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# Regulating Greenhouse Gases from Ships: Some Light at the End of the Funnel?

Henrik Ringbom

## 1 Introduction

Developing standards for reducing greenhouse gas (GHG) emissions from ships involves various challenges of a technical, regulatory and political nature. The main role of the 1982 UN Convention on the Law of the Sea (LOSC) here, as with the prevention of pollution from ships more generally, is to ensure that a uniform set of standards applies across the globe. *What* those standards should be is up to other institutions to decide: the LOSC does not specify which institution(s) should be in charge, or even whether there is an obligation for any institution to act in this field.<sup>1</sup> However, pressure from multiple directions has been mounting on the international maritime community to achieve significant reductions in GHG emissions from shipping. The perspective taken in this chapter is mainly an institutional one, focusing on the inter-relatedness and interaction between different legal regimes in a matter which still struggles to find its regulatory format. Despite the appeals in the LOSC for global solutions to regulate shipping, the prospect of regional rules still looms in the background as a legal alternative. However, recent developments have increasingly shifted the focus to the division of responsibilities between certain key global institutions involved in the regulation of GHGs and their mutual roles and responsibilities.

GHG emissions from shipping consist almost exclusively of CO<sub>2</sub> emissions linked to fuel combustion. International maritime transport accounts for some 2%–3% of total anthropogenic GHG emissions worldwide, and is growing faster than the global average.<sup>2</sup> To achieve an equal contribution to other sectors in achieving the climate goals (50% probability of attaining the 2°C limit to global temperature rise), shipping emissions must be reduced by 50% from 2012 levels by 2050 and reach zero emissions by 2080.<sup>3</sup> However, even dramatic improvements in fuel efficiency in ships would not achieve overall reductions in

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<sup>1</sup> But see the discussion on the relationship between climate change and the general environmental obligations laid down in LOSC Part XII in Chapter XY by A Boyle in this volume.

<sup>2</sup> See e.g. the 'Third IMO GHG Study', published in 2014, estimated international shipping emissions in 2012 to be 796 million tonnes, or about 2.2% of global total anthropogenic CO<sub>2</sub> emissions. (Report available at [https://gmn.imo.org/wp-content/uploads/2017/05/GHG3-Executive-Summary-and-Report\\_web.pdf](https://gmn.imo.org/wp-content/uploads/2017/05/GHG3-Executive-Summary-and-Report_web.pdf) and IMO Doc. MEPC 67/INF.3. A summary is available in IMO Doc. MEPC 67/6, Annex). An earlier IMO study from 2009 ([www.imo.org/en/OurWork/Environment/PollutionPrevention/AirPollution/Documents/SecondIMOStudy2009.pdf](http://www.imo.org/en/OurWork/Environment/PollutionPrevention/AirPollution/Documents/SecondIMOStudy2009.pdf)) had estimated the percentage to be around 2.7. See also B Martinez Romera, 'The Paris Agreement and the Regulation of International Bunker Fuels', 25(2) *Review of European Community & International Environmental Law*, 2016, 215, at 215–216, with further references.

<sup>3</sup> See J Scott, T Smith, N Rehmatulla, B Milligan, 'The Promise and Limits of Private Standards in Reducing Greenhouse Gas Emissions from Shipping', 29 *Journal of Environmental Law* 2017, 234.

the cumulative emissions from ships. Due to estimated increases in world trade, total emissions are projected to rise by 50% to 250% by 2050.<sup>4</sup>

For more than two decades, the reduction of GHGs from shipping has been on the agenda of the main international regulatory body for shipping, the International Maritime Organization (IMO), but few requirements have been agreed to date. Discussions have been marked by a persistent divide within the organization as to what international body should be in charge of the matter and what principles should govern the regulation.

Certain developments in recent years give rise to some cautious optimism concerning the establishment of an adequate governance framework for shipping and GHGs in the coming decades. The adoption of the Paris Agreement in 2015, combined with developments at the IMO, offer prospects of smoother institutional interaction and convergence on several divisive issues. On the other hand, the urgency of achieving concrete reductions has become increasingly obvious, and the question is still open as to whether recent policy commitments will – or even can – be translated into binding emissions reductions from the shipping sector.

## 2 The Competent Forum and Applicable Principles

### 2.1 LOSC and the Global Setting

Unlike the case of several other topics addressed in this book, the law of the sea does not dominate discussions on reducing GHGs from shipping. The LOSC offers considerable flexibility for different types of regulatory solutions for existing and future challenges relating to shipping, for environmental or other purposes. The main significance of the LOSC when it comes to regulating shipping lies in its distribution of authority between flag and coastal states, and between states and international institutions.<sup>5</sup> Typically, for shipping, rules are to be adopted by a 'competent international organization' or 'general diplomatic conference', and will normally gain jurisdictional weight only once they are 'generally accepted' or 'generally applicable' on a worldwide basis. As long as the rules and standards are adopted by the IMO or another competent global body, and meet the requirements of general acceptance,<sup>6</sup> they will form part of the set of rules which flag states must require of their ships, irrespective of the sea area, and which

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<sup>4</sup> Ibid.

<sup>5</sup> See e.g. DR Rothwell & T Stephens, *The International Law of the Sea*, Second edition (Hart 2016) at 228–244 and 376–386.

<sup>6</sup> See e.g. the Final Report of the International Law Association's Committee on Coastal State Jurisdiction relating to Marine Pollution over Vessel-Source Pollution, 2000, available at <http://www.ila-hq.org/en/committees/index.cfm/cid/12>. In practice, the achievement of 'general acceptance' is eased by the fact that the key IMO conventions, including the International Convention on the Prevention of Pollution from Ships (Marpol), are very widely ratified today and include 'tacit acceptance' procedure (in Art. 16), under which an amendment becomes applicable to all parties to the Convention, unless they specifically opt out from the amendment. See also J Harrison, 'Recent developments and continuing challenges in the regulation of greenhouse gas emissions from international shipping', A Chircop, S Coffen-Smout & M McConnell (eds), 27 *Ocean Yearbook*, 2013, 359–84, also available at [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=2037038](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2037038).

coastal states may implement and enforce with respect to foreign ships, subject to certain safeguards.<sup>7</sup> The actual content of the requirements matters less, as far as jurisdiction is concerned.

