of fossil fuels, be it in the production of electricity and commodities or to generate the drive power in various modes of transport.<sup>2</sup> Burning fossil fuels releases greenhouse gases (GHGs) which trap solar energy in the Earth's atmosphere, cumulatively contributing to global warming and, ultimately, climate change.<sup>3</sup>

In 1992, the United Nations (UN) proposed a framework for dealing with climate change, the *United Nations Framework Convention on Climate Change* (UNFCCC), which entered into force in 1994.<sup>4</sup> UNFCCC segregates UN member states into developed (Annex I) and developing (non-Annex I) nations.<sup>5</sup> In 1997, the Kyoto Protocol (KP) was agreed as a practical attempt to put the aspirations of UNFCCC into effect.<sup>6</sup> KP prescribed a means of dealing with specified GHGs<sup>7</sup> and set a target of GHG emission reduction which, optimistically, will avert catastrophic climate change. Reduction targets were only set for Annex I nations under the UNFCCC concept of 'common but differentiated responsibilities' (CBDR);<sup>8</sup> through industrialisation, the developed nations were deemed disproportionately responsible for accelerating climate change.<sup>9</sup> KP was drafted to facilitate industrial growth for all nations in a less emissions intensive, more sustainable way.

CBDR precludes allocation of national ownership of GHG emissions from activities of an international character, specifically international shipping and aviation. Article 2(2) of KP (KP2(2)) assigns responsibility for these to Annex I nations through the international institutions which administer each: the International Civil Aviation Organization (ICAO) and the International Maritime Organization (IMO).<sup>10</sup> In terms of impact, international

\* This paper was the joint winner of the 2010 Morella Calder Best Essay prize.

<sup>1</sup> H Le Treut, R Somerville, U Cubasch, Y Ding, C Mauritzen, A Mokssit, T Peterson and M Prather, '2007: Historical Overview of Climate Change' in S Solomon, D Qin, M Manning, Z Chen, M Marquis, K B Averyt, M Tignor and H L Miller (eds), *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge University Press, 2007) 105; see also G S Callendar, 'On the Amount of Carbon Dioxide in the Atmosphere' (1958) 10(2) *Tellus* 243, 243-248.

<sup>2</sup> Intergovernmental Panel on Climate Change ('IPCC'), *Climate Change 2007: Synthesis Report*, 37 <[http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4\\_syr.pdf](http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr.pdf)>.

<sup>3</sup> *Ibid* 37-41.

<sup>4</sup> The Tenth Session of the FCCC Subsidiary Bodies, 12(99) *Earth Negotiations Bulletin* (1999) 1. <<http://www.iisd.ca/vol12/enb1299e.html>>.

<sup>5</sup> *United Nations Framework Convention on Climate Change* ('UNFCCC'), opened for signature 9 May 1992, 1771 UNTS 107 (entered into force 21 March 1994) annex I, 23.

<sup>6</sup> See UNFCCC website, Kyoto Protocol link <[http://unfccc.int/kyoto\\_protocol/items/2830.php](http://unfccc.int/kyoto_protocol/items/2830.php)>.

<sup>7</sup> *Kyoto Protocol to the United Nations Framework Convention on Climate Change* ('KP'), opened for signature 11 December 1997, 2303 UNTS 148 (entered into force 16 February 2005) annex A, 19.

<sup>8</sup> UNFCCC Preamble.

<sup>9</sup> *Ibid*; see also KP Preamble.

<sup>10</sup> KP art 2(2).

shipping contributed around 3 per cent of global GHG emissions in 2007,<sup>11</sup> twice the amount Annex I nation Australia emitted in 2000.<sup>12</sup> Yet Australia's relatively small population plus inefficiencies in land transportation and energy production mean Australians rank high amongst the worst per capita emitters of GHGs in the world;<sup>13</sup> on the other hand, shipping is touted as the lowest emitting mode of transport per tonne of cargo shifted.<sup>14</sup> As such, it seems sensible that transportation by sea be promoted as the mode of choice in a future constrained by climate change, whilst at the time doing whatever can be done to reduce its contribution to the problem.

In this paper, I will endeavour to reconcile the implications of GHG emissions, climate change and international shipping with IMO's mandate under KP.<sup>15</sup> I will start by looking at some of the implications of climate change in Part 2. In Part 3, I will review current regulation regimes in international shipping and how these might be applied to GHG emission controls. I will then address additional IMO proposals for GHG emissions control in Part 4. Part 5 contains my conclusions.

## 2 Climate Change

In 1988 the World Meteorological Organisation (WMO) and the United Nations Environment Programme (UNEP) established the Intergovernmental Panel on Climate Change (IPCC) to assess 'the scientific, technical and socioeconomic information relevant for the understanding of the risk of human-induced climate change'.<sup>16</sup> The IPCC's First Assessment Report, released in 1990, formed the basis for negotiating UNFCCC. The report determined:

There is a natural greenhouse effect which already keeps the Earth warmer than it would otherwise be... Emissions resulting from human activities ... will enhance the greenhouse effect, resulting on average in an additional warming of the Earth's surface.<sup>17</sup>

IPCC's Fourth Assessment Report, released in 2007, stated that the '[c]limate has changed on all time scales throughout Earth's history... past climate changes were natural in origin... whereas most of the warming of the past 50 years is attributable to human activities'.<sup>18</sup>

The report and subsequent research comprehensively analysed the probabilities of future impacts of climate change and, amongst other inferences, found:

- It is likely sea levels will rise<sup>19</sup> with the seas becoming more acidic, threatening marine ecosystems at their foundations.<sup>20</sup>
- 60 per cent of humankind lives in coastal areas and is thus vulnerable to climate change.<sup>21</sup>
- Low-lying coastal and delta regions are likely to be inundated – including low-lying cities such as New York, Amsterdam, Kolkata and others.<sup>22</sup>

<sup>11</sup> Ø Buhaug, JJ Corbett, Ø Endresen, V Eyring, J Faber, S Hanayama, DS Lee, D Lee, H Lindstad, AZ Markowska, A Mjeld, D Nelissen, J Nilsen, C Pålsson, JJ Winebrake, W Wu, K Yoshida, *Second IMO GHG Study 2009* (International Maritime Organization, 2009) Executive Summary, 1, 110.

<sup>12</sup> Kevin A Baumert, Timothy Herzog and Jonathon Pershing, *Navigating the Numbers, Greenhouse Gas Data and International Climate Change*, (2005), 12 <[http://pdf.wri.org/navigating\\_numbers.pdf](http://pdf.wri.org/navigating_numbers.pdf)>.

<sup>13</sup> Ross Garnaut, *The Garnaut Climate Change Review: Final Report* (Cambridge University Press, 2008) ch 7.1 (Australia's emissions in a global context); see generally Hal Turton, 'Greenhouse Gas Emissions in industrialised countries Where does Australia Stand?' (Discussion Paper Number 66, The Australia Institute, June 2004).

<sup>14</sup> Buhaug et al, above n 11, 8-9, ch 9.

<sup>15</sup> Patricia Birnie, Alan Boyle, and Catherine Redgwell, *International Law and the Environment* (Oxford University Press, 3<sup>rd</sup> ed, 2009) 356-360.

<sup>16</sup> IPCC, *History* <<http://www.ipccfacts.org/history.html>>.

<sup>17</sup> IPCC, *First Assessment Report* (1990) 52 [1] (overview) <[http://www.ipcc.ch/ipccreports/far/IPCC\\_1990\\_and\\_1992\\_Assessments/English/ipcc-90-92-assessments-overview.pdf](http://www.ipcc.ch/ipccreports/far/IPCC_1990_and_1992_Assessments/English/ipcc-90-92-assessments-overview.pdf)>.

<sup>18</sup> E Jansen, J Overpeck, K R Briffa, J-C Duplessy, F Joos, V Masson-Delmotte, D Olago, B Otto-Bliesner, W R Peltier, S Rahmstorf, R Ramesh, D Raynaud, D Rind, O Solomina, R Villalba and D Zhang, '2007: Palaeoclimate' in S Solomon, D Qin, M Manning, Z Chen, M Marquis, K B Averyt, M Tignor and H L Miller (eds), *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge University Press, 2007) 465.

<sup>19</sup> Ibid 317-318.

<sup>20</sup> Michael Roddy (ed), 'Climate change turning the seas acid: scientists', *Reuters* (online), 31 May 2009 <<http://www.reuters.com/article/environmentNews/idUSTRE54U1ZB20090601>>.

<sup>21</sup> UNFCCC, *Climate Change Small Island Developing States* (2005) 4 <[http://unfccc.int/resource/docs/publications/cc\\_sids.pdf](http://unfccc.int/resource/docs/publications/cc_sids.pdf)>.

<sup>22</sup> TJ Wilbanks, P Romero Lankao, M Bao, F Berkhout, S Cairncross, J-P Ceron, M Kapshe, R Muir-Wood and R Zapata-Marti, '2007: Industry, settlement and society' in M L Parry, O F Canziani, J P Palutikof, P J van der Linden and C E Hanson (eds), *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge University Press, 2007) 377 [357]-[390]; see also UNCTAD, *Maritime transport and the climate change challenge*, UNCTAD/DTL/TLB/2009/1 (1 December 2009) 5-6.

- Fisheries are likely to be impacted in Africa, Asia and South America.<sup>23</sup>
- Island states might lose both their sovereignty and their substance as they are submerged.<sup>24</sup>
- It is likely populous regions will have limited water for drinking and agriculture<sup>25</sup> and the spread of disease is likely to increase.<sup>26</sup>
- Continental deserts are likely to expand.<sup>27</sup>
- There will likely be severe loss of biodiversity.<sup>28</sup>

In response to the disproportionate impact of climate change their member states are likely to suffer, the African Union (AU),<sup>29</sup> Alliance of Small Island States (AOSIS)<sup>30</sup> (mostly representative of the Small Island Development States (SIDS))<sup>31</sup>, Latin American leaders<sup>32</sup> and representatives from the UN designated Least Developed Countries (LDCs)<sup>33</sup> have all been vocal in demanding more action on climate change. Currently, in a year, nations comprising these bodies probably do not cumulatively emit as many GHGs as international shipping.<sup>34</sup> These are non-Annex I nations, that is nations not required by KP to reduce GHG emissions. In fact, UNFCCC and KP do not ascribe a role for these nations at all; neither instrument provides a means by which such nations can proactively reduce global GHG emissions nor any method of redress if the Convention and Protocol are not enforced by the Annex I nations to which these documents apply: the enforcement branch of KP deals only with compliance breaches of Annex I nations and appeals by Annex I nations related thereto.<sup>35</sup> Other than being vocal, there is nothing non-Annex I nations can do under UNFCCC to conserve their future.

### 3 IMO Regulation

IMO evolved from an entity constituted by the UN in 1948. It is a specialised agency created under Article 57 of the *Charter of the United Nations*,<sup>36</sup> 'brought into relationship' with the UN, not a subsidiary of the UN.<sup>37</sup> IMO was charged with regulating international shipping and has drafted a number of conventions and attendant protocols to do so. Its 167 member states are obliged to bring these conventions into law domestically.<sup>38</sup> IMO's longevity and ubiquity mean that even if a shipping nation has not ratified an IMO convention, it would likely be

<sup>23</sup> Zoraido Portillo, *World's fisheries face climate change threat* (20 February 2009) Science and Development Network <<http://www.scidev.net/en/news/world-s-fisheries-face-climate-change-threat.html>>.

<sup>24</sup> The Alliance of Small Island States (AOSIS), 'Climate Change and Small Island States', (Presented at Ministerial Conference on Environment and Development in Asia and the Pacific 2000, Kitakyushu, Japan, 31 August - 5 September 2000) <<http://www.unescap.org/mced2000/pacific/background/AOSIS.htm>>.

<sup>25</sup> IPCC, above n 2, 48-49; see also Wilbanks et al, above n 22, 364-376.

<sup>26</sup> U Confalonieri, B Menne, R Akhtar, K L Ebi, M Hauengue, R S Kovats, B Revich and A Woodward, '2007: Human health' in M L Parry, O F Canziani, J P Palutikof, P J van der Linden and C E Hanson (eds), *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge University Press, 2007) 405-415 [391]-[431].

<sup>27</sup> IPCC, above n 2, 30; see also 'UN launches decade-long efforts to tackle desertification', UNEP News Centre, 16 August 2010 <<http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=646&ArticleID=6720&l=en>>.

<sup>28</sup> IPCC, above n 2, 48.

<sup>29</sup> African Union, The Conference of African Heads of State and Government on Climate Change CAHOSCC Meeting Kampala Uganda, 24 July 2010 <<http://www.africa-union.org/root/au/index/index.htm>>; see also African Union, *Member States* (18 August 2010) <<http://www.africa-union.org/root/au/memberstates/map.htm>>.

<sup>30</sup> AOSIS, *Alliance of Small Island States Declaration on Climate Change 2009* (2009) <<http://www.sidsnet.org/aosis/documents/AOSIS%20Summit%20Declaration%20Sept%202021%20FINAL.pdf>>; see also AOSIS, *Members and Observers* (21 September 2009) <<http://www.sidsnet.org/aosis/members.html>>.

<sup>31</sup> Small Island Developing States Network, *Who are the SIDS?* (2007) <<http://www.sidsnet.org/2.html>>.

<sup>32</sup> Anastasia Moloney, 'Latin America urges industrialised countries to foot climate bill', Thomson Reuters Foundation, 25 September 2009 <<http://www.alertnet.org/db/blogs/59877/2009/08/25-143554-1.htm>>.

<sup>33</sup> United Nations Conference on Trade and Development (UNCTAD), *The Least Developed Countries Report* <<http://www.unctad.org/Templates/Page.asp?intItemID=3073&lang=1>>; see also United Nations Statistics Division, *Composition of macro geographical (continental) regions, geographical sub-regions, Selected economic and other groupings* (1 April 2010) <<http://unstats.un.org/unsd/methods/m49/m49regin.htm>>.