If the rules do *not* meet these criteria – if they have been agreed solely at national or regional level – only those (flag) states that have formally endorsed the rules will be bound by them. The jurisdiction of coastal states will essentially be limited to prescribing standards for their territorial sea which do not concern the construction, design equipment or manning of ships;<sup>8</sup> and port state jurisdiction will have to be based on jurisdiction under general international law, outside the jurisdictional regime outlined in the LOSC.<sup>9</sup> Clearly, the coverage and impact of such rules would be significantly lower than with widely accepted global rules. Moreover, any non-global initiatives in this area are bound to lead to serious political and legal controversies which will complicate their adoption and reduce their legitimacy.

## 2.2 The Competent Global Forum

Since the first discussions on climate change in the early 1990s there has been uncertainty as to which global body (and treaty regime) should govern GHG emissions from shipping. While it is well-established that emissions from *domestic* shipping form part of a state's national emissions and are subject to national inventories, reports and reduction commitments under the UNFCCC,<sup>10</sup> the regulatory position of *international* shipping has been subject to controversy from the outset,<sup>11</sup> and is still not fully clarified.

The question of forum has important substantive implications because of the question of what principles should underlie the regulation. The climate-change regime and IMO have emphasized very different principles for how the responsibility for addressing climate change should be allocated between states. Whereas the climate-change regime from the outset adopted the 'common but differentiated responsibility' (CBDR) approach, signifying greater responsibility

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<sup>7</sup> In particular LOSC Articles 21, 94 and 211 and, as regards safeguards, Articles 223–233. See also Y Tanaka, 'Regulation of greenhouse gas emissions from international shipping and jurisdiction of states, 25(3) *Review of European Community & International Environmental Law*, 2016, 333–346.

<sup>8</sup> LOSC Articles 21(2), 211(5).

<sup>9</sup> H Ringbom, 'Global problem – regional solution? International law reflections on an EU CO<sub>2</sub> emissions trading scheme for ships', 26 *The International Journal for Marine and Coastal Law*, 2011, 613–641.

<sup>10</sup> See Articles 4(1)(a) and 12 of the UNFCCC and Article 7 of the Kyoto Protocol, referring to 'anthropogenic emissions by sources ... of greenhouse gases not controlled by the Montreal Protocol'. See also 'Revised 1996 Guidelines for National Greenhouse Gas Inventories of the Intergovernmental Panel on Climate Change'.

<sup>11</sup> Among the early documents, see e.g. UN Doc. A/AC.237/34 (1993) (Note by the Secretariat: 'Matters Relating to Commitments, Methodologies for Calculation/Inventories of Emissions and Removals of Greenhouse Gases'). See also Decision 2/CP.3 (1997), para. 4, in which the UNFCCC Subsidiary Body for Scientific and Technological Advice (SBSTA) was 'urged to further elaborate on' the inclusion of emissions from international maritime transport and aviation in the overall greenhouse gas inventories of the parties.

for developed states,<sup>12</sup> international shipping has traditionally been based on the principle of equal treatment and non-discrimination on the basis of nationality.<sup>13</sup>

### 2.3 UNFCCC

The ultimate goal of the UNFCCC is, in its own words, to 'achieve ... stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.'<sup>14</sup> According to the principles listed in Article 3, climate policies should 'comprise all economic sectors'; specific reference to efforts to reduce emissions from transport is made in Article 4(1)(c). These provisions represent the legal foundation for the activities of the UN climate regime in the field of international shipping.

The UNFCCC started to address GHG emissions from ships in 1995 in recognition of the growing volume of such emissions and their impact on climate change. At the first meeting of the Conference of the Parties, the UNFCCC Subsidiary Body for Scientific and Technological Advice (SBSTA) was tasked with considering how to deal with international emissions from shipping and aviation. It mooted eight options for the allocation of shipping's emissions to states, but there was no agreement with respect to any of these options.<sup>15</sup>

### 2.4 The Kyoto Protocol

In view of the difficulties linked to allocating responsibility for internationally mobile emissions, international shipping and aviation emissions were explicitly excluded from the Kyoto Protocol in 1997. Article 2(2) of the Protocol called for Annex I states to

pursue limitation or reduction of emissions of greenhouse gases not controlled by the Montreal Protocol from aviation and marine bunker fuels, working through the International Civil Aviation Organization and the International Maritime Organization, respectively.

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<sup>12</sup> Article 3(1) of the UNFCCC provides that the parties 'should protect the climate system for the benefit of present and future generations of humankind, on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities. Accordingly, the developed country Parties should take the lead in combating climate change and the adverse effects thereof.'

<sup>13</sup> E.g. Marpol Article 5(4) See also Article 1(c) of the 1948 Convention on the International Maritime Organization, and the general non-discrimination clause in LOSC Article 227.

<sup>14</sup> UNFCCC, Article 2.

<sup>15</sup> The eight options were 1) no allocation; 2) allocation to parties in proportion with their national emissions; 3) allocation based on where the bunker fuels were sold; 4) based on the nationality of the transporting company or the ship's state of registry; 5) based on the country of departure or destination of the ship; 6) based on the state of departure or destination of the cargo or passengers; 7) based on the country that owns the cargo or nationality of passengers; or 8) based on where the emission is generated. UN Docs. FCCC/CP/1995/7/Add.1, at p. 16; and UNFCCC/SBSTA/1996/9/Add.2.

This solution was the outcome of lengthy deliberations on how best to cover international bunker fuels.<sup>16</sup> It came to represent a way 'to lessen the need for the climate regime to be proactive in the controversial policy issues surrounding allocation and control options.'<sup>17</sup>

The full policy implications of this provision have been subject to controversy over the years;<sup>18</sup> here we may note that it neither grants the IMO exclusive authority to regulate emissions from shipping (in the sense that it would preclude action by other institutions to engage in this matter) nor imposes an obligation of result on the IMO to arrive at reduction measures.

The clause may have met the political needs within the climate regime at the time, but it did not have much effect in terms of reducing emissions from shipping. The IMO started discussing the matter seriously immediately following the adoption of the Kyoto Protocol in 1997. However, as noted in section 4 below, it was not until 2011 that the first (and so far only) regulatory measures were adopted.