<sup>34</sup> See appended Table, compilation from: World Bank, *2007 Little Green Data Book* (2007), generally <<http://siteresources.worldbank.org/INTDATA/64199955-1178226923002/21322619/LGDB2007.pdf>>; see also 'Carbon Emissions by Country', *Scribd*, 9 August 2007 <<http://www.scribd.com/doc/275791/carbon-emissions-by-country>>; see also Moloney, above n 32; see also Bronwyn Herbert, 'Africa demands compo for climate chaos' *ABC News* (online), 25 August 2009 <<http://www.abc.net.au/news/stories/2009/08/25/2666498.htm>>; see generally UNFCCC, *Ad Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol*, FCCC/KP/AWG/2009/MISC.1/Add.1 (25 March 2009) (Submissions from Grenada and Tuvalu).

<sup>35</sup> UNFCCC, *An Introduction to the Kyoto Protocol Compliance Mechanism* <[http://unfccc.int/kyoto\\_protocol/compliance/items/3024.php](http://unfccc.int/kyoto_protocol/compliance/items/3024.php)>; see also UNFCCC, *Report of the Conference of the Parties on its Seventh Session, held at Marrakesh from 29 October to 10 November 2001* Volume III, FCCC/CP/2001/13/Add.3 (21 January 2002) add pt 2 (Action Taken by the Conference of the Parties), Decisions 24/CP.7 64, 71-74 (Procedures and mechanisms relating to compliance under the Kyoto Protocol).

<sup>36</sup> *Charter of United Nations* ch IX.

<sup>37</sup> UNFCCC, *United Nations Maritime Conference, Draft Agreement on Relationship between United Nations and the Inter-governmental Maritime Consultative Organization*, E/CONF.4/57 (adopted 4 March 1948) 1.

<sup>38</sup> IMO, Member States link <<http://www.imo.org/>>; see also Institute of Maritime Law, *Southampton on Shipping Law* (Informa, 2008) 312-323.

bound by IMO's rules as a representation of customary law.<sup>39</sup> The overarching *United Nations Convention of the Law of the Sea 1982* (UNCLOS) ascribes implementation of its articles to a 'competent international organisation' which, by default, is IMO.<sup>40</sup>

IMO conventions regulate ship safety and seaworthiness, control marine pollution, allocate liability and compensation for damage and facilitate maritime trade and commerce.<sup>41</sup> IMO's members may be states which flag ships and states with ports engaged in international trade or both. In 2005, Resolution A973(24) was adopted by IMO member states.<sup>42</sup> This resolution demands flag and port state members enact national legislation incorporating a ratified IMO instrument and ensure compliance, including punitive actions, and embeds the 'no more favourable treatment' principle into all major IMO conventions, meaning flag states must ensure they discharge their convention obligations and port states must impose the conditions of the conventions on all ships visiting their territory.<sup>43</sup>

### 3.1 Rights of Flag States

Under UNCLOS, signatory states 'fix the conditions' for the granting of nationality and registration of ships on their registers;<sup>44</sup> these 'flag' states are then obligated to enforce IMO's rules regarding 'navigation, safety and administration, technical and social matters'.<sup>45</sup> That is, UNCLOS obliges flag states to comply with IMO conventions, and IMO obliges flag states to regulate seaworthiness, safety and pollution controls under these conventions;<sup>46</sup> a flag state which is not a signatory state would most likely have to comply with IMO provisions anyway as representative of customary international law.

Whilst the idea is sound in theory, it has been hard for IMO to achieve. Though there are certification and regulation regimes in place<sup>47</sup> under both the *International Convention for the Safety of Life at Sea*, amended 1974, and Protocols (1978 and 1988) (SOLAS)<sup>48</sup> and the *International Convention for the Prevention of Pollution from Ships*, as modified by 1978 Protocol (MARPOL 73/78),<sup>49</sup> and indeed under other IMO conventions, 'IMO itself has no mandate to implement directly or to enforce its regulations'.<sup>50</sup> In practice, states willing to offer open registries or 'Flags of Convenience' (FOCs)<sup>51</sup> have thrived, with two, Panama and Liberia, comprising 32.4 per cent of the world fleet in 2007,<sup>52</sup> and holding the top two places for ships flagged per tonnage in 2008.<sup>53</sup> FOCs are notorious for cutting costs around ship safety and pollution controls and for employing underqualified crews;<sup>54</sup> in March 2005, IMO noted flag states' low compliance with existing mandatory reporting requirements under MARPOL 73/78.<sup>55</sup>

<sup>39</sup> Institute of Maritime Law, above n 38; see also Birnie et al, above n 15, 386-390.

<sup>40</sup> Anna Mihneva-Natova, *The Relationship Between United Nations Conventions on the Law of the Sea and the IMO Conventions*, 8-10 <[http://www.un.org/Depts/los/nippon/unmff\\_programme\\_home/fellows\\_pages/fellows\\_papers/natova\\_0506\\_bulgaria.pdf](http://www.un.org/Depts/los/nippon/unmff_programme_home/fellows_pages/fellows_papers/natova_0506_bulgaria.pdf)>.

<sup>41</sup> Ibid 8; see also Institute of Maritime Law, above n 38, 312-323.

<sup>42</sup> See generally, IMO, *Code for the Implementation of Mandatory IMO Instruments*, Agenda Item 9, A24/Res.973 (19 December 2005).

<sup>43</sup> Ibid 17.

<sup>44</sup> *United Nation Convention on the Law of the Sea* (UNCLOS), opened for signature 10 December 1982, 1833 UNTS 3, (entered into force 16 November 1994) pt VII art 91.

<sup>45</sup> UNCLOS art 94.

<sup>46</sup> IMO, above n 38, Safety link; Institute of Maritime Law, above n 38, 305-326.

<sup>47</sup> IMO, above n 38, Safety link and Marine Environment link; see also Institute of Maritime Law, above n 38, chs 7, 8; see also Martin Davies and Anthony Dickey, *Shipping Law* (Lawbook, 3<sup>rd</sup> ed, 2004) chs 3, 4, 19.

<sup>48</sup> *International Convention for the Safety of Life at Sea* (SOLAS), opened for signature 1 November 1974, 1184 UNTS 278, (entered into force 25 May 1980).

<sup>49</sup> *International Convention for the Prevention of Pollution from Ships 1973* as amended by the 1978 Protocol (MARPOL73/78), opened for signature 17 February 1978, 1340 UNTS 61 (entered into force 2 October 1983).

<sup>50</sup> IMO, above n 38, WA O'Neil, Secretary-General of IMO, 'IMO and the application, compliance with and enforcement of safety regulations in the APEC Region' (Speech delivered at the International Symposium on Safer Shipping in the APEC Region, Sydney (Australia), 6 – 7 March 2001); see also IMO, above n 38, Legal link, Conventions, Enforcement.

<sup>51</sup> International Transport Workers' Federation, *What are Flags of Convenience?* <<http://www.itfglobal.org/flags-convenience/sub-page.cfm>>.

<sup>52</sup> UNCTAD, *Review of Maritime Transport 2007* (2007) x, 35-43 <[http://www.unctad.org/en/docs/rmt2007\\_en.pdf](http://www.unctad.org/en/docs/rmt2007_en.pdf)>.

<sup>53</sup> See appended Table.

<sup>54</sup> See generally Carmen Casado, 'Vessels on the High Seas: using a model Flag State compliance agreement to control marine pollution' (2004-2005) 35 *California Western International Law Journal* 203.

<sup>55</sup> See generally IMO Circular, *Compliance with the reporting requirements under MARPOL 73/78*, FSI.1/Circ.12 (17 March 2005).

### 3.2 Rights of Port States

In response, IMO has facilitated port states' right to audit foreign ships for IMO compliance through a number of individual IMO convention articles, regulations and IMO resolutions,<sup>56</sup> and a series of regional Memoranda of Understanding (MOUs).<sup>57</sup> Traditionally, foreign ships at berth are subject to the law of the relevant port state, as reflected in UNCLOS.<sup>58</sup> UNCLOS<sup>59</sup> permits contracting port states to enforce pollution violations against foreign flagged ships even if the breach occurred on the high seas or in foreign waters;<sup>60</sup> MARPOL 73/78 also permits the detention of foreign ships by port states for breaches of its pollution regulations.<sup>61</sup> Ships not complying with the MOUs or enacted UNCLOS/IMO provisions can be detained and minimal necessary repairs ordered.<sup>62</sup> IMO has also amended SOLAS so that most ships engaged in international travel must have a unique identification number, displayed internally and externally,<sup>63</sup> and has also instigated the Global Integrated Shipping Information System (GISIS) to facilitate global tracking of ships.<sup>64</sup>

In short, whilst flag states have the obligation to maintain safety, efficiency and pollution standards on the ships of their fleets, port states have the right to ensure flag states do so.

### 3.3 Emissions from international shipping

Annex A of KP currently lists six GHGs to be controlled: Carbon Dioxide (CO<sub>2</sub>), Methane (CH<sub>4</sub>), Nitrous oxide (N<sub>2</sub>O or NO<sub>x</sub>), Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs), and Sulphur hexafluoride (SF<sub>6</sub>).<sup>65</sup>

Though KP allocates control of these emissions from international shipping to IMO, some are not relevant to international shipping. IMO already regulates emissions of NO<sub>x</sub> and Sulphur Dioxide (SO<sub>2</sub> or SO<sub>x</sub>) through MARPOL 73/78 Annex VI (MARPOL VI) as air pollutants.<sup>66</sup> Although toxic, SO<sub>x</sub> is not a GHG but rather may have a localised atmospheric cooling effect.<sup>67</sup> Certain NO<sub>x</sub> emissions react with ozone and create a global warming effect, whereas other NO<sub>x</sub> compounds breakdown CH<sub>4</sub>, resulting in cooling.<sup>68</sup> Technical measures implemented to reduce emissions of these pollutants may indirectly contribute to global warming through resultant increased CO<sub>2</sub> emissions.<sup>69</sup> Despite these inconsistencies, in July 2010, IMO's Marine Environmental Protection Committee (MEPC), at its 60<sup>th</sup> session (MEPC60), agreed to further amend the same instrument, MARPOL VI, to accommodate provisions to control GHG emissions.<sup>70</sup> It is not clear how IMO will reconcile conflict regarding control of SO<sub>x</sub> and NO<sub>x</sub> as noxious pollutants and CO<sub>2</sub> as a GHG for ships subject to both control regimes under MARPOL VI. It seems logical NO<sub>x</sub> control should take precedence as it can be both a pollutant and a GHG, but IMO's address at the last UNFCCC Conference of the Parties, COP15,<sup>71</sup> stated that

<sup>56</sup> IMO, above n 42; see especially, SOLAS ch I reg 19; SOLAS modified by 1988 Protocol ch IX reg 6.2, ch XI reg 4; *International Convention on Load Lines*, opened for signature 5 April 1966, 640 UNTS 133 (entered into force 21 July 1968) as modified by 1988 Protocol art 21; see also MARPOL 73/78 arts 5-6, reg 8A Annex 1, reg 15 Annex II, reg 8 Annex III, reg 8 Annex V; *International Convention on Standards of Training, Certification and Watch-keeping for Seafarers*, opened for signature 7 July 1978, 1361 UNTS 190 (entered into force 28 April 1984) art X; *International Convention on Tonnage Measurement of Ships*, opened for signature 23 June 1969, 1291 UNTS 4 (entered into force 18 July 1982) art 12; *Procedures for Port State Control* IMO Resolution A.787(19), adopted 23 November 1995 and *Amendments to Procedures for Port State Control* IMO Resolution A.882(21), adopted 25 November 1999 as cited by Captain Ambrose Rajadurai, 'Regulation of Shipping: The Vital Role of Port State Control' (2004) 18 *Maritime Law Association of Australia and New Zealand Journal* 83, 83-90.

<sup>57</sup> Rajadurai, above n 56, 93-94; see also IMO, *Port State Control, an update on IMO's work in 2003* (2003) <<http://www.imo.org/OurWork/Safety/Implementation/Pages/PortStateControl.aspx>>; see also Birnie et al, above n 15, 410; see also Casado, above n 54, 218-219; see also Ho-Sam Bang, 'Port State Jurisdiction and Article 218 of the UN Convention on the Law of Sea' (2009) 40(2) *Journal of Maritime Law and Commerce* 291, 291-313.

<sup>58</sup> UNCLOS art 25(2).

<sup>59</sup> Rajadurai, above n 56, 87; see also UNCLOS art 211(3).

<sup>60</sup> Bang, above n 57, 299-300; see also UNCLOS art 218.

<sup>61</sup> MARPOL 73/78 art 5(2); see also Mihneva-Natova, above n 40, 20-21.

<sup>62</sup> Casado, above n 54, 219; see also UNCLOS arts 218, 219.

<sup>63</sup> MARPOL 73/78 ch V reg 19.2.4, ch XII reg 3.

<sup>64</sup> *Global Integrated Shipping System* (2010) <<http://gis.imo.org/Public/>>.

<sup>65</sup> KP annex A.

<sup>66</sup> IMO, above n 38, *Prevention of Air Pollution from Ships*.

<sup>67</sup> CE Delft, Germanischer Lloyd, MARINTEK, Det Norske Veritas, *Greenhouse Gas Emissions for Shipping and Implementation Guidance for the Marine Fuel Sulphur Directive* (December 2006) pt D 181, 187 <[http://ec.europa.eu/environment/air/pdf/transport/final\\_report.pdf](http://ec.europa.eu/environment/air/pdf/transport/final_report.pdf)>.

<sup>68</sup> Ibid; see also Laurie Goldsworthy, 'Exhaust Emissions from Ship Engines – Significance, Regulations, Control Technologies' (2010) 24 *Australia & New Zealand Maritime Law Journal* 21, 21-29.

<sup>69</sup> Above n 67; Goldsworthy, above n 68, 21-29.

<sup>70</sup> IMO, *Report of the Marine Environment Protection Committee on its Sixtieth Session*, Agenda item 22, MEPC 60/22 (12 April 2010) Section 4 (Prevention of Air Pollution from Ships) [4.23]–[4.36]; see generally Goldsworthy, above n 68.

<sup>71</sup> IMO, 'Control of Greenhouse Gas Emissions from Ships Engaged in International Trade' (Presented at the United Nations 15<sup>th</sup> Climate Change Conference – Eighth Session of the Ad Hoc Working Group on Long-term Co-operative Action (AWG-LCA 8), Copenhagen, 7-18 December 2009) 3-5.

CO<sub>2</sub> is the ‘most important’ GHG in international shipping.<sup>72</sup> NO<sub>x</sub> emissions controls are only enforceable in designated emissions control areas (ECAs), whereas CO<sub>2</sub> controls would apply globally and would presumably be similarly enforced. MEPC60 also acknowledged the contribution of ship emissions of Black Carbon to global warming, but has deferred discussion on the issue.<sup>73</sup>

In April 2009, IMO released a second study of GHG emissions from shipping.<sup>74</sup> This comprehensive study recognises the likely impacts of current and future levels of GHG emissions from shipping and identifies technical and operational measures which could reduce emissions by ‘25 to 75 per cent below the current levels’.<sup>75</sup> However, although KP2(2) instructs Annex I nations to limit or reduce GHG emissions from international shipping through IMO, it does not state to what extent. With no cap set, it is hard to frame an appropriate level of mitigation within the range IMO postulates. Accurately assessing actual emissions from international shipping is also problematic. The GHG report noted the difficulty of assessing GHG emissions from international shipping using the IPCC/KP top-down approach based on fuel purchases.<sup>76</sup> Buhaug et al<sup>77</sup> suggested a more accurate bottom-up activity-based approach, where a ship’s route, speed, cargo and class are factored into equations, however these estimates necessarily include some domestic shipping, which is specifically excluded from IMO’s governance under KP. A New Zealand study in 2008 on shipping over particular international routes calculated emissions using Buhaug’s approach of six times those the New Zealand government had published using IPCC/KP methods.<sup>78</sup> This indicates international shipping may be contributing to GHG emissions at a greater rate than previously estimated; it also suggests GHG emissions estimates for other sectors using IPCC/KP methodologies may be flawed.

For international shipping, reducing GHG emissions necessarily involves monitoring and regulation of existing fossil fuel burning marine engines on a per ship basis, an activity which nominally falls within the purview of the flag state.<sup>79</sup> Almost all flag states blacklisted as FOCs by both the International Transport Worker’s Federation<sup>80</sup> and under regional MOUs<sup>81</sup> are also non-Annex I nations to UNFCCC,<sup>82</sup> with many also counted as either LDCs, or SIDS.<sup>83</sup> FOC nations are thus also nations which are likely to be disproportionately affected by climate change, and which have been active in lobbying UNFCCC for more stringent measures to be taken to address climate change.<sup>84</sup> In theory, IMO’s KP imperative could particularly empower these nations to actively combat climate change in a way KP does not.

### 3.4 IMO promoted GHG reductions measures

At MEPC60, IMO members agreed to three technical and operational emissions reduction measures to be brought into force through modifications to MARPOL VI. These measures may commence by January 2013,<sup>85</sup> and are outlined below.

#### 3.4.1 Energy Efficiency Design Index (EEDI)<sup>86</sup>

The construction of all new ships will be rated according to a mandatory EEDI which could ‘provide a strong incentive to improve the design efficiency of new ships’.<sup>87</sup> EEDI is intended to ‘stimulate innovation and

<sup>72</sup> Buhaug et al, above n 11, 1.

<sup>73</sup> IMO *IMO MEPC60 Report* (2 April 2010) 10, see also 9-12 Lloyd’s Register <[https://www.cdlive.lr.org/information/Documents/IMOMarineServices2010/LR\\_IMO\\_MEPC\\_60\\_Report.pdf](https://www.cdlive.lr.org/information/Documents/IMOMarineServices2010/LR_IMO_MEPC_60_Report.pdf)>.

<sup>74</sup> Buhaug et al, above n 11.

<sup>75</sup> Ibid 1.

<sup>76</sup> Ibid 24, 28; see also Inga J Smith, Oliver J A Howitt, Vincent G N Revol, Warren B Fitzgerald and Craig J Rodger, ‘Greenhouse Gas Emissions from International Maritime Transport: The Science in a New Zealand and Australian Context’ (2010) 24 *Australia & New Zealand Maritime Law Journal* 30, 32-33.

<sup>77</sup> Buhaug et al, above n 11, 24-28.

<sup>78</sup> Smith et al, above n 76, 34.

<sup>79</sup> See above nn 44-46.

<sup>80</sup> International Transport Workers’ Federation, above n 51, FOC Countries link.

<sup>81</sup> Rajadurai, above n 56, 93-94; see also Birnie et al, above n 15, 410.

<sup>82</sup> See appended Table.

<sup>83</sup> See appended Table.

<sup>84</sup> Through national lobbying and through associations such as AOSIS/SIDS above nn 28, 30, 31; AU, above n 29; see also UNCTAD, above n 33; see generally Moloney, above n 32.

<sup>85</sup> Above n 73, 10.

<sup>86</sup> Ibid 10-12; see also Buhaug et al, above n 11, 44-46.

<sup>87</sup> IMO, *Prevention of Air Pollution from Ships, Second IMO GHG Study 2009*, Executive Summary (Note by Secretariat), MEPC 59/4/7 (9 April 2009) 12 [1.25].

technical development of all elements influencing the energy efficiency<sup>88</sup> of ship design and is calculated using a formula, the complexity of which is an attempt to accommodate a wide range of ships; however, it is not applicable to all engine types.<sup>89</sup> IMO has produced a circular of interim guidelines for calculations using the formula and interim guidelines for voluntary verification of EEDI to new ships.<sup>90</sup> In practice, EEDI will focus mainly on hull, engine and rudder design.<sup>91</sup> Reviews of EEDI will be submitted to MEPC61.<sup>92</sup>

### 3.4.2 Ship Energy Efficiency Management Plan (SEEMP)<sup>93</sup>

All ships will draft a mandatory ship-specific SEEMP (previously ‘SEMP’) to ‘improve the energy efficiency of ship operations’.<sup>94</sup> The shipowner, operator or other party concerned would develop the SEEMP for a given ship, preferably as part of the shipowning company’s larger environmental management plan. The plan would improve energy efficiency through ‘planning, implementation, monitoring, and self-evaluation and improvement’.<sup>95</sup> SEEMP should not add to the administrative burden of crew, though continuous and consistent monitoring is necessary for the plan to be effective; as much as possible, shore staff should monitor data records with respect to the SEEMP, and all records should be used to evaluate the performance of the ship before writing a SEEMP for the next cycle of monitoring. IMO suggests the following matters be incorporated into a SEEMP: voyage planning and weather routing [sic]; early communication to optimise port operation; optimal use of speed, shaft power (constant RPM), trim, ballast, propeller and propeller inflow, rudder and autopilot; hull and propulsion maintenance; cargo and fleet handling; fuel type and energy recovery; waste, heat and methane recovery, and other matters.<sup>96</sup>

### 3.4.3 Energy Efficiency Operational Index (EEOI)<sup>97</sup>

IMO is also considering a mandatory EEOI with a penalty provision which would ‘incentivize both technical and operational measures’.<sup>98</sup> IMO has published a circular containing guidelines for a voluntary EEOI.<sup>99</sup> EEOI is also a formula which requires collection of data from a ship, including distance travelled, as recorded in the ship’s log-book, quantity and type of fuel used, and all fuel information relating to CO<sub>2</sub> emitted as provided on Bunker Delivery Notes (BDNs) required under regulation 18, MARPOL VI.<sup>100</sup> IMO again recommends shore staff monitor the EEOI, so as not to overly burden the ship’s crew, and that EEOI be used to set internal performance criteria and targets.

Additionally, IMO’s GISIS may be able to assist both flag and port states to verify GHG emissions over a particular voyage.<sup>101</sup> Automatic emissions monitoring systems for ships are also now commercially available.<sup>102</sup>

Whilst EEDI, SEEMP and EEOI may provide environmental benefits, the 2009 GHG study found these will not be fully effective in reducing GHG emissions from shipping at least cost.<sup>103</sup> IMO’s study concludes that the

<sup>88</sup> IMO, ‘Control of Greenhouse Gas Emissions from Ships engaged in International Trade in a post-2012 Regime’ (Information note on the Fifth Session of the Conference of the Parties serving as the Meeting of the Parties to the Kyoto Protocol – CMP5, Copenhagen, 7 – 18 December 2009) 2, 16, 19-23.

<sup>89</sup> IMO, *Interim Guidelines on the Method of Calculation of the Energy Efficiency Design Index for New Ships*, MEPC.1/Circ.681 (17 August 2009) 2 and generally.

<sup>90</sup> See generally, IMO, *Interim Guidelines for Voluntary Verification of the Energy Efficiency Design Index*, MEPC.1/Circ.682 (17 August 2009).

<sup>91</sup> Buhaug et al, above n 11, 44-46; IMO, above n 88, 19-23; see also IMO, above n 73, 10-12.

<sup>92</sup> For example, The Royal Institute of Naval Architects, ‘Report on a trial verification of the Energy Efficiency Design Index (EEDI)’ (Paper for MEPC 61, 27 September – 1 October 2010) Agenda and papers item 5 - Reduction of GHG emissions from ships, MEPC 61/5/2 <<http://www.rina.org.uk/article855.html>>.

<sup>93</sup> IMO, above n 88, 16, 19, 23-25; see also Buhaug et al, above n 11, 64; see also IMO, above n 73, 10-11.

<sup>94</sup> IMO, above n 88, 23.

<sup>95</sup> IMO, *Guidance for the Development of a Ship Energy Efficiency Management Plan (SEEMP)*, MEPC.1/Circ.683 (17 August 2009) 2 and generally.

<sup>96</sup> *Ibid.*

<sup>97</sup> Buhaug et al, above n 11, 63-64; see also IMO, *Guidelines for the Voluntary Use of the Ship Energy Efficiency Operational Indicator*, MEPC.1/Circ.684 (17 August 2009) 3-7.

<sup>98</sup> Buhaug et al, above n 11, 6.

<sup>99</sup> IMO EEOI Guidelines, above n 96.

<sup>100</sup> *Ibid.* 5.

<sup>101</sup> GISIS, above n 64.

<sup>102</sup> For example, *A Guide to Ship CO<sub>2</sub> Indexing*, Martek Marine (2010) <<http://www.martek-marine.com/ProductsSystems/AGuidetoShipCO2Indexing.aspx>>; see also *Continuous Ship Engine Emissions Monitoring*, Martek Marine (2010) <<http://www.martek-marine.com/ProductsSystems/EngineEmissionsMonitoring/MariNOx.aspx>> which covers CO<sub>2</sub>, NO<sub>x</sub> and SO<sub>x</sub>.

<sup>103</sup> Buhaug et al, above n 11, 13.

introduction of market-based instruments (MBIs) will disincentivise the use of marine fossil fuels because of the additional cost of using those fuels.<sup>104</sup>

## 4 IMO Market-Based Instruments (MBIs)

As defined by the Organization for Economic Cooperation and Development (OECD):

[MBIs] seek to address the market failure of 'environmental externalities' 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.<sup>105</sup>

Marine bunker fuel produces CO<sub>2</sub>, NO<sub>x</sub>, SO<sub>x</sub>, volatile organic compounds, particulate matter and soot.<sup>106</sup> Of these, only CO<sub>2</sub> and NO<sub>x</sub> are currently considered GHGs under KP. The negative effects of NO<sub>x</sub> and SO<sub>x</sub> on human health and the environment<sup>107</sup> have caused individual nations and IMO to reduce emission of these substances<sup>108</sup> via regional Emissions Trading Schemes (ETSs), as noted in the above-mentioned amendments to MARPOL VI.<sup>109</sup> Regional NO<sub>x</sub> and SO<sub>x</sub> ETSs have proved so effective, both within shipping<sup>110</sup> and on land,<sup>111</sup> that the push for a GHG ETS for international shipping was inevitable.

IMO has proposed either a Marine Emissions Trading Scheme (METS) or a bunker fuel levy to control emissions from international shipping, each comprised of 'several' submissions put to it,<sup>112</sup> with further submissions presented to IMO since COP15.<sup>113</sup> IMO recently instigated an Expert Group to conduct a Feasibility Study and Impact Assessment of 10 submissions drawn from negotiations at MEPC60.<sup>114</sup> The Expert Group will submit a written report to MEPC61 in September/October 2010.<sup>115</sup>

In order to review the IMO proposals, it is prudent to appraise the types of MBI suggested and other matters related to implementation, including enforcement.

### 4.1 Emissions Trading Scheme (ETS)

KP Article 17 permits an international ETS as one of the flexibility mechanisms by which Annex I nations' GHG emissions will be controlled.<sup>116</sup> Under an ETS, each tonne of GHG emitted is equated to a tradable permit. In KP ETSs, all GHGs emitted are represented by tonnes of CO<sub>2</sub> equivalent (CO<sub>2</sub>e) to the global warming potential of the actual gas emitted.<sup>117</sup> For example, one tonne of NO<sub>x</sub> has 280 times the global warming potential of one tonne of CO<sub>2</sub>e over 20 years.<sup>118</sup> Although IMO already controls NO<sub>x</sub> emissions from shipping, it seems unlikely the current NO<sub>x</sub> ETSs will be adjusted to comply with CO<sub>2</sub>e measures for a METS because IMO has stated CO<sub>2</sub> is the most important GHG emitted by international shipping;<sup>119</sup> that is, the METS will likely deal solely with CO<sub>2</sub> emissions.