The main issue of contention has been whether the formula in Article 2(2) of the Kyoto Protocol limits the options available to the IMO. Given that this Article is addressed to Annex 1 states only, the question arises as to whether any regulatory solution by the IMO should also be based on a differentiation between Annex 1 and non-Annex 1 countries, or whether the reference includes no such restrictions.<sup>19</sup> It also seems clear that, in the absence of a hierarchical relationship between the two institutions, and indeed the absence of hierarchy in international law more generally, IMO's mandate to act in the field derives not from the Kyoto Protocol, but from its own constituent instrument and other conventions and rules adopted by its membership.<sup>20</sup>

However, the IMO has pointed out that the specific reference to the organization in the Kyoto Protocol shows that the climate-change regime acknowledges the competence of the UN specialized agencies as the natural forum for negotiating

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<sup>16</sup> See S Oberthür, 'Institutional interaction to address greenhouse gas emissions from international transport: ICAO, IMO and the Kyoto Protocol' 3(3) *Climate Policy*, 2003, 191; and A Chircop, M Doelle, R Gauvin, *Shipping and Climate Change: International Law and Policy Considerations*, Special Report, Centre for International Governance Innovation 2018 (hereinafter: 'CIGI Report'), 11.

<sup>17</sup> F Yamin and J Depledge, *The International Climate Change Regime: A Guide to Rules, Institutions and Procedures* (Cambridge University Press 2004) 85.

<sup>18</sup> See e.g. S Kopela 'Climate change, regime interaction, and the principle of common but differentiated responsibility: the experience of the International Maritime Organization', 24(1) *Yearbook of International Environmental Law*, 2014, 75–77.

<sup>19</sup> The general legal view, including that taken by the IMO Legal Affairs Division, is that measures may be taken with respect to all states without contravening the Kyoto Protocol. See Kopela, note 18 above, at 73–78, and Harrison, note 6 above.

<sup>20</sup> See e.g. Article 1(a) and 15(j) of the Convention on the International Maritime Organization. Resolution A.963(23), which entrusted the IMO to work with GHG emissions in 2003, established a series of other relevant provisions in IMO instruments and the LOSC, providing a mandate for the IMO to act in this field.

sector-specific GHG emission reductions, given their expertise and experience in regulating other environmental matters, including air emissions.<sup>21</sup>

Just how the CBDR principle could apply in international shipping in practice is not obvious. If requirements followed ships' flag states, their effectiveness would be reduced by the ease by which ship operators can choose their flag state, side-stepping their obligations by a simple change of flag. Some three-quarters of the world's tonnage is registered outside the (developed) countries listed in Annex I of the UNFCCC,<sup>22</sup> and that share would probably increase significantly if a future regime covered only ships flying the flag of Annex I states. Differentiating on the basis of the ship's nationality (flag) is therefore not a practical option for regulating shipping, while linking reduction obligations to other states based on the place of destination or true ownership is fraught with other, more practical difficulties – for example, as regards rule evasion and the challenges of gathering reliable data. However, that differentiation between developed and developing states might be done in other forms – perhaps by allocating potential revenues to developing countries for financing mitigation and adaptation measures, or through 'rebate mechanisms', or through technical assistance.

## 2.5 The Paris Agreement

Given the lack of regulatory progress at the IMO, and the increasing efforts aimed at reaching agreement on a successor to the Kyoto Protocol, the idea of including international bunker fuels within the climate regime re-surfaced in 2007 and remained contentious in the international climate discussions for many years.<sup>23</sup> The matter remained uncertain until the very end of the negotiations of the Paris Agreement. Draft texts had occasionally included provisions on shipping, notably the 90pp negotiation text from February 2015, which included a reference to the need for 'global sectoral emission reduction targets' for international aviation and shipping and to the need for all parties to work through the IMO (and the International Civil Aviation Organization, ICAO) to develop global policy frameworks for achieving such targets.<sup>24</sup>

These options were maintained in subsequent negotiation texts, but were eventually deleted from the drafts presented at COP 21 in Paris.<sup>25</sup> Some less controversial texts, on the parties' need to pursue the limitation or reduction of emissions by international bunker fuels at IMO and ICAO, re-surfaced during the

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<sup>21</sup> See e.g. [www.imo.org/en/OurWork/Environment/PollutionPrevention/AirPollution/Pages/Historic%20Background%20GHG.aspx](http://www.imo.org/en/OurWork/Environment/PollutionPrevention/AirPollution/Pages/Historic%20Background%20GHG.aspx).

<sup>22</sup> E.g. MEPC 60/WP.5 (2010). See also Kopela, note 18 above, 93.

<sup>23</sup> Including international bunker fuels within the climate regime featured as one aspect of the Bali Action Plan (Decision 1/CP.13 (UN Doc. FCCC/CP/2007/6/Add.1). In the end, however, the question of international bunker fuels was the only item in the Action Plan that was closed without a decision text or follow-up process, nor was there a conclusion in the subsequent negotiations on this topic leading up to the Doha meeting in 2012 (Decision 1/CP.18/ Un Doc. UNFCCC/CP/2012/8/Add.1). For more, see Martinez Romera note 2 above, 217.

<sup>24</sup> UN Doc. FCCC/ADP/2015/1, para. 40. The same text included as one option that the two sectoral organizations could adopt a levy scheme to provide financial support for the Adaptation Fund and, in doing so, 'to take into consideration the needs of developing countries, particularly the LDCs, SIDS' (para. 116.5).

<sup>25</sup> See Martinez Romera, note 2 above, 219–220, with further references.

negotiations in Paris and were retained in the draft text as late as three days before the closure of the COP meeting, but also these were eventually removed.<sup>26</sup>

Thus, the Paris Agreement includes no reference to the obligation of the shipping sector to contribute to the goals of the Agreement, or to any particular responsibilities of the IMO in this respect. The omission of such references was essentially due to the policy of eliminating provisions in the draft that were highly contentious and divisive but not essential for the Agreement as a whole.<sup>27</sup>

It has been held that the failure to include a specific reference to shipping and aviation represents a 'missed opportunity', and that including it would have resolved a long-standing problem for the climate regime, while also enhancing equity in the scheme and in the use of potential revenues from international bunker fuels.<sup>28</sup> On the other hand, shipping remains linked to the climate regime, through Article 4(1) of the UNFCCC, and could be taken up in the SBSTA or another forum.