<sup>104</sup> Ibid 13-14.

<sup>105</sup> OECD, *Market-based Instruments* (23 July 2007) <<http://stats.oecd.org/glossary/detail.asp?ID=7214>> Glossary of Statistical Terms.

IMO referred to MBIs in GHG Study 2009, but now refers to them as Market Based Mechanisms (MBMs); for the purposes of this paper, the acronym MBIs will be used.

<sup>106</sup> Veronika Eyring, James J Corbett, David S Lee and James J Winebrake, 'Brief summary of the impact of ship emissions on atmospheric composition, climate, and human health', Submission to the Health and Environment sub-group of the International Maritime Organization, 6 November 2007, 1 (Emissions) <[http://www.pa.op.dlr.de/~VeronikaEyring/Eyringetal\\_IMOBriefSummary\\_FINAL.pdf](http://www.pa.op.dlr.de/~VeronikaEyring/Eyringetal_IMOBriefSummary_FINAL.pdf)>.

<sup>107</sup> Ibid 3 (Conclusions).

<sup>108</sup> Birnie et al, above n 15, chs 6 & 7 generally.

<sup>109</sup> Ibid; see also above nn 66-68.

<sup>110</sup> See generally, Andrew Aulisi, Alexander E Farrell, Jonathon Pershing and Stacy Vandever, 'Greenhouse Gas Emissions Trading in US States, Observations and Lessons from the OTC NO<sub>x</sub> Budget Program' (WRI White Paper, 2005) <[http://pdf.wri.org/nox\\_ghg.pdf](http://pdf.wri.org/nox_ghg.pdf)> .

<sup>111</sup> Birnie et al, above n 15, ch 6.

<sup>112</sup> Buhaug et al, above n 11, 5-7, 67, 70-87.

<sup>113</sup> IMO, 'Session 5 Market-based Measures, Other Approaches – Market-based measures for international shipping', Submission to the 3rd ICAO Colloquium on Aviation and Climate Change, *Outcome of the Sixtieth Session of the Marine Environment Protection Committee, Further progress made on technical, operational and market-based measures*, May 2010 <[http://www.icao.int/CLQ10/Docs/5\\_IMO-Handout.pdf](http://www.icao.int/CLQ10/Docs/5_IMO-Handout.pdf)> .

<sup>114</sup> Ibid [12].

<sup>115</sup> Ibid [16].

<sup>116</sup> UNFCCC, Kyoto Protocol link, Mechanisms link, Emissions Trading link.

<[http://unfccc.int/kyoto\\_protocol/mechanisms/emissions\\_trading/items/2731.php](http://unfccc.int/kyoto_protocol/mechanisms/emissions_trading/items/2731.php)> .

<sup>117</sup> OECD, *Carbon Dioxide Equivalent* (25 September 2001) <<http://stats.oecd.org/glossary/detail.asp?ID=285>> Glossary of Statistical Terms.

<sup>118</sup> UNFCCC, *GHG Data* <[http://unfccc.int/ghg\\_data/items/3825.php](http://unfccc.int/ghg_data/items/3825.php)> .

<sup>119</sup> Above n 11, 1.



There are two basic forms of ETSs: baseline and credit, and cap and trade.

#### 4.1.1 Baseline and credit

A baseline and credit ETS allows an eligible emitting entity to set a baseline for emissions over a compliance period. If the entity proves it emitted less than that baseline amount of carbon, it is issued tradable permits for tonnes of GHG emissions avoided. It can bank or trade these credits.<sup>120</sup>

KP is essentially a global baseline and credit ETS where the emitting entities covered are the Annex I nations and KP sets emissions targets for nations over compliance periods; targets are set around baseline years.<sup>121</sup> These targets, if achieved, should mitigate climate change, but there is no cap on global emissions because non-Annex I nations are not subject to emissions control.<sup>122</sup> Currently the world's probable largest GHG emitter, China,<sup>123</sup> has no obligation to reduce its emissions under KP;<sup>124</sup> neither does Indonesia, Brazil or India (fourth, fifth and seventh respectively).<sup>125</sup> Annex I nations set their own baseline year under KP, then self-evaluate yearly GHG emissions and submit a national report to UNFCCC.<sup>126</sup> KP allots Annex I nations Assigned Allocation Units (AAUs) at the beginning of each compliance period for amounts these nations are allowed to emit, granted as a percentage of emissions over the nation's chosen baseline year. A nation can bank or trade excess AAUs at the end of a compliance period.<sup>127</sup>

Baseline and credit ETSs have faced a number of criticisms due to difficulty in establishing valid baselines and costs to administer, no real incentive for emitters to reduce emissions, ease of rorting by eligible emitters and indeterminate cap to future individual emissions.<sup>128</sup> However, it is also claimed baseline and credit ETSs pass less cost on to the consumer than cap and trade.<sup>129</sup>

#### 4.1.2 Cap and trade

Most extant ETSs follow a cap and trade model, where a national cap is set and permits are issued to eligible emitting entities up to that cap, based on the entity's emissions relative to a national total. Entities must pay for emissions over the allowance by either purchasing permits from other eligible entities which have not reached their limit, or by acquiring other eligible permits. The market sets the price of permits because, as the cap is tightened, the permits become scarcer and more valuable. In theory, for some entities it will be more cost effective to invest in technology to internally reduce emissions than to purchase permits to emit.<sup>130</sup>

The effectiveness of this type of ETS depends largely on the accuracy of the cap setting. In 2006, the EU ETS crashed because an over-allocation of free permits undermined the trading price – a glut meant there was no need to trade.<sup>131</sup> It has also been argued that any ETS will only reduce national or sectoral GHG emissions if the trading arena is limited to that nation or sector.<sup>132</sup> However, KP encourages the entrance into national ETSs of tradable permits generated from sources external to the relevant nation. These units are generated through the other flexibility mechanisms of KP,<sup>133</sup> each unit purportedly offsetting one tonne of CO<sub>2</sub>e GHG, which can be traded under KP in lieu of an emission permit. An emitting entity could use its allocated permits and offset

<sup>120</sup> David Hodgkinson and Renee Garner, *Global Climate Change : Australian law and policy* (LexisNexis Butterworths, 1<sup>st</sup> ed, 2008) 240-248.

<sup>121</sup> UNFCCC, above n 116, Kyoto Protocol link.

<sup>122</sup> Hodgkinson and Garner, above n 120, 62-64.

<sup>123</sup> Chris Buckley and David Fox (ed), 'China says moving to enforce greenhouse gas goals', *Reuters* (online), 28 February 2010 <<http://www.reuters.com/article/idUSTRE61R12720100228>>.

<sup>124</sup> Lan Lan, 'No intention' of capping emissions: But country 'still committed' to reducing carbon intensity', *China Daily*, 25 February 2010, 3 <[http://www.chinadaily.com.cn/china/2010-02/25/content\\_9499066.htm](http://www.chinadaily.com.cn/china/2010-02/25/content_9499066.htm)>.

<sup>125</sup> The Garnaut Climate Change Review, *Greenhouse gas emissions by source and country – 3 Emissions in the Platinum Age* (16 October 2008) <<http://www.garnautreview.org.au/chp3.htm>>.

<sup>126</sup> UNFCCC, *Kyoto Protocol Reference Manual on Accounting and Emissions of Assigned Amount* (November 2008) 31-39 <[http://unfccc.int/resource/docs/publications/08\\_unfccc\\_kp\\_ref\\_manual.pdf](http://unfccc.int/resource/docs/publications/08_unfccc_kp_ref_manual.pdf)>; see also UNFCCC, above n 116, Kyoto Protocol link, Reporting link; see also Sebastian Oberthür, and Hermann Ott, *The Kyoto Protocol: international climate policy for the 21st century* (Springer, 1999) 121-140.

<sup>127</sup> UNFCCC, *Kyoto Protocol Reference Manual on Accounting and Emissions of Assigned Amount* (November 2008) 31-39 <[http://unfccc.int/resource/docs/publications/08\\_unfccc\\_kp\\_ref\\_manual.pdf](http://unfccc.int/resource/docs/publications/08_unfccc_kp_ref_manual.pdf)>.

<sup>128</sup> Hodgkinson and Garner, above n 120, 245-246; see also McLennan Magasanik Associates, *Policy Brief: Baseline and Credit versus Cap and Trade Emissions Trading Schemes*, 1-3 <<http://www.climateinstitute.org.au/images/capandtradebriefingpaper.pdf>>.

<sup>129</sup> McLennan Magasanik Associates, above n 128, 1-3.

<sup>130</sup> Hodgkinson and Garner, above n 120, ch 7.

<sup>131</sup> Regina Betz and Misato Sato, Editorial, 'Emissions trading: lessons learnt from the 1st phase of the EU ETS and prospects for the 2nd phase' (2006) 6 *Climate Policy* 351, 357.

<sup>132</sup> Hodgkinson and Garner, above n 120, 62-64.

<sup>133</sup> UNFCCC, above n 116.

excess emissions by purchasing units thus generated. If it is more cost effective to invest in units than to reduce emissions, the emitting entity will not reduce emissions, merely ‘offset’ them. It is worth noting the tradable KP units equate estimations of GHGs *which have not been emitted* (that have been avoided) with *actual* emissions created by an Annex I nation. That is, an Annex I nation *emits* a tonne of CO<sub>2</sub>e GHG and pays for a permit that *avoids* emitting the same. The Annex I nation has not reduced its actual emissions but has paid for permits representing avoided emissions elsewhere on the planet. These units, purportedly reducing global GHG emissions, are discussed below.

#### 4.1.3 Units tradable in a KP ETS

##### *Joint Implementation (JI) generating Emissions Reduction Units (ERUs)*<sup>134</sup>

Defined in Article 6 of KP, JI allows one Annex I nation to earn ERUs from an emission-reduction or emission removal project in which it has invested in another Annex I nation. Both parties must have ETSs in place; emitting entities covered by such ETSs cumulatively contribute to the home nation’s KP commitment objectives by reducing emissions.<sup>135</sup> The ERU is a unit generated to represent a tonne of CO<sub>2</sub>e reduced or removed through implementation of the project; to date, mostly through the removal of CH<sub>4</sub>.<sup>136</sup> The ERU generated is retired from the first nation’s KP commitment. In reality, the ERU reduces both the emitting entity’s obligation under its national ETS and the host nation’s actual emissions counted under KP. Whilst only the first nation is credited with the ERU, the second nation experiences the actual emissions reduction. JI has not been a particularly popular mechanism; the activity generated has mostly been between Western and Eastern Europe.<sup>137</sup>

##### *Clean Development Mechanism (CDM) generating Certified Emissions Reductions (CERs)*<sup>138</sup>

Defined in Article 12 of KP, CDM allows an Annex I nation to implement an emission-reduction project in a developing country (non-Annex I). Emitting entities within an ETS conducted by the Annex I nation can invest in CDM and acquire CERs.<sup>139</sup> Each CER would also be counted under the Annex I nation’s KP commitment. CDM has facilitated investment in ‘clean’ energy projects in non-Annex I nations by foreign corporations and governments to offset GHG emissions in their home (Annex I) countries.<sup>140</sup> China and India have benefited most from CDM projects,<sup>141</sup> with 26 per cent CERs being generated by the reduction of HFCs, PFCs and NO<sub>x</sub>.<sup>142</sup>

##### *Land-Use, Land-Use Change and Forestry (LULUCF), generating Removal Units (RMUs)*<sup>143</sup>

Defined in Article 3(3) and (4) of KP, LULUCF allows an emitting entity in an Annex I nation to offset its emissions through avoided deforestation or plantation of forest sinks, as either JI or CDM projects. LULUCF has been criticised for a number of reasons: forest sinks are costly to establish and maintain and thrive on land best suited to growing food;<sup>144</sup> CO<sub>2</sub> is the only GHG sequestered, slowly over decades, and it is hard to verify to what degree.<sup>145</sup> LULUCF may allow non-Annex I nations to generate units tradable to Annex I nations through preserving forest sinks which would otherwise be cleared for domestic land use.<sup>146</sup> Whilst there are obvious

<sup>134</sup> Ibid Kyoto Protocol link, Mechanisms link, Joint Implementation (JI) link.

<sup>135</sup> KP art 6 (3).

<sup>136</sup> UNEP RISOE Centre, *Energy, Climate and Sustainable Development*, (1 August 2010) <<http://cdmpipeline.org/ji-projects.htm>>.

<sup>137</sup> Ibid; see also Deborah Murphy, John Drexhage and Peter Wooders, *International Carbon Market Mechanisms in a Post-2012 Climate Change Agreement*, May 2009, 5, International Institute for Sustainable Development (IISD) <[http://www.iisd.org/pdf/2009/international\\_carbon\\_market\\_mechanisms.pdf](http://www.iisd.org/pdf/2009/international_carbon_market_mechanisms.pdf)>.

<sup>138</sup> UNFCCC, above n 116, Kyoto Protocol link, Mechanisms link, Clean Development Mechanism (CDM) link.

<sup>139</sup> KP art 12 (9).

<sup>140</sup> Murphy et al, above n 137, 6-7; see also John Vidal, ‘Billions wasted on UN climate programme, Energy firms routinely abusing carbon offset fund, US studies claim’, *Guardian* (online), 26 May 2008

<<http://www.guardian.co.uk/environment/2008/may/26/climatechange.greenpolitics>>.

<sup>141</sup> UNEP RISOE Centre, *Energy, Climate and Sustainable Development, CDM projects grouped in types* (1 August 2010)

<<http://cdmpipeline.org/cdm-projects-type.htm>>.

<sup>142</sup> Ibid.

<sup>143</sup> UNFCCC, *LULUCF under the Kyoto Protocol* <[http://unfccc.int/methods\\_and\\_science/lulucf/items/4129.php](http://unfccc.int/methods_and_science/lulucf/items/4129.php)>.

<sup>144</sup> For example, see generally Sarah Bellamy, ‘Discussion Paper: Trees, Agriculture and Emissions Trading’, Bulletin 4777, Government of Western Australia, Department of Food and Agriculture (October 2009)

<[http://www.agric.wa.gov.au/objtwr/imported\\_assets/content/lwe/cli/bull4777treesagemissionstrading.pdf](http://www.agric.wa.gov.au/objtwr/imported_assets/content/lwe/cli/bull4777treesagemissionstrading.pdf)>.

<sup>145</sup> Ibid; see also Murphy et al, above n 137, 11-12; see also Richard M Adams et al, ‘Sequestering Carbon on Agricultural Land: Social Cost and Impacts on Timber Markets’ (1993) 11(1) *Contemporary Policy Issues* 76, 79-81, IV Conclusion.

<sup>146</sup> Murphy et al, above n 137, 11-12.

benefits to preserving standing forests, non-Annex I governments may withdraw these forests from the stewardship of the traditional owners, impacting on human rights.<sup>147</sup>

#### *Assigned Amount Units (AAUs)*<sup>148</sup>

Each of the above KP units is also effectively tradable with AAUs, which Annex I nations are allocated in accordance with the baseline set in a compliance period under KP.<sup>149</sup> Under Article 17 of KP, Annex I nations can trade excess AAUs with each other. At the inception of KP, eastern bloc countries were allocated AAUs based on emissions during the Soviet era, emissions they have yet to equal;<sup>150</sup> consequently some nations have been over-allocated AAUs, causing a trading glut.<sup>151</sup> Whilst this suits other Annex I parties wishing to acquire permits, it does not contribute to a global reduction of GHGs.

#### 4.1.4 Criticisms of units tradable in a KP ETS

In addition to specific criticisms noted above, it has been suggested that many CDM projects would have occurred anyway, without the investment from Annex I nations, and cannot truly be seen as *additional* to a 'business as usual' scenario, a key requirement for both CDM and JI verification.<sup>152</sup> The UNFCCC Secretariat also recently commissioned an independent review of the management, verification and administration of both CDM and JI project submissions, presented at COP15.<sup>153</sup> The review found, amongst other issues:

- Variable interpretation and application of standards and guidelines with frequent changes and updates to the guidelines and rules;
- Few negative consequences for DOEs (Designated Operational Entities)<sup>154</sup> for poor-quality submissions for JI and CDM projects;
- Lack of transparency on system and stakeholder performance;
- No systematic, balanced measurement of how well either the Secretariat or DOEs are performing.<sup>155</sup>

Amongst other proposals, the review recommended the Secretariat:

[implement] key performance indicators, targets and performance dialogues at all levels ... and ... [i]mprove communication between the secretariat and DOEs to ensure effective collaboration in systematically identifying and removing sources of quality errors.<sup>156</sup>

It concluded that action on recommendations would provide a foundation 'that is much more scalable for any future growth in the use of [MBIs] beyond 2012'.<sup>157</sup>

As IMO intends to enter a METS into this amorphous KP carbon market,<sup>158</sup> it is critical the UNFCCC Secretariat is encouraged to act on the recommendations made in the review; the integrity of any units available for trade should withstand scrutiny. As IMO's GHG study has already noted the difficulties in accurately assessing GHG emissions from international shipping,<sup>159</sup> it seems a METS could also face over-allocation of emissions permits and a trading glut; in any event, ETSS, which are designed to function as financial markets, can be volatile and subject to collapse.<sup>160</sup>

<sup>147</sup> Climate frontlines, *A global forum for indigenous peoples, small islands and vulnerable communities* (13 February 2009) <<http://www.climatefrontlines.org/en-GB/node/169>>.

<sup>148</sup> UNFCCC, *Modalities for the accounting of assigned amounts under Article 7, paragraph 4, of the Kyoto Protocol*, Decision 13/CMP.1, FCCC/KP/CMP/2005/8/Add.2 (30 November 2005), 23 – 37 <<http://unfccc.int/resource/docs/2005/cmp1/eng/08a02.pdf#page=23>>.

<sup>149</sup> UNFCCC, above n 116, Kyoto Protocol link, Emissions Trading link; see especially Kyoto Protocol Reference Manual; see generally above n 126, 12-39.

<sup>150</sup> Murphy et al, above n 137, 4-5; see also Hodgkinson and Garner, above n 120, 62.

<sup>151</sup> Commodities Now, *IETA warns of Impact of AAU surplus*, (17 June 2009) <<http://www.commodities-now.com/news/environmental-markets/166-ieta-warns-of-impact-of-aaus-surplus.html>>.

<sup>152</sup> Kyoto Protocol Reference Manual, above n 125, 12-28; see also Oberthür and Ott, above n 125, 151-194.

<sup>153</sup> UNFCCC, *Helping the UNFCCC secretariat improve its support to the Clean Development Mechanism and Joint Implementation, an independent technical review*, McKinsey & Company

<[http://cdm.unfccc.int/workshops/cop15/COP15\\_SE\\_091208\\_SDM\\_imp\\_TechRev.pdf](http://cdm.unfccc.int/workshops/cop15/COP15_SE_091208_SDM_imp_TechRev.pdf)> Andrew Howard, (Paper presented to the UNFCCC Secretariat, COP15 Side Event, 8 December 2009) <<http://regserver.unfccc.int/seors/reports/archive.html>>.

<sup>154</sup> UNFCCC, *Designated Operational Entities (DOE)* <<http://cdm.unfccc.int/DOE/index.html>>.

<sup>155</sup> UNFCCC McKinsey Review, above n 153, 5-6.

<sup>156</sup> *Ibid* 7.

<sup>157</sup> *Ibid* 8.

<sup>158</sup> Buhaug et al, above n 11, 71-72.

<sup>159</sup> *Ibid* 23-31; see also IISD, 'A summary report of the Technical Workshop on Emissions from Aviation and Maritime Transport' (2007)

146(1) *Technical Workshop on Bunker Fuel Emissions Bulletin 7* <<http://www.iisd.ca/download/pdf/sd/ymbvol146num1e.pdf>>.

<sup>160</sup> Betz and Sato, above n 131, generally.

#### 4.1.5 Marine Emissions Trading Schemes (METS)

Several METS submissions have been made both within and outside IMO.<sup>161</sup> IMO's initial proposal is summarised below, followed by submissions made to MEPC60 currently under consideration by IMO's Expert Group.

##### *IMO METS*<sup>162</sup>

IMO's cap and trade scheme would have global coverage 'in line with the existing IMO treaty instruments and with resolution A963(23)',<sup>163</sup> and to prevent ships switching to flag states with no KP commitments. It would apply to all ships above a certain size, but with 'modifications to its scope in order to avoid undesirable negative impacts'.<sup>164</sup> The cap would be set on historical global maritime transport emissions. METS would trade all permits available from KP compliant ETSs; non-IMO member flagged ships could surrender permits to any other trading entity. The ship is conceptualised as the entity responsible for assessing and trading emissions – in practice, this would be the ship operator, charterer or consignee. This entity would report to its flag state annually; port states would monitor whether the responsible entity had surrendered the required permits. Permits would be auctioned, sold or freely allocated depending on individual ship's benchmarks. IMO would set up an administrative body to manage funds generated by the scheme, with funds going to research and development and developing nations.

##### *Norway*<sup>165</sup>

The Norwegian proposal would operate through the 'traditional and well tested regulatory approach of IMO',<sup>166</sup> with flag state enforcement through survey and certification and Port State Control (PSC). The scheme administrator would be a new organ of IMO; a participating ship would keep records of bunker consumption and an emissions account and would register with the administrator. An emissions cap would be set as well as compliance periods. Allowances would be interchangeable with other KP ETS permits in an open global system. There would be a phase-in to a full auction system of 'Emission Allowances'.<sup>167</sup> The proposal suggests funding mitigation actions through CDM. It also acknowledges the additional burden of an MBI on developing countries, and suggests these may opt not to join but will then receive no funding generated by the scheme; or the scheme could include an exemption clause for SIDS but must be careful this does not lead to carbon leakage and distortion of competition.

##### *United Kingdom*<sup>168</sup>

The United Kingdom proposed an overall global cap for international shipping which would be agreed through UNFCCC, IMO or both with allowances up to that cap then auctioned; cap and compliance periods would be monitored and adjusted for maximum effectiveness after an introductory phase. The scheme would have global coverage, with exemptions for voyages involving 'the most vulnerable countries',<sup>169</sup> and would link to other KP ETSs. It would be limited to ships of a certain size. Ship operators would be the legally responsible entity through vessels identified by their IMO number. 'Ship operator' is defined per SOLAS regulation IX/1 (the Document of Compliance (DOC) Company) and is 'the organization identified on the DOC, SMC or ISPS certificate'.<sup>170</sup> Ship operators would ensure each ship has a 'Greenhouse Gas Certificate',<sup>171</sup> and would keep BDNs to monitor fuel consumption. BDN data would include details of bunker supply and fuel type. Ship operators would be required to have emissions reports independently verified before registration with the scheme

<sup>161</sup> Buhaug et al, above n 11, 67-88; see also, for example, Dr Per Kågeson, *The Maritime Emissions trading Scheme* (12 May 2008) Nature Associates <<http://www.natureassociates.se/pdf/METS%20final.pdf>>; see also The International Chamber of Shipping, *A global cap-and-trade system to reduce carbon emissions from international shipping* <<http://www.shippingandco2.org/CoS-GlobalCapAndTrade.pdf>>; see also Jasper Faber, Agnieszka Markowska, Veronika Eyring, Irene Cionni and Espen Selstad, *A Global Maritime Emissions Trading System* <[http://www.ce.nl/publicatie/a\\_global\\_maritime\\_emissions\\_trading\\_system/1024](http://www.ce.nl/publicatie/a_global_maritime_emissions_trading_system/1024)>.

<sup>162</sup> Buhaug et al, above n 11, 72-73.

<sup>163</sup> Ibid 75.

<sup>164</sup> Ibid 72.

<sup>165</sup> Norway, 'A further outline of a Global Emission Trading System (ETS) for International Shipping', Submission MEPC 60/4/22 to MEPC, *Prevention of Air Pollution from Ships*, 15 January 2010.

<sup>166</sup> Ibid 4.

<sup>167</sup> Ibid 4-5.

<sup>168</sup> United Kingdom, 'A global emission trading system for greenhouse gas emissions from international shipping', Submission MEPC 60/4/26 to MEPC, *Prevention of Air Pollution from Ships*, 15 January 2010.

<sup>169</sup> Ibid 5.

<sup>170</sup> Ibid 6.

<sup>171</sup> Ibid 4-5, 7.

administrator. Compliance would be covered by a new IMO convention implemented nationally by members and enforced in ports through port and flag state powers, with the GHG Certificate inspected through PSC. Penalties against ship operators might include fines per excess tonne of CO<sub>2</sub> for failure to submit a verified emissions report or a requirement to purchase allowances to cover a shortfall.

#### France<sup>172</sup>

This proposal covers ships above 400 GT, regardless of flag, identified by IMO number. The legally responsible entity would be the company per SOLAS regulation IX/I and International Ship Management (ISM) Code, identified by its company IMO number.<sup>173</sup> Ship operators would monitor emissions based on bunkered fuel and regularly surrender equivalent allowances to the administrator. Emissions calculations would be based on BDNs and international standardised emissions factors for fuel type. The scheme would link with other KP ETSs. Information on allowances and compliance status for each ship would be available through the administrator, which may facilitate accounting for CO<sub>2</sub> costs in contracts between shipowners and charterers, with allowances obligations designated in charter contracts and during ship sales. Flag state control would include third party verification of records. PSC would include monitoring compliance and enforcement of sanctions which might range from fines to detention of the ship. The administrator would likely not have inquiry and injunction powers and would have to rely on national authorities, such as financial markets authorities, for enforcement.

#### US Ships Efficiency Credit Trading Scheme (SECTS)<sup>174</sup>

This proposal combines a baseline and credit ETS and a levy system (an additional submission has been made to MEPC61).<sup>175</sup> It proposes EEDI could be modified to create an emissions standard per ship class, setting a baseline for each. A ship proving it has achieved better than its efficiency standard over a set period, 'would generate positive efficiency credits, which could be sold to ships needing credits'.<sup>176</sup> EEDI would apply to both new and existing ships with the trade in efficiency credits limited to international shipping. The responsible party for a particular ship would calculate efficiency credits, subject to flag and port state controls; the ship's owner/operator would keep a tally of credits surplus or required. The flag state or its 'authorized recognized organizations' would validate reports and certify compliance with the efficiency credit requirement.<sup>177</sup> 'Flag and port states would enforce the efficiency credit trading consistent with current obligations under MARPOL Annex VI'.<sup>178</sup> IMO would have oversight of SECTS but an independent body would operate it.

## 4.2 Carbon Tax

The balance of MBI submissions made to and by the IMO postulate taxation based on emissions calculated from fuel bunkered.

A strict carbon tax 'is an excise tax on the producers of raw fossil fuels based on the relative carbon content of those fuels'.<sup>179</sup> For marine bunker fuel, this converts to a potentially high tax, though it is relative to the other taxing components on fuel price and how the tax is levied.<sup>180</sup>

KP commits Annex I nations to remove 'market imperfections, fiscal incentives, tax and duty exemptions and subsidies in all [GHG] emitting sectors that run counter to the objective of the Convention'.<sup>181</sup> Introducing a carbon tax on fossil fuel to combat climate change would require UNFCCC nations to suspend their current fuel tax regimes over the cost base of each grade of fuel until such time as the carbon levy has been applied. Once a standard 'carbon' tax is embedded into the wholesale refinery price of each grade of fuel, the cost base of that grade of fuel becomes cost plus carbon tax.<sup>182</sup> Variations in national taxing of fuel noted by the Organization of

<sup>172</sup> France, 'Further elements for the development of an Emissions Trading System for International Shipping', Submission MEPC60/4/41 to MEPC, *Prevention of Air Pollution from Ships*, 15 January 2010.