Experience with the Kyoto Protocol model shows that a formulation that explicitly delegates such a task to the IMO is no guarantee for regulatory results or even clarity about the governing principles.<sup>29</sup> The solution adopted in the Paris Agreement – no mention of shipping at all – will probably serve the interests of future climate regulation of maritime transport better than a Kyoto Protocol-type exclusion clause. It maintains effective pressure on the IMO to act, without emplacing specific targets as to the outcome.<sup>30</sup> Accordingly, neither including nor excluding shipping emissions in the global climate framework represents a convenient compromise which may prove significant in the future, in particular if trust in the IMO's capabilities for addressing the matter were to erode.

More importantly, the approach taken in the Paris Agreement includes several elements likely to influence discussions on shipping in the longer term. Here we may note: the establishment of global climate stabilization goals, rather than prescriptive emissions reduction requirements;<sup>31</sup> the bottom-up approach under which countries will determine their own contributions on an individual and successive basis; and the softening of the CBDR principle to include all states

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<sup>26</sup> UNFCCC Draft Paris Outcome, Proposal by the President, 9 December 2015, 15:00, available at <http://unfccc.int/resource/docs/2015/cop21/eng/da01.pdf>

<sup>27</sup> Martinez Romera, note 2 above, at 220.

<sup>28</sup> *Ibid.*, 219.

<sup>29</sup> The Kyoto Protocol and its sharp division between developed and developing states has been held to be at the root of IMO's problems in finding a regulatory solution: see e.g. A Chrystostomou & E Vagslid, 'Climate Change: A Challenge for IMO Too', in R Asariotis, H Benemara (eds.), *Maritime Transport and the Climate Change Challenge* (Earthscan, 2012) 81. See also Kopela, note 18 above, 89–94.

<sup>30</sup> The solution has also been interpreted by Martinez Romera, note 2 above, 225–226 as legitimising unilateral action by states or regions as the sole effective means, while J Scott et al., note 3 above, p. 255, note industry concerns that not specifically tasking the IMO to address the matter might increase the risk of regional regulatory action in the field.

<sup>31</sup> The Paris Agreement identifies a target of global temperature increase above pre-industrial levels of 'well below 2°C', with the aim of limiting the increase to 1.5°C.



in mitigation efforts.<sup>32</sup> These elements offer a clear target, and clarify that no state or group of states is exempt from making emissions reductions; at the same time, there is flexibility for tailor-made solutions to deal with specific issues. All these elements are likely to ease the tensions that have troubled negotiations at the IMO over the past decades.

## 3 Regulatory Developments at the IMO

### 3.1 Introduction

Greenhouse gases have been discussed more or less continuously in the IMO ever since the late 1990s, but with greater intensity and focus on reduction requirements in the past decade.<sup>33</sup> Some technical rules for newly-built ships were adopted in 2011, coupled with operational measures of a voluntary nature. Market-based measures were discussed in the same period, but proved so difficult that the discussions were suspended in May 2013. A new policy framework for the future was agreed in 2018 in the form of an 'initial strategy', to be complemented by a more developed strategy in 2023. In addition, a data collection scheme intended to form the basis of any future regulatory measure has been approved, but not yet put into operation.<sup>34</sup> These measures are briefly reviewed below.

### 3.2 The EEDI

The first requirement aimed at reducing CO<sub>2</sub> emissions from shipping concerned the design of ships.<sup>35</sup> It introduced minimum standards of energy efficiency for new ships, in the form of an index – the attained Energy Efficiency Design Index (EEDI) – which is based on the amount of fuel (and CO<sub>2</sub> emissions) that the ship burns (and emits), at a given reference speed taken at 75% of the Maximum Continuous Rating (MCR) of its main propulsion power under maximum cargo/loading capacity.<sup>36</sup> The required EEDI sets a minimum energy-efficiency level per capacity mile (tonne mile) for different ship types and size segments. The requirement for energy efficiency performance is to be made more stringent every five years, so that ships will gradually become more energy efficient. Under the scheme, ships built in 2025 will be 30% more energy efficient than those built in 2014. The reduction factors and reference line values which form the

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<sup>32</sup> Paris Agreement, 3rd recital, Article 2(2) and several paragraphs of Article 4. See also L Rajamani, 'Ambition and Differentiation in the 2015 Paris Agreement: Interpretative Possibilities and Underlying Politics' in 65 *International Journal of Comparative Law Quarterly*, 2016, 493, D Bodansky, 'The Paris Climate Change Agreement: A New Hope?' 110(2) *American Journal of International Law*, 2016, 288, notes 60–62.

<sup>33</sup> For an overview, see CIGI Report, note 16 above, 36–48.

<sup>34</sup> Additionally the IMO has commissioned three comprehensive studies on the extent of GHG emissions from shipping, including projections for the future, in 2000, 2012 and 2014. These studies represent the main scientific basis for action in the field, and represent state-of-the-art science on the matter. The 2014 study (note 2 above) is currently being updated.

<sup>35</sup> IMO Resolution MEPC.203(62), introducing a new chapter 4 to Marpol Annex VI, which entered into force on 1 January 2013.

<sup>36</sup> Marpol, Annex VI Chapter 4, regulations 19–21. See also the 2014 Guidelines on the Method of Calculation of the Attained Energy Efficiency Design Index (EEDI) for new ships. IMO Doc. MEPC, 66/21, Annex 5.

basis of the energy efficiency requirements are also to be reviewed subject to technical developments.<sup>37</sup>

The technical requirements introduced by the EEDI are entirely goal-based in the sense that they leave the technical decisions on how to achieve the necessary reductions to ship designers. The EEDI value could be reduced either by reducing engine power, fuel consumption or the carbon factor of fuel, or by increasing the deadweight or speed of the ship (without affecting fuel consumption). The principal technical options available today include slimmer hull design, lightweight construction materials, more efficient engines, alternative fuels or complementary energy sources, such as solar or wind power (e.g. serving auxiliary and backup systems).