<sup>173</sup> *Ibid* 2.

<sup>174</sup> United States, 'Further details on the United States proposal to reduce greenhouse gas emissions from international shipping', Submission MEPC 60/4/12 to MEPC, *Prevention of Air Pollution from Ships*, 14 January 2010.

<sup>175</sup> The Royal Institute of Naval Architects, above n 92, 'Further details on the US proposal to reduce greenhouse gas emissions from international shipping', MEPC 61/INF.24.

<sup>176</sup> USA Submission, above n 174, 3.

<sup>177</sup> *Ibid* 3.

<sup>178</sup> *Ibid* 3.

<sup>179</sup> OECD, *Carbon tax* (6 March 2008) <<http://stats.oecd.org/glossary/detail.asp?ID=287>> Glossary of Statistical Terms.

<sup>180</sup> OECD, *Special Issues in Carbon/Energy Taxation: Marine Bunker Fuel Charges*, (1997) 8-9 <[http://www.ois.oecd.org/olis/1997/doc.nsf/LinkTo/NT00001052/\\$FILE/02E88855.PDF](http://www.ois.oecd.org/olis/1997/doc.nsf/LinkTo/NT00001052/$FILE/02E88855.PDF)> .

<sup>181</sup> KP art 2(1)(a)(v).

<sup>182</sup> OECD, above n 180, 30-35.

Petroleum Exporting Countries (OPEC)<sup>183</sup> indicate considerable scope to apply a global carbon levy over the cost base of a grade of fuel. It is worth noting that substantial revenue is generated from the taxing of fuel over its cost base, and it is a matter of government policy whether that revenue is turned to climate change mitigation.<sup>184</sup>

A carbon tax is best applied as far upstream as possible, that is, at the point of production.<sup>185</sup> Calculating a levy proportional to carbon content of the grade of fuel allows certain fuel products, which will not be combusted, to be assessed as exempt of the tax at the point of on-selling.<sup>186</sup> Calculation at the point of production would enable oil-producing non-Annex I nations to assess the potential GHG emissions being passed on, and may assist these nations in future policy decisions regarding climate change.<sup>187</sup> Where a fuel is consumed in the nation in which it is produced, the carbon levy could be remitted to the national government to fund climate change commitments.<sup>188</sup> Where it is imported, the levy could be administered under Border Tax Adjustment (BTA) rules.<sup>189</sup> Marine bunkering often occurs offshore to avoid port state taxes already in place and international co-operation to standardise bunker pricing could circumvent this sort of evasion.<sup>190</sup>

#### 4.2.1 Criticisms of carbon taxation

Carbon taxes have been criticised because no cap to GHG emissions is set,<sup>191</sup> given there is no cap on global emissions under UNFCCC, and that UNFCCC has not capped GHG emissions from international shipping, this argument seems spurious. It is self-evident inequalities will result if a carbon tax is not applied worldwide.

BTA of imported goods from non-Annex I nations to Annex I nations has been suggested as an alternative if MBIs are not applied globally,<sup>192</sup> but has been criticised for being too complex to administer and deleterious to international trade.<sup>193</sup> The *General Agreement on Tariffs and Trade 1994* (GATT)<sup>194</sup> demands no tax barriers to trade, except where 'necessary to protect human, animal or plant life or health'<sup>195</sup> and 'relating to the conservation of exhaustible natural resources if such measures are made effective in conjunction with restrictions on domestic production or consumption'.<sup>196</sup> UNFCCC demands no artificial barriers to trade be hidden behind environmental outcomes.<sup>197</sup> Given these provisos, both conventions provide scope for a tax geared towards sustainable outcomes, provided it is applied globally so as not to affect international trade. Whilst this sounds difficult to administer, it should be noted that a global carbon levy or ETS covering all forms of transportation could be structured similarly to the *International Fuel Tax Agreement* (IFTA) already in place for road transportation between the USA and Canada.<sup>198</sup> Sir Nicholas Stern, in his seminal review, claims climate change unchecked will adversely affect Gross Domestic Product at 5 to 20 per cent per annum. He claims the cost of

<sup>183</sup> OPEC, *Who Gets What from Imported Oil*, (July 2009) 2-7

<[http://www.opec.org/opec\\_web/static\\_files\\_project/media/downloads/archive/WGW2009.pdf](http://www.opec.org/opec_web/static_files_project/media/downloads/archive/WGW2009.pdf)>; see also Richard Webb, 'Petrol Price Rises: Causes and Consequences', (Research Note 6 2000-01, Parliamentary Library, Parliament of Australia, 2000)

<<http://www.aph.gov.au/library/pubs/rn/2000-01/01RN06.htm>>.

<sup>184</sup> For example, see generally Fuel Taxation Enquiry, *History of Fuel Taxation in Australia* (21 September 2001)

<<http://fueltaxinquiry.treasury.gov.au/content/backgnd/002.asp>>.

<sup>185</sup> OECD, above n 178, 30-35; see also Gilbert E Metcalf and David Weisbach 'The Design of a Carbon Tax', (2009) 33 *Harvard Environmental Law Review* 499, 521-524.

<sup>186</sup> *Ibid* 527.

<sup>187</sup> For lists of relevant nations, see Central Intelligence Agency, *The World Factbook, Country Comparison: Oil-production*

<<https://www.cia.gov/library/publications/the-world-factbook/rankorder/2173rank.html>>.

<sup>188</sup> Reuven S Avi-Yonah & David M Uhlmann, 'Combating Global Climate Change: Why a Carbon tax is a Better response to Global Warming than Cap and Trade' (Working Paper No 117, University of Michigan Public Law, 18 March 2008) 41-43

<<http://ssrn.com/abstract=1109167>>.

<sup>189</sup> Metcalf and Weisbach, above n 185, 545; see also GATT, *Border Tax Adjustments, Report of the Working Party adopted on 2 December 1970*, L/3464, [21]-[45].

<sup>190</sup> OECD, above n 178, 34-35.

<sup>191</sup> Avi-Yonah and Uhlmann, above n 188, 48-50; see also Senate Economics Committee, Senate, *Exposure draft of the legislation to implement the Carbon Pollution Reduction Scheme* (2009) ch 11 [11.7]-[11.21]

<[http://www.aph.gov.au/senate/committee/economics\\_ctte/cprs\\_09/report/c11.htm](http://www.aph.gov.au/senate/committee/economics_ctte/cprs_09/report/c11.htm)>.

<sup>192</sup> For example, see Metcalf and Weisbach, above n 185, 499-556; see also Joshua Elliott, Ian Foster, Sam Kortum, Todd Munson, Fernando Perez Cervantes and David Weisbach, 'Trade and Carbon Taxes' (2010) 100(2) *Papers and Proceedings Australian National Library*, 1-5.

<sup>193</sup> Professor Warwick McKibbin and Peter J Wilcoxon, *The economic and environmental effects of border tax adjustments for climate change policy* summary, Lowy Institute for International Policy <<http://www.lowyinstitute.org/Publication.asp?pid=978>>.

<sup>194</sup> *General Agreement on Tariffs and Trade* (GATT), opened for signature 30 October 1947, 55 UNTS 194 (entered into force 1 January 1948).

<sup>195</sup> GATT art XX(b).

<sup>196</sup> GATT art XX(g).

<sup>197</sup> UNFCCC art 3(4).

<sup>198</sup> Dwight Denison, 'Interstate tax coordination: lessons from the International Fuel Tax Agreement' (2005) *National Tax Journal* 1, 1-14; see also generally Frank J O'Connell Jr, 'International fuel tax agreement' (2000) *The Tax Advisor* <<http://www.allbusiness.com/personal-finance/individual-taxes/630481-1.html>>; see also *International Fuel Tax Agreement*, Ontario Ministry of Revenue (6 August 2010) <<http://www.rev.gov.on.ca/en/tax/ifta/index.html>>.

mitigating climate change is about 1 per cent,<sup>199</sup> which seems in keeping with the ‘modest additional cost’<sup>200</sup> of a general carbon tax. A carbon tax is thus an investment in future trade.

The obvious benefit of a tax is certainty; taxation only varies with the amount of carbon in the fuel, or a flat levy could be applied regardless of carbon content. Whereas ETSs will fluctuate in value, and therefore in funds generated, tax is guaranteed revenue.<sup>201</sup> On the balance, a global carbon tax on fossil fuels seems a more efficient, equitable and effective means of reducing GHG emissions, reaching all consumers of fossil fuels.<sup>202</sup> However, a tax applied only to marine bunker fuel would disadvantage international shipping over all other modes of transport not subject to a comparable MBI.<sup>203</sup>

#### 4.2.2 Marine levy proposals

Drawn from several submissions and its own work,<sup>204</sup> IMO has drafted a proposal for bunker levies pooled into an International Compensation Fund (ICF) to combat GHG emissions; below is a brief review of ICF and further submissions currently under consideration by the Expert Group, numbered 5 to 8.

##### *IMO International Compensation Fund (ICF)*<sup>205</sup>

Here, all ships in international trade would be subject to a bunker fuel levy, based on different emission factors of the type of fuel. The levy could be paid by ships, suppliers or refiners; the first option is the simplest way to avoid evasion. An IMO created administrator would keep a unique account for each ship, tracking all bunker purchases; the ship (owner or operator) would pay the levy into the ship’s account on bunkering, and a receipt would be issued which could be verified by port states. The levy would be remitted to the ICF for investment in CDM, JI and research and development in shipping.

##### *Cyprus, Denmark, Marshall Islands, Nigeria and International Parcel Tankers Association (IPTA)*<sup>206</sup>

This scheme postulates a GHG ‘contribution’<sup>207</sup> introduced for ships over 400GT. It requires mandatory registration of bunker fuel suppliers, with each providing a banker’s guarantee prior to registration as insurance against fraud or bankruptcy. Suppliers would calculate the contribution based on fuel bunkered per ship, and would collect and transfer GHG contributions to ICF, preferably electronically. Shipowners would keep BDNs and Oil Record Books on board. Non-Party ships would pay to enter the scheme. The administrator would either be a new division of the IMO Secretariat or a new IMO organ which would receive and monitor information from ships, control and receipt of GHG contributions, allocate revenues, maintain a ship-specific registry, notify parties in cases of (suspected) non-compliance and submit an annual report. Port states would audit ships’ BDNs and Oil Record Books. The scheme would be enforced by ICF and convention parties through national regulation and PSC. GHG contributions to ICF are projected to ‘have none or very limited impact on the price of commodities transported by sea’.<sup>208</sup> Scheme revenue would reduce emissions using CDM and finance ‘adaptation purposes in developing countries’, specifically SIDS and LDCs; money would not be remitted directly to national governments. If UNFCCC does not cap emissions from international shipping, then IMO could set a target by 2020 using 2007 (most recent IMO data) or 2005 (in line with an expected international aviation baseline) as the baseline year. The proponents’ state:

<sup>199</sup>Sir Nicholas Stern, *Stern Review: The Economics of Climate Change, Summary of Conclusions*, i-iv

<[http://webarchive.nationalarchives.gov.uk/+http://www.hm-treasury.gov.uk/media/9/9/CLOSED\\_SHORT\\_executive\\_summary.pdf](http://webarchive.nationalarchives.gov.uk/+http://www.hm-treasury.gov.uk/media/9/9/CLOSED_SHORT_executive_summary.pdf)>.

<sup>200</sup> Metcalf and Weisbach, above n 185, 556.

<sup>201</sup> Avi-Yonah and Uhlmann, above n 188, 38-46; see also Buhaug et al, above n 11, 81.

<sup>202</sup> For example, see Carbon Tax Center, *Border Tax Adjustments* (19 October 2009) <<http://www.carbontax.org/issues/border-adjustments/>>; see also *Experts: Carbon Tax needed and NOT Cap-and-Trade Emissions Trading Scheme*, Yarra Valley Climate Action Group <<http://sites.google.com/site/yarrawallevclimateactiongroup/carbon-tax-needed-not-cap-and-trade-emission-trading-scheme-ets>>; see also ‘Carbon markets create a muddle’, *Financial Times* (online), 26 April 2007 <[http://www.ft.com/cms/s/0/4b80ee18-f393-11db-9845-000b5df10621.html?nclink\\_check=1](http://www.ft.com/cms/s/0/4b80ee18-f393-11db-9845-000b5df10621.html?nclink_check=1)>.

<sup>203</sup> Buhaug et al, above n 11, 75-76, 79, ch 9; see also OECD, above n 180, 40-41.

<sup>204</sup> Buhaug et al, above n 11, 71-72; see also, for example, Dr Andre Stochniol, *The International Maritime Emissions Reduction Scheme*, IMERS Summary <[http://imers.org/files/docs/IMERS\\_summary.pdf](http://imers.org/files/docs/IMERS_summary.pdf)>.

<sup>205</sup> Stochniol, above n 204; Buhaug et al, above n 11, 71-72.

<sup>206</sup> Cyprus, Denmark, the Marshall Islands, Nigeria and the IPTA, ‘An International Fund for Greenhouse Gas emissions from ships’, Submission MEPC 60/4/8 to MEPC, *Prevention of Air Pollution from Ships*, 18 December 2009.

<sup>207</sup> *Ibid* 2 and generally.

<sup>208</sup> *Ibid* 15.

The expediency of using the Oil Record Book [and] the BDN is that 150 Member States, representing 99.14 per cent of the world's merchant fleet are Parties to MARPOL I, while only 56 Member States are Parties to MARPOL VI representing 83.46 per cent of the world's merchant fleet.<sup>209</sup>

### *Japan, Leveraged Incentive Scheme (LIS)*<sup>210</sup>

LIS would rank ships according to emissions efficiency; efficient ships would be granted pro rata refunds out of revenues by the ICF. Mandatory contributions would be collected per tonne of fuel purchased, small ships may be excluded. Contributions would be remitted electronically to individual ship accounts held in ICF, administered much as the International Oil Pollution Compensation (IOPC) Fund.<sup>211</sup> Eligible ships would keep BDNs, an Oil Record Book and record fuel consumption. A performance appraisal based on EEOI would not be mandatory but would be necessary for the ship operator to be eligible for LIS. EEOI can be used by new or old ships. A similar appraisal can be based on EEDI where a ship has performed better than expected; the appraisal is not mandatory, but would be necessary to be eligible for LIS; EEDI assessment is applicable to newer ships. ICF administration or an independent body would assess ships' applications for refunds, with the amount of the refund based on the ship operator's submission. Excess revenue would be used for climate change mitigation and adaptation projects in developing countries.

### *World Shipping Council, Vessel Efficiency System (VES)*<sup>212</sup>

This proposal suggests establishing mandatory efficiency standards for new ships - tiered over time - and standards based on EEDI for all ships. It suggests introducing charges for vessels failing to meet the applicable standard set for such vessels with funds generated governed by IMO. The charge would be based on each tonne of fuel purchased and would vary according to a scale of expected efficiency. Baselines would be calculated for respective vessel classes 'with breakouts by vessel size as appropriate';<sup>213</sup> there would be no charge for a vessel meeting its appropriate standard. Charges would be collected directly from ships or through registered fuel suppliers. Funds generated could be used to improve efficiency of the world fleet. VES supposedly does not disadvantage non-Annex I countries as it is not dependent upon financial markets or third-party brokers and may also exempt smaller vessels.

### *Jamaica, Ship Traffic, Energy and Environment Model (STEEM)*<sup>214</sup>

This proposal is based on an emissions model designed by Wang et al<sup>215</sup> and postulates an IMO convention authorising all countries to levy a globally uniform emissions charge on vessels calling at their ports. Ships incur an emission charge on arrival into port, irrespective of the owner, operator or charterer, providing an easy to administer institutional mechanism. The process would be enforced through PSC. The amount of fuel consumed in the voyage prior to entry into the port is used to determine the amount of pollution emitted during the voyage and levy the appropriate fee. The charge could be staggered higher for heavier and dirtier fuels and lower for cleaner fuels.

## **4.3 Alternative views to proposed MBIs**

IMO's MBI proposals have not been without criticism. The following two submissions are also being considered by the Expert Group, with a further submission listed on MEPC61's provisional agenda.<sup>216</sup>

<sup>209</sup> Ibid 4-5.

<sup>210</sup> Japan, 'Consideration of a market-based mechanism: Leveraged Incentive Scheme to improve the energy efficiency of ships based on the International GHG Fund', Submission MEPC 60/4/37 to MEPC, *Prevention of Air Pollution from Ships*, 15 January 2010.

<sup>211</sup> Ibid 3.

<sup>212</sup> World Shipping Council, 'Proposal to Establish a Vessel Efficiency System (VES)', Submission MEPC 60/5/39 to MEPC, *Prevention of Air Pollution from Ships*, 15 January 2010.

<sup>213</sup> Ibid 4.

<sup>214</sup> Jamaica, 'Achieving reduction in greenhouse gas emissions from ships through Port State arrangements utilizing the ship traffic, energy and environment model, STEEM,' Submission MEPC 60/4/40 to MEPC, *Prevention of Air Pollution from Ships*, 15 January 2010.

<sup>215</sup> Chengfeng Wang, John Callahan and James Corbett, *Geospatial Modeling of Ship Traffic and Air Emissions*, ESRIUC#1863, generally <[http://proceedings.esri.com/library/userconf/proc07/papers/papers/pap\\_1863.pdf](http://proceedings.esri.com/library/userconf/proc07/papers/papers/pap_1863.pdf)>.

<sup>216</sup> The Royal Institute of Naval Architects, above n 92, 'Market-Based Measures - inequitable burden on developing countries', MEPC 61/5/19.



## The Bahamas<sup>217</sup>

The Bahamas suggest a global METS would most likely operate through developed countries and favour newer ships which are more efficient; it notes older ships tend to carry lower value cargo and emit more GHGs, so poorer states with older fleets would most likely need to buy permits from developed nations to offset emissions. This creates a barrier to trade, is in conflict with UNFCCC and takes capital from less developed nations. The Bahamas claim a levy is a tax on international trade; the integrity of such a system is questionable with a high potential for fraud, requiring extensive monitoring. It claims it is not clear by what criteria ICF revenue would be distributed, but as most research and development takes place in developed nations, this will again not benefit needy countries with older fleets. Both MBIs could impact negatively on the cost of international shipping compared with other modes of trade transport; most goods exported from developing nations are low in value so it is a double penalty if the nation then has to account for an MBI. Finally, if any ‘penalty’ is to be applied to international shipping, it should be proportional to the contribution of international shipping to global emissions, i.e. 2.7 per cent.<sup>218</sup>

## International Union for Conservation of Nature (IUCN)<sup>219</sup>

This approach proposes a differentiated rebate mechanism within IMO’s chosen MBI to fulfil KP’s CBDR principle. The proposal is that each developing country under UNFCCC be entitled to an unconditional payment (rebate) equal to the cost incurred by a maritime MBI. The rebate mechanism could apply to any MBI, provided it generated enough gross revenue to cover the rebate needs; this would be easier with a levy (tax). The rebate would be calculated annually in proportion to that country’s share of global imports by value. The proponents claim a country’s usage of international shipping is closely related to its imports, saying ‘[d]ata on share of global imports by value, country by country, is readily available [from the International Monetary Fund]’.<sup>220</sup> Remaining revenue could be managed by the Copenhagen Green Climate Fund as proposed in the Copenhagen Accord.<sup>221</sup> The proponents claim many developing countries do not benefit from investment in CDM because the majority of CDM projects are concentrated in certain countries, specifically China, India, the republic of Korea and Brazil.<sup>222</sup> The application threshold for an MBI could be set at a level higher than 4000GT because this would ‘practically exclude nearly all ships transporting goods to and from SIDS and other small countries, as their ports typically can receive only smaller ships’<sup>223</sup> and also ships involved in coastal shipping, increasing these vessels competitiveness with land-based transport. IMO is urged to ensure that international shipping is subject to the same carbon price as other industries.

## 4.4 Carbon leakage

If not applied globally, each of the proposed MBIs will likely cause activity transference resulting in ‘carbon leakage’.<sup>224</sup> If international shipping becomes more costly because of an MBI, trade may move to other modes of transport which are not subject to the MBI such as rail, road or inland waters transportation.<sup>225</sup> Island nations such as Australia, New Zealand and much of Asia would clearly be disadvantaged because such transference is not an option.<sup>226</sup>

At the same time, increased shipping costs would be passed onto all stakeholders from shipowners to charterers and ultimately consumers, doubly disadvantaging the international shipping industry. Globally, overall emissions would not be reduced, just transferred, and increased because international shipping is the least carbon intensive mode of cargo transport.<sup>227</sup> If transferring the same volume of trade to less emissions efficient modes of transport increases GHG emissions, then projected increases in global trade<sup>228</sup> will mean an exponentially greater amount

<sup>217</sup> The Bahamas, ‘Market-Based Instruments: a penalty on trade and development’, Submission MEPC 60/4/10 to MEPC, *Prevention of Air Pollution from Ships*, 13 January 2010.

<sup>218</sup> Ibid 4.

<sup>219</sup> International Union for Conservation of Nature, ‘A rebate mechanism for a market-based instrument for international shipping’, Submission MEPC 60/4/55 to MEPC, *Prevention of Air Pollution from Ships*, 29 January 2010.

<sup>220</sup> Ibid 3.

<sup>221</sup> Ibid 4.

<sup>222</sup> Ibid 3.

<sup>223</sup> Ibid 6.

<sup>224</sup> IPCC Third Assessment Report, Climate Change 2001, *Synthesis Report*, 377 Annex B, Glossary of Terms, (Leakage)

<<http://www.ipcc.ch/pdf/glossary/tar-ipcc-terms-en.pdf>>; see also Duncan Brack, Michael Grubb and Craig Windram, *International trade and climate change policies* (Earthscan, 2000), 34-37.

<sup>225</sup> Buhaug et al, above n 11, 75 -76, 79, ch 9.

<sup>226</sup> Smith et al, above n 76, 35.

<sup>227</sup> See above n 14; see also OECD, above n 180, 10.

<sup>228</sup> Buhaug et al, above n 11, 75-76, 79, ch 9; see also OECD, above n 180, 40-41.

of GHG emissions; this clearly runs counter to the objectives of UNFCCC and KP, and will not mitigate climate change. Negating carbon leakage is critical to the success of global GHG emissions reduction.<sup>229</sup> IMO must insist international trade transportation, as a sector, reduces GHG emissions.

## 4.5 Enforcement

If MARPOL VI is the vehicle by which GHG emissions will be controlled, then flag states would enforce these provisions per standard MARPOL VI practices,<sup>230</sup> at least, the technical and operational measures in EEDI, SEEMP and EEOI would be enforced thus. Port states are authorised under existing MARPOL VI provisions to conduct audits ensuring flag state compliance<sup>231</sup> and can detain ships and take punitive action under domestic law for current MARPOL VI breaches,<sup>232</sup> but the purpose of GHG emissions controls is to discharge an undertaking in KP, not MARPOL VI.

Constituted under KP Article 18, the KP enforcement branch limits 'enforcement' to deducting 1.3 times the amount in tonnes of excess emissions from emissions allowances in the next commitment period where the offending Annex I nation cannot otherwise purchase or offset ETS units.<sup>233</sup> The enforcement branch can also insist the offending nation develop a compliance plan to control excess emissions and can also suspend the eligibility of the nation to enter international ETSs.<sup>234</sup> It is not clear how these enforcement measures could or would apply to a METS under IMO as IMO is not an Annex I nation. KP enforcement provisions make no other reference to either IMO or international shipping and, in any case, no emission cap or compliance period has been set for international shipping by KP, so no breach of KP can occur. Sanctions under the European Union's ETS, to which a METS may link, include 'effective, proportionate and dissuasive' penalties<sup>235</sup> domestically legislated by contracting parties, naming and shaming and a set excess emissions penalty increased proportionally with the consumer price index.<sup>236</sup> IMO could not be a nation party to this ETS, so it is not clear how these penalties could be enforced.

Although a carbon tax does not rely on cap-setting it is also not enforceable under the current KP structure. A bunker levy could be collected by port states and might be governable by the taxation provisions of that nation, but IMO would need to finalise enforcement issues for any levy remitted directly to an IMO body. In any event, enforcement provisions would need to be commensurate with the actual desired outcome of reduced GHG emissions.

If IMO were to regulate GHG emissions breaches under its standard practices for MARPOL VI, the result may be to penalise shipping entities subject to a METS or carbon tax more than Annex I nations partaking in a KP ETS. Alternatively, IMO could request international shipping as a sector make a commitment equivalent to an Annex I nation for the next commitment period of KP, with a set cap and subject to enforcement provisions under KP.<sup>237</sup> If both international shipping and international aviation were granted standing equivalent to an Annex I nation through the auspices of KP2(2), then Annex I nations should be encouraged to enforce GHG emissions reductions on land transportation sectors in kind.

## 5 Conclusion

IMO's GHG emissions reduction strategies will lead to a short-term increase in the cost of international shipping and this cost will be spread amongst all players involved in each voyage and in the industry in general.<sup>238</sup> If IMO does nothing, by 2050, GHG emissions from international shipping 'may grow by a factor of 2 to 3' over 2007 totals<sup>239</sup> through growth in world population and international trade. By any measure, IMO has rightly committed its members to an early reduction in GHG emissions from international shipping in an effort to

<sup>229</sup> For example, see Buhaug et al, above n 11, 75-76, 79, ch 9; see also OECD, above n 180, 40-41; see also World Resources Institute, *World Greenhouse Gas Emissions: 2005* (2005) chart <<http://www.wri.org/chart/world-greenhouse-gas-emissions-2005>>.

<sup>230</sup> See above n 70.

<sup>231</sup> For example, see above nn 58-66.

<sup>232</sup> IMO, *Report of the Marine Environment Protection Committee on its Fifty-eighth Session*, MEPC 58/23/Add.1 (17 October 2008), 12-13.

<sup>233</sup> UNFCCC, *Report of the Conference of the Parties on its Seventh Session, Held at Marrakesh from 29 October to 10 November 2001*, add pt 2: Action Taken by the Conference of the Parties, Volume III, FCCC/CP/2001/13/Add.3 (21 January 2002), Decision 24/CP.7, XV Consequences applied by the Enforcement Branch, 75-76.

<sup>234</sup> *Ibid.*

<sup>235</sup> *Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003* [25.10.2003] OJ L 275/32, Article 16.

<sup>236</sup> *Directive 2009/29/EC of the European Parliament and Council of 23 April 2009* [5.6.2009] OJ L 140/63, Article 15a.

<sup>237</sup> International Chamber of Shipping, above n 161, 10-14.

<sup>238</sup> Buhaug et al, above n 11, 75-76, 79, ch 9; see also OECD, above n 180, 40-41.

<sup>239</sup> Buhaug et al, above n 11, 1.

combat climate change. Technical and operational measures may come into effect as soon as January 2013;<sup>240</sup> it is hard to say when an MBI will follow, and in what form.

Distilling the MBI proposals under consideration by IMO's Expert Group and applying their assessment criteria yields the following:<sup>241</sup>

1. ***Feasibility of implementation***

- A global scheme, either a METS linked to other KP ETSs, or a carbon tax which – it is submitted – might be administered similarly to IFTA or through BTA; instigated by amending MARPOL VI, applied per ship and based on fuel bunkered by the ship; BDNs and Oil Record Books track fuel bunkered per ship. IMO lobbies UNFCCC so that all international transportation is subject to GHG emissions control as a KP Annex A sector.