The rule applies to all ships, of the covered 12 ship types ordered or having undergone major conversions as from 2017.<sup>38</sup> Each ship shall carry a certificate indicating its EEDI value,<sup>39</sup> to be issued by its flag state and checked by port-state control, irrespectively of flag.<sup>40</sup> A series of supplementary guidelines have been adopted to assist in the calculation of the index values and reference lines, and for implementing the scheme more generally.<sup>41</sup>

In view of the scope of the requirement it is clear that the EEDI can have only a limited impact on reducing emissions from ships in the short term. Since the measure covers only new ships (or major conversions), a significant time-lag for its impact on global emissions is inevitable. As ships normally have a commercial life of some 30 years, it will take several decades before all ships have been built to EEDI standards. In addition, the reference lines have been set quite conservatively, so many existing ships will satisfy the EEDI requirements for several decades to come. The implication for certain categories of ships is that, unless the requirements are further strengthened, even ships ordered in the coming decade can be designed according to today's energy-efficiency

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<sup>37</sup> The EEDI originally covered only the largest and most energy-intensive segments of the world merchant fleet: tankers, bulk carriers, gas carriers, general cargo ships, container ships, refrigerated cargo carriers and combination carriers. In 2014, Marpol Annex VI was amended to extend the scope of EEDI to LNG carriers, ro-ro cargo ships (vehicle carriers), ro-ro cargo ships; ro-ro passenger ships and cruise passenger ships having non-conventional propulsion.

<sup>38</sup> In 2011 seven ship types were included (bulk carriers, gas carriers, tankers, container ships, general cargo ships, refrigerated cargo ships, and combination carriers) which were thought to cover 70% of the total shipping emissions. In 2014, five new ship types were added (LNG carriers, ro-ro cargo ships, ro-ro passenger ships and cruise passenger ships with non-conventional propulsion systems), bringing the percentage up to an estimated 85%. However, the regime applies only to new ships and to ships above 400gt.

<sup>39</sup> Marpol Annex VI, Regulation 19. See also 2014 guidelines on survey and certification of EEDI (Resolution MEPC.254(67) as amended by IMO resolution MEPC.309(73).

<sup>40</sup> Marpol Annex VI, Regulation 10(5).

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See

[www.imo.org/en/OurWork/Environment/PollutionPrevention/AirPollution/Pages/Technical-and-Operational-Measures.aspx](http://www.imo.org/en/OurWork/Environment/PollutionPrevention/AirPollution/Pages/Technical-and-Operational-Measures.aspx).

practices.<sup>42</sup> However, for certain ship types, the requirements concerning implementation dates were strengthened in May 2019.<sup>43</sup>

### 3.3 The SEEMP

Reducing fuel consumption (and CO<sub>2</sub> emissions) from ships is not only – or even mainly – a function of how ships are designed. The ways in which they are operated entail significant reduction potentials. It has been estimated that a single operational measure based on slow steaming may reduce bunker consumption by up to 59 per cent.<sup>44</sup> Other mechanisms for achieving better energy efficiency include improved voyage planning, more frequent cleaning of the hulls (underwater parts of the ship), ship/fleet energy management policies, planned engine maintenance, etc. It has been estimated that, by combining various operational measures and using only existing technologies, GHG emissions from shipping could be reduced up to 75%.<sup>45</sup> Such measures would also provide benefits in the form of fuel savings.

In order to include the operation of ships, including existing ships, in the regulatory framework, the IMO developed in parallel with the EEDI an obligation for all ships to have a ship energy efficiency management plan (SEEMP) on board.<sup>46</sup> Through the SEEMP, the shipowner, operator or charterer, is to aim at improving that ship's energy efficiency through planning, monitoring, implementation and improvement. The IMO also proposed that an energy efficiency operational indicator (EEOI) could be used as a monitoring tool to measure improvements over time.<sup>47</sup>

However, in terms of normative impact, the SEEMP is of limited value. While the SEEMP urges ship operators at each stage of the plan to consider new technologies and practices when seeking to optimize the performance, it does not require any specific type of reduction or even monitoring method to be used. Simply having a management plan on board is sufficient to meet Marpol requirements.<sup>48</sup>

### 3.4 Market-Based Measures

It is widely acknowledged that existing measures are far from sufficient to meet the climate goals set by the IMO. Indeed, a study commissioned by the IMO in

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<sup>42</sup> IMO Doc. MEPC 74/WP.8 (Report of the Working Group on Air Pollution and Energy Efficiency), para. 39, Annex 9.

<sup>43</sup> IMO Doc. MEPC 74/18 (Final Report). The amendment brings forward the entry-into-force date of phase 3 to 2022 (from 2025), for several ship types, and tightens the requirements by up to 50% for large container vessels.

<sup>44</sup> A Wiesmann, 'Slow Steaming: A Viable Long-term Option?', *Wärtsilä Technical Journal*, 2010, 50. See also CIGI Report, note 16 above, 59. However, some estimates fail to note that in such cases more ships would be needed to perform the work.

<sup>45</sup> 2nd IMO GHG study, note 2 above, 54 and 58.

<sup>46</sup> Marpol Annex VI, Regulation 22.

<sup>47</sup> The EEOI is a simple calculating tool that indicates the ratio between CO<sub>2</sub> emissions and transport work (cargo carried x distance). See also IMO Doc. MEPC.1/Circ. 684.

<sup>48</sup> Marpol Annex VI, Regulations 22(2), requires only that the management plan 'shall be developed taking into account guidelines adopted by the [IMO]'. This refers in particular to the 2016 Guidelines for the development of a ship energy efficiency management plan (SEEMP), (IMO Resolution MEPC.282(70)).

2010 indicated that, because of the projected growth in trade, GHG emissions from international shipping would increase, even with the implementation of the EEDI and the SEEMP.<sup>49</sup> The third main group of measures discussed at the IMO concerns market-based measures (MBMs), i.e. economic incentives for ship operators to reduce their bunker fuel consumption.<sup>50</sup> The proposed measures range from various forms of 'levies' or 'carbon taxes' on bunker fuel to efficiency-credit trading programs and fully fledged 'cap and trade' emission trading schemes where emissions rights can be sold and purchased on the market.

MBMs were originally put forward as an option in the first IMO GHG Study from 2000 and have been discussed since 2003, in greater depth from 2006.<sup>51</sup> In contrast to the (partial) progress made on technical and operational measures, MBMs have proven very difficult. IMO members have been deeply divided on whether and how to include such measures, and whether, in that case, this should be a system for the shipping sector alone or might be made applicable in other sectors as well; and on whether and how the system should accommodate the CBDR principle.

Seven main types of MBMs have been proposed to date. These are a GHG Fund;<sup>52</sup> a port state levy;<sup>53</sup> an 'Efficiency Incentive Scheme';<sup>54</sup> a 'Ship Efficiency and Credit Trading' scheme;<sup>55</sup> a global emissions trading system;<sup>56</sup> a system based on penalties on trade and development;<sup>57</sup> and a rebate mechanism for market-based instruments.<sup>58</sup> Following the conclusion of the energy-efficiency measures in 2011, IMO decided in 2012 to discuss these seven groups with a view to narrowing down a more limited range of options. However, the topic proved so divisive that it was decided to suspend discussions in 2013,<sup>59</sup> and they have not yet resumed. MBMs are not expected to be adopted in the short term, due mainly to concerns regarding possible extra costs for the shipping industry.<sup>60</sup>

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<sup>49</sup> Full Report of the Work Undertaken by the Expert Group on Feasibility Study and Impact Assessment of Possible Market-Based Measures, IMO Doc MEPC 61/INF.2. See also Y Shi, 'Reducing greenhouse gas emissions from international shipping: is it time to consider market-based measures?', 64 *Marine Policy* 2016, 123–134.

<sup>50</sup> The OECD defines market-based measures more narrowly, by stating that they '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.' See <https://stats.oecd.org/glossary/detail.asp?ID=7214>. See also H.N. Psaraftis, 'Market-Based Measures for Greenhouse Gas Emissions from Ships: A Review, 11(2) *WMU Journal of Maritime Affairs*, 2012, 211.

<sup>51</sup> [www.imo.org/en/OurWork/Environment/PollutionPrevention/AirPollution/Pages/Market-Based-Measures.aspx](http://www.imo.org/en/OurWork/Environment/PollutionPrevention/AirPollution/Pages/Market-Based-Measures.aspx)

<sup>52</sup> IMO Doc. MEPC 60/4/8 (Denmark, the Marshall Islands, Nigeria)

<sup>53</sup> IMO Doc. MEPC 60/4/40 (Jamaica)

<sup>54</sup> IMO Doc. MEPC 60/4/39 (World Shipping Council, Japan)

<sup>55</sup> IMO Doc. MEPC 60/4/12 (United States)

<sup>56</sup> IMO Docs. MEPC 61/4/22 (Norway), MEPC 60/4/26 (UK) and MEPC 60/4/41 (France)

<sup>57</sup> IMO Doc. MEPC 60/4/10 (Bahamas)

<sup>58</sup> IMO Doc. MEPC 60/4/55 (IUCN)

<sup>59</sup> IMO Doc. MEPC 65/22, p. 44.

<sup>60</sup> See Y Shi & W Gullett, 'International Regulation of Low-Carbon Shipping for Climate Change Mitigation: Development, Challenges and Prospects', 49(2) *Ocean Development and International Law*, 2018, 140.

### 3.5 Mandatory Data Collection System

In 2016, the global data collection system for maritime transport was adopted to address the absence of reliable ship emissions data and to facilitate the development of further regulatory measures.<sup>61</sup> Starting from 2020, the IMO data collection system requires all ships above 5,000 gross tonnage to collect consumption data for each type of fuel oil they use, as well as additional, specified, data including proxies for transport work. These data are reported by owners to the flag state on a yearly basis. Flag states issue a 'Statement of Compliance' to the ships that have been reported in accordance with the requirements, and subsequently transfer the data, in aggregated form, to an IMO Ship Fuel Oil Consumption Database. The IMO then produces an annual report to its Marine Environment Protection Committee (MEPC), summarizing the data collected.

This data collection system was preceded by the adoption of a regional EU Regulation on 'monitoring, reporting and verification' (MRV) in 2015. As discussed in section 4.4 below, there are certain differences between the systems and it seems likely, despite ongoing efforts to align them, that some differences will persist.

### 3.6 2018 IMO Initial Strategy

Following the adoption of the Paris Agreement in 2015, the IMO came under significant pressure to demonstrate its capacity to deal efficiently with emissions from shipping. In 2016 it adopted a roadmap for developing a 'Comprehensive IMO strategy on reduction of GHG emissions from ships';<sup>62</sup> an 'initial strategy' was adopted in 2018,<sup>63</sup> to be replaced by a comprehensive strategy in 2023. Even if it is not a binding instrument, the strategy sets certain important goals for the organization in dealing with GHGs from ships, while also suggesting a common approach to some of the previously contentious issues.

Under the overarching vision of the initial strategy, 'IMO remains committed to reducing GHG emissions from international shipping and, as a matter of urgency, aims to phase them out as soon as possible in this century.'<sup>64</sup> The strategy envisages a reduction in carbon intensity of international shipping (to reduce CO<sub>2</sub> emissions per transport work, as an average across international shipping), by at least 40% by 2030, pursuing efforts towards 70% by 2050, compared to 2008), and that total annual GHG emissions from international shipping should be reduced by at least 50% by 2050 compared to 2008. Significantly, it is also acknowledged that the Paris Agreement temperature goals form part of the

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<sup>61</sup> IMO Resolution MEPC.278(70) introducing a new Regulation 22A to Marpol Annex VI, including two new appendices. See also Resolution MEPC 293(71) and [www.imo.org/en/MediaCentre/PressBriefings/Pages/04MARPOLamendments.aspx](http://www.imo.org/en/MediaCentre/PressBriefings/Pages/04MARPOLamendments.aspx)

<sup>62</sup> IMO Doc. MEPC 70/18/Add.1, Annex 11. See also IMO Doc. MEPC 70/7/8.

<sup>63</sup> Note **Error! Bookmark not defined.** above.

<sup>64</sup> Initial strategy, note **Error! Bookmark not defined.** above, para 2.

levels of ambition that direct the strategy<sup>65</sup> and that both non-discrimination and the CBDR principles represent guiding principles for the strategy.<sup>66</sup>

The initial strategy also includes a list of candidate short-, mid-, and long-term further measures, with possible timelines, to be revised as appropriate as additional information becomes available. The short-term measures (to be agreed between 2018 and 2023) include further improvement of the EEDI and SEEMP tools for improving energy efficiency, along with a series of measures to stimulate the adoption of innovatory technologies. Five mid-term measures (2023–2030) are listed, one of which is ‘new/innovative emission reduction mechanism(s), possibly including Market-based Measures (MBMs), to incentivize GHG emission reduction’.<sup>67</sup>

While reaching consensus on these goals and principles is highly significant in light of the earlier divisions in IMO, the initial strategy is still very far from producing any emission reductions from shipping. The document is an expression of objectives, not actions, in a legally non-committing format, and includes no concrete actions in the form of reduction measures to be undertaken. In reality, existing technologies may not be sufficient to achieve the longer-term reduction goals.<sup>68</sup> Moreover, even if the reduction goals expressed in the initial strategy were achieved, that would not be sufficient to meet the climate goals of the Paris Agreement, let alone those of the latest report of the Intergovernmental Panel on Climate Change (IPCC).<sup>69</sup> Finally, it may be noted that some less-transparent accounting techniques built into the strategy reduce its actual level of ambition.<sup>70</sup>

### 3.7 Assessment

The regulation of GHGs from shipping is the most politically divisive matter ever discussed at the IMO. The division on fundamental principles has deadlocked progress for more than a decade, and has contributed to casting doubt on the organization's ability to deal with the matter at all. Even if shipping is generally

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<sup>65</sup> *Ibid.*, para. 3.1.3.

<sup>66</sup> *Ibid.* para. 3.2.1.

<sup>67</sup> *Ibid.*, para. 4.8.3. The only candidate longer-term measures (beyond 2030) listed in para. 4.9 are to ‘pursue the development and provision of zero-carbon or fossil-free fuels to enable the shipping sector to assess and consider decarbonization in the second half of the century’ and to ‘encourage and facilitate the general adoption of other possible new/innovative emission reduction mechanism(s).’

<sup>68</sup> See e.g. Transport & Environment Position Paper of March 2018, available at [www.transportenvironment.org/sites/te/files/publications/2018\\_03\\_TE\\_position\\_paper\\_IMO\\_Initial\\_GHG\\_strategy.pdf](http://www.transportenvironment.org/sites/te/files/publications/2018_03_TE_position_paper_IMO_Initial_GHG_strategy.pdf), at 4.

<sup>69</sup> According to para. 3.1 of the initial strategy, reviews should take into account updated emissions estimates and the reports of IPCC. On the availability of technology, see e.g. Transport & Environment Position Paper, note 68 above, at 1–4, and International Workshop on Greenhouse Gas Emissions and Shipping, Singapore, 13–14 November 2018, Workshop Report, available at <https://cil.nus.edu.sg/wp-content/uploads/2019/01/Greenhouse-Gas-Emissions-and-Shipping-Workshop-Report.pdf>, paras. 16, 72.

<sup>70</sup> Notably, the year selected as the reference year for the reduction requirements, 2008, was by far the peak year for shipping CO<sub>2</sub> emissions to date; it was lower in the following years, due to the general downturn in world trade. See Third IMO GHG Study, note 2 above, and CIGI Report, note 16 above, 47.

thought to involve greater opportunities for cutting emissions through technical and operational measures than, e.g., aviation,<sup>71</sup> there are as yet no requirements which concern the operation of ships or otherwise target shipowners beyond the ship design stage.

That the IMO has had difficulties in agreeing on further measures is due to several reasons. Apart from the technical and scientific complexities surrounding GHGs and climate change, the fact that the concerns involved extend beyond shipping has entailed a series of additional challenges for the organization.

Firstly, uncertainty about the share of shipping in the global problem, and hence what would constitute a 'fair' mechanism for addressing it, given the fact that shipping is largely a function of global trade, has contributed to a certain reluctance to adopt far-reaching rules in the field. Fears have repeatedly been expressed that shipping will be a funding source, or 'milch cow', for financing climate-mitigation measures in other sectors.

Secondly, deliberations at the IMO have clearly been affected by politically delicate discussions underway in parallel in other UN bodies on climate change, notably the UNFCCC. Linking the available shipping solutions to a broader political agenda, e.g. on the role and relevance of the CBDR principle more generally, has fragmented the debate and impaired affected the prospects of finding consensus-based solutions. An exacerbating factor is that some of the principles that have governed negotiations in the UNFCCC are manifestly difficult to apply in shipping.

Finally, some of the IMO's own traditions and procedures have proven difficult in dealing with a matter fraught with so many uncertainties. For example, the IMO tradition has been that a new regulation should not be introduced unless there is a 'compelling need' for it, and having regard to its cost implications.<sup>72</sup> Another tradition is not to extend new technical rules to existing ships, but to include a 'grandfather clause' limiting the application of new rules to future ships, to avoid retrofitting needs and the accompanying uncertainty for ship operators.

Generally speaking, the IMO regulatory process tends to work best when it deals with challenges that can be resolved by technical means, preferably for new ships only, based on a level playing field covering all ships, by solutions to be implemented by engineers, approved by classification societies, certified by flag states and verified by port-state control. This is the typical way for IMO to approach issues in its conventions. Implementation is essentially delegated to naval architects and engineers, leaving it to shipowners, operators and states to

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<sup>71</sup> See e.g. Martinez Romera, note 2 above, 216, and CIGI Report, note 16 above, 57.

<sup>72</sup> The principle that applied for decades, that 'proposals for new conventions or amendments to existing conventions be entertained only on the basis of clear and well-documented compelling need and having regard to the costs to the maritime industry and the burden of the legislative and administrative resources of Member States' (IMO Resolution A.777(18), 1993, para 4), has since been moderated through Assembly Resolution A.1103(29) from 2015, providing in Annex, para. 1.1 that '[b]efore considering the introduction of new regulation, there is a need to establish, in advance, if the administrative requirement can be met by other means.'

ensure that the required equipment/certificate is in place, knowing that all other operators will be subject to identical requirements. Of the measures discussed for GHG reduction, only the EEDI fits this description, which can at least in part explain why agreeing on the EEDI has been so much easier within the IMO, despite its huge technical complexity compared to the proposed operational measures.

In the case of operational and market-based measures, this setting is different. For such measures, emission reductions necessarily entail changes in the way ships are operated, or at least a higher price-tag for maintaining the status quo. They also imply a wide range of methods to ensure compliance, forcing ship operators individually to find the mechanism that fits their particular needs. This in turn requires more effort on the part of ship operators, and increases the costs as well as the prospect of different solutions – all of which are effects that the IMO has traditionally sought to avoid in its regulations.

Operational and market-based measures, or any combination of them, have no precedents in existing IMO Conventions, and will necessarily involve several difficult regulatory challenges. In shifting the focus from technology to operations, for example, it becomes necessary to establish the responsible party, the scope of the measure and how to avoid various jurisdictional concerns linked to implementing operational rules that need to be specified in geographical terms. Such a shift also involves important challenges in terms of monitoring and enforcement mechanisms. Further, some of the measures discussed will require establishing new institutions, principles governing the use of funds, or legal challenges in relation to international taxation.

All such challenges are surmountable, and the IMO certainly seems better placed than any other (global or regional) body to deal with them. A key concern, however, remains: bar a massive switch to nuclear fuel in shipping (which seems unlikely for various reasons),<sup>73</sup> none of the technologies or fuels that exist today, could meet the longer-term reduction goals set forth in the strategy, in view the projected increase in maritime transport. Reducing total GHG emissions from international shipping by at least 50% by 2050 ‘whilst pursuing efforts towards phasing them out’ simply does not seem feasible without significant technological breakthroughs in the field of engines and fuels. Currently no such technologies are available for large-scale use by international shipping.<sup>74</sup> On the other hand, without pressure in the form of additional costs for fuel combustion, as under operational and market-based measures, there would be even fewer incentives for the industry to invest in developing such alternative technologies.

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<sup>73</sup> In addition to high investment and operating costs, there are technical concerns with nuclear propulsion of commercial ships. See e.g. S Hirdaris, YF Cheng, P Shallcross, J Bonafoux, D Carlson, B Prince, GA Sarris, 'Considerations on the potential use of Nuclear Small Modular Reactor (SMR) technology for merchant marine propulsion'.<sup>79</sup> *Ocean Engineering*, 2014, pp. 101–130, who conclude that further maturity of nuclear technology and the development and harmonization of the regulatory framework are necessary. That said, concerns related to climate change have clearly served to increase interest in nuclear propulsion for commercial ships. See e.g. <https://cleantechnica.com/2017/01/28/now-time-nuclear-cargo-shipping/>.

<sup>74</sup> See e.g. presentation by Prof. Lam in *Singapore Report*, note 69 above, paras. 30–36.



## 4 Post-Paris Pressures on the IMO

### 4.1 General

Apart from the commitments undertaken by the IMO itself, the organization is under external pressure from many directions to produce tangible results in the form of concrete emissions-reduction requirements. Those pressures range from implicit or explicit policy pressures and legal challenges by other intergovernmental institutions, to commercial pressure by progressive industry parties. The key external institutional pressures are briefly reviewed below.

### 4.2 The Global Climate Regime

Even if the solution adopted in the Paris Agreement is widely considered to consolidate the IMO's position as the international body in charge of regulating greenhouse gas emissions from ships,<sup>75</sup> there has been no express pronouncement to that effect. As noted above, the non-hierarchical nature of international law complicates the imposition of mandates or other regulatory directions between international treaty regimes or institutions.<sup>76</sup> Moreover, in view of the solution adopted in the Paris Agreement not to refer to international bunker fuels at all, there is nothing to prevent the UNFCCC regime from re-engaging itself in the matter if the IMO fails to deliver what is perceived as an effective scheme within reasonable time. A parallel climate regime for shipping within the UNFCCC could be developed on the basis of existing provisions, and would not require any amendment of its existing mandate.<sup>77</sup>

The 1992 UNFCCC, which remains the main framework convention for the regulation of climate change, has not changed and remains applicable. As noted above, the Convention refers to measures addressing 'all greenhouse gases not controlled by the Montreal Protocol', the contribution by 'all economic sectors', and even includes certain references to transport in some of the key provisions.<sup>78</sup> Moreover, even the Kyoto Protocol's express request for the IMO to pursue emissions reductions did not amount to an exclusive mandate for that organization. The absence of a similar clause in the Paris Agreement strengthens the argument that responsibility for the matter is shared – or at least not specifically apportioned – between the two regulatory regimes.

More importantly, the Paris Agreement itself includes all GHG emissions within its long-term mitigation goals. The aim is 'to strengthen the global response to the threat of climate change' by containing the increase of temperature within the limits referred to in Article 2(1)(a).<sup>79</sup> In order to achieve those goals, 'Parties aim to reach global peaking of greenhouse gas emissions as soon as possible ... so as to achieve a balance between anthropogenic emissions by sources and

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<sup>75</sup> See e.g. Martinez Romera, note 2 above, 221, 224; the CIGI Report, note 16 above, 45.

<sup>76</sup> See at note 20 above.

<sup>77</sup> See also A O'Leary & J Brown, 'Legal bases for IMO Climate Change Measures', Report by Environmental Defense Fund, Columbia Law School, 2018, available at <http://columbiaclimatelaw.com/files/2018/06/OLeary-and-Brown-2018-06-IMO-Climate-Measures.pdf>

<sup>78</sup> Section 2.3 above.

<sup>79</sup> Paris Agreement, Article 2(1).

removals by sinks of greenhouse gases in the second half of this century'.<sup>80</sup> It seems clear that allowing the emissions of shipping to increase by a factor of two or more until 2050<sup>81</sup> would jeopardize the climate goals set by the Paris Agreement, and would therefore not be consistent with the Agreement.

Nor would the reference in the LOSC to a single 'competent international organization' as regards ship-source pollution constitute a limit in this regard. The wording is commonly understood as referring to the IMO, but there is no limitation to that effect in the LOSC itself.<sup>82</sup> The climate-change regime could very well be the organization competent for regulating GHG emissions from shipping, in view of its better understanding of the global challenge underlying the need for regulation. Nor is there anything in the LOSC to preclude sharing of competence for a given matter between two or more organizations.

In more practical terms, however, shifting the regulatory initiative to the UNFCCC would require some preparation. The only body within the climate regime that addresses international bunker fuel emissions is the SBSTA, and its involvement is currently limited to progress reporting by ICAO and IMO.<sup>83</sup> The mitigation tools offered by the Paris Agreement – the national pledges – are not well suited for dealing with emissions caused by international shipping; and the UNFCCC framework offers fewer opportunities for adopting amendments that apply worldwide within a few years (unlike the IMO's tacit acceptance procedure) and includes no tools for ensuring a workable monitoring and enforcement regime.

It now seems widely accepted, also within the climate-change regime, that the IMO is the body best most suited for addressing GHG emissions from ships.<sup>84</sup> Regulatory measures, such as the EEDI, and implementation tools, such as the data collection system, have strengthened the IMO's position in this respect in

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<sup>80</sup> Paris Agreement Article 4(1).

<sup>81</sup> T Smith, M Traut, A