2. ***Relationships with other relevant conventions and compatibility with customary international law***

3. ***Potential additional workload, economic burden and operational impact for ships, the shipping industry and the maritime sector***

- The legal entity responsible for engaging in the MBI is the ship's operator per ISM, SOLAS IX/1.<sup>242</sup> A ship complying with ISM is currently issued a DOC by IMO; DOCs are valid for five years and must remain onboard the ship, available to PSC,<sup>243</sup> and under the control of a designated person<sup>244</sup> as agent of the shipowner under ISM.<sup>245</sup> As shipowners in developed countries 'own about 60 per cent of the world's fleet by deadweight tonnage',<sup>246</sup> this provision aligns with UNFCCC's CBDR.
  - Regulating GHG emissions is incorporated within this existing scheme because the designated person already undertakes a similar task.
- An IMO created registry holds accounts for all eligible ships; ships over 400GT, identified by IMO number, would be included with certain exemptions – it is submitted these should not be based on flag but on the ship's EEDI or EEOI rating.
  - Administrative costs are funded by the MBI.

4. ***Incentives to technological change and accommodation of current technologies***

5. ***Need for technology transfer and capacity building in developing countries, particularly LDCs and SIDS, for implementation and enforcement of MBI, including finance for climate change mitigation and adaptation***

6. ***Cost-effectiveness and potential impacts on trade and sustainable development***

- As the amount of fuel bunkered may not reflect actual GHG emissions, standardised EEDI ratings for each ship class are made available to assist emissions calculations.
- Emissions factors of relevant grades of fuel are standardised to facilitate ease of emissions calculations.
- Preferably, emissions monitoring systems are installed on all ships – it is submitted MBI revenue could fund a program of installation of such devices.
- Depending on available revenue:
  - A rebate mechanism is included to assist less developed countries implement and enforce the chosen MBI, especially FOCs.
  - An efficiency incentive system is also available.
  - Funds generated are remitted to LDCs and SIDS to assist in climate change mitigation and adaptation, technology transfer and upgrading of fleets.

7. ***Compatibility with existing enforcement and control provisions under IMO***

<sup>240</sup> See above n 85.

<sup>241</sup> IMO ICAO Submission, above n 113, annex 2 [5]; see also Buhaug et al, above n 11, 73-88.

<sup>242</sup> Instituted through SOLAS IX, see International Safety Management (ISM) Code 2002, Preamble 1 <[http://www.imo.org/humanelement/mainframe.asp?topic\\_id=287](http://www.imo.org/humanelement/mainframe.asp?topic_id=287)>.

<sup>243</sup> Baatz et al, above n 38, 228.

<sup>244</sup> Baatz et al, above n 38, 227-229.

<sup>245</sup> SOLAS IX, above n 242.

<sup>246</sup> Faber et al, above n 159, 7.

## 8. *Administrative burden and legal aspects for National Administrations*

- Enforcement provisions are framed to achieve the desired outcome of global GHG emissions reductions, and are consistent with other UNFCCC enforcement provisions so as not to overly penalise international shipping.
  - Conflict between UNFCCC purposes and standard MARPOL VI enforcement favours UNFCCC so as not to overly disadvantaging international shipping.
- GISIS tracks ship movements for PSC verification of ship emissions claims.
- Member states embed scheme compliance and PSC provisions into domestic legislation.

## 9. *Environmental effectiveness*

- The criticisms listed for the flexibility mechanisms of KP noted above<sup>247</sup> are rigorously assessed regarding a genuine capacity to combat climate change before IMO invests MBI funds and any investment projects funded undergo rigorous periodic review. EEDI, SEEMP and EEOI are periodically evaluated for effectiveness, and are expanded to apply to all ship types. IMO's NOX emissions reductions measures are not displaced by CO2 reduction measures because this runs counter to IMO's MARPOL imperative without facilitating KP2(2)'s request: NOX is both a pollutant and a GHG.

IMO should lobby UNFCCC for assistance in assuring international shipping is not disadvantaged because KP2(2) does not reach competitive modes of transport. It is worth noting the above MBI commonalities fit the operational measures in place for IFTA which deals with fuel tax in trans-border road transportation in North America.<sup>248</sup> If a global carbon tax on fuel was introduced, the lack of a reliable emissions cap for any GHG emitting sector would not matter; if a METS is chosen, IMO must be careful its operation does not overly burden LCDs and SIDS. Both MBIs rely on global application, either a worldwide tax on transport fuel, or a robust international KP ETS. Neither of these options currently exists.

It is also worth noting IMO's ratification process is designed to accommodate maximum coverage of merchant ships in service by tonnage; members' votes on certain IMO matters are weighted according to the tonnage of the fleet under that member's flag.<sup>249</sup> Previously, amendments to SOLAS in 1974 were brought into force by the ratification of 25 members whose combined merchant fleets comprised 50 per cent of world's gross tonnage.<sup>250</sup> An entirely new IMO convention could come into force simply by the ratification of SIDS and LDC members of IMO,<sup>251</sup> states with limited power under UNFCCC which also flag the majority of the world's fleet. But a new convention could be similarly defeated.

IMO also has a policy of tacit acceptance where all members are bound by a convention amendment whether or not they ratified it if they do not object within a certain period,<sup>252</sup> a GHG amendment to MARPOL VI would be passed on this process. Very few MBI submissions under consideration by IMO were made by SIDS and LDCs. Since most proposals support funding climate change mitigation and adaptation for these states, it is submitted more negotiations are necessary to ascertain exactly what these states need and how they want to be aided; ineffective aid defeats the purpose of the MBI and benefits none. It is submitted the primary focus of IMO's MBI funds, or perhaps funded CDM projects, could be to enhance these non-Annex I states' capacity to flag more energy efficient ships and facilitate less energy intensive trade, thus satisfying UNFCCC aspirations with IMO tools.

Ultimately, IMO should be credited with successfully overseeing international shipping for the last 60 plus years with a level of international governance and cohesion that puts current UNFCCC outcomes to shame. Pragmatic shipping nations have begun developing ships less reliant on fossil fuels independent of IMO and UNFCCC imperatives;<sup>253</sup> given the planet was colonised by seafarers powered by wind and sea currents, these technologies are not so much new as renewed. On that historical note, I will end by recalling the captain of *RMS Titanic* was, like us, warned of looming catastrophe and a lack of lifeboats. Against all evidence, he still believed his mighty vessel was unsinkable.<sup>254</sup> He was wrong.

<sup>247</sup> See above nn 152-160.

<sup>248</sup> IFTA references, above n 198, especially O'Connell.

<sup>249</sup> IMO, above n 38, Conventions link, Entry into force link.

<sup>250</sup> Ibid.

<sup>251</sup> See appended Table.

<sup>252</sup> IMO, above n 38, Conventions link, Tacit Acceptance procedure link.

<sup>253</sup> Buhaug et al, above n 11, Appendix 2, 166; see also David Harrison, 'Unveiled: The Clean Queen of the Seas', *The Telegraph* (2005) <<http://www.rense.com/general63/sea.htm>>; see also *Japanese Firms Launch Electric-Assist, Low-Emission Transport Ship* (19 October 2008) Japan for Sustainability, <<http://www.japanfs.org/en/pages/027177.html>>.

<sup>254</sup> *Webtitanic, Titanic Disaster* (2001) <<http://www.webtitanic.net/framesunday.html>>.

## Appendix

TABLE, by column:

1. Non-exhaustive list of UNFCCC non-Annex I members; \* IMO member<sup>255</sup>; + non-IMO, UNCLOS<sup>256</sup> member.
2. Non-exhaustive list of FOCs.
3. Non-exhaustive list of global ranking of ships flagged to state, by tonnage; FOCs in top 10 in **bold**.
4. Non-exhaustive list of SIDS and LDCs under UNFCCC.
5. Non-exhaustive list of national percentage of global GHG emissions, 2007.

1. Non-Annex I <sup>257</sup>	2.FOC State <sup>258</sup>	3. Global Fleet Rank <sup>259</sup>	4. Listed SIDS/ LDC <sup>260</sup>	5. Percent global CO2 emissions <sup>261</sup>
Albania*	Yes	91	-	0.01%
Antigua & Barbudu*	Yes	<b>7</b>	SIDS	<0.01%
Bahamas*	Yes	<b>6</b>	SIDS	0.01%
Barbados*	Yes	53	SIDS	<0.01%
Belize*	Yes	33	SIDS	<0.01%
Bermuda	Yes	44	-	<0.01%
Burma (Myanmar)*	Yes	92	LDC	0.04%
Bulgaria*	Yes	59	-	0.18%
Cambodia*	Yes	17	LDC	0.02%
Cayman Islands	Yes	49	-	<0.01%
Comoros*	Yes	46	SIDS/LDC	<0.01%
Cyprus*	Yes	13	-	0.03%
Dominica*	Yes	69	SIDS	<0.01%
Equatorial Guinea*	Yes	158	LDC	0.02%
Georgia*	Yes	35	-	0.02%
Gibraltar	Yes	32	-	<0.01%
Honduras*	Yes	47	-	0.03%
Jamaica*	Yes	99	SIDS	0.05%
Lebanon*	Yes	84	-	0.05%
Liberia*	Yes	<b>2</b>	LDC	<0.01%
Libya*	Yes	101	-	0.20%
Malta*	Yes	<b>4</b>	-	0.01%
Marshall Islands*	Yes	<b>10</b>	SIDS	<0.01%
Mauritius*	Yes	141	SIDS	0.01%
Mongolia*	Yes	57	-	0.04%
Morocco*	Yes	81	-	0.16%
Netherlands Antilles	Yes	42	SIDS	0.02%
North Korea (DPR of)+	Yes	39	-	0.24%
Panama*	Yes	<b>1</b>	-	0.02%
Romania*	Yes	103	-	0.32%
Sao Tome & Principe*	Yes	130	SIDS/LDC	<0.01%
Singapore*	No	<b>5</b>	SIDS	0.18%
St Kitts & Nevis*	Yes	40	SIDS	<0.01%
St Vincent & Grenadines*	Yes	21	SIDS	<0.01%
Sri Lanka*	Yes	89	-	0.04%
Syria*	Yes	58	-	0.24%
Thailand*	Yes	25	-	0.95%
Tonga*	Yes	109	SIDS	<0.01%
Turkey*	Yes	19	-	0.98%
Vanuatu*	Yes	68	SIDS/LDC	<0.01%

<sup>255</sup> IMO, above n 38, Member States link.

<sup>256</sup> Oceans and Law of the Sea, Table recapitulating the status of the Convention and of the related Agreements, as at 1 June 2010 <[http://www.un.org/Depts/los/reference\\_files/status2010.pdf](http://www.un.org/Depts/los/reference_files/status2010.pdf)>

<sup>257</sup> UNFCCC, Parties & Observers link, Parties & Observer States, List of Non-Annex I Parties to the Convention <[http://unfccc.int/parties\\_and\\_observers/parties/non\\_annex\\_i/items/2833.php](http://unfccc.int/parties_and_observers/parties/non_annex_i/items/2833.php)>.

<sup>258</sup> Compilation from International Transport Workers Federation, above n 51; Birmie et al, above n 15, 410.

<sup>259</sup> Central Intelligence Agency, *The World Factbook, Country Comparison: Merchant Marine* <<https://www.cia.gov/library/publications/the-world-factbook/rankorder/2108rank.html>>.

<sup>260</sup> UN Statistics Division, above n 33.

<sup>261</sup> World Bank, above n 34.

## MAIN ACRONYMS

AAU	Assigned Amount Unit, granted to Annex I nations under KP
BDN	Bunker Delivery Note
BTA	Border Tax Adjustment
CBDR	Common But Differentiated Responsibilities under UNFCCC
CDM	Clean Development Mechanism
CER	Certified Emissions Reduction credit, generated by CDM
CO <sub>2</sub>	Carbon Dioxide
CO <sub>2</sub> e	Carbon Dioxide equivalent
COP15	Fifteenth Conference of the Parties to UNFCCC
CH <sub>4</sub>	Methane
DOC	Document of Compliance
DOE	Designated Operational Entity
ECA	Emissions Control Area
EEDI	Energy Efficiency Design Index
EEOI	Energy Efficiency Operational Index
ERU	Emissions Reduction Units generated by JI
ETS	Emissions Trading Scheme
FOC	Flag of Convenience
GATT	General Agreement on Tariffs and Trade
GHG	Greenhouse Gases
GISIS	Global Integrated Shipping Information System
HFC	Hydrofluorocarbons
ICAO	International Civil Aviation Organization
ICF	International Compensation Fund
IMO	International Maritime Organisation
IPCC	Intergovernmental Panel on Climate Change
ISM	International Safety Management Code
JI	Joint Implementation
KP	<i>Kyoto Protocol to UNFCCC</i>
KP2(2)	Article 2 (2) of the Kyoto Protocol
LDC	Least Developed Countries
LULUCF	Land-use, Land-use Change and Forestry
MARPOL 73/78	<i>International Convention for the Prevention of Pollution from Ships 1973, modified by 1978 Protocol</i>
MARPOL VI	<i>MARPOL Annex VI, Prevention of Air Pollution from Ships</i>
MBI	Market Based Instrument
MEPC	Marine Environmental Protection Committee
METS	Marine Emissions Trading Scheme
MOU	Memorandum of Understanding
NOX/N <sub>2</sub> O	Nitrous Oxide
PFC	Perfluorocarbons
RMU	Removal Unit
SECTS	Ships Efficiency Credit Trading Scheme
SEEMP	Ship Energy Efficiency Management Plan
SF <sub>4</sub>	Sulphur Hexafluoride
SIDS	Small Island Development States
SOLAS	<i>International Convention for the Safety of Life at Sea</i>
SOX/SO <sub>2</sub>	Sulphur Dioxide
UN	United Nations
UNFCCC	<i>United Nations Framework Convention on Climate Change</i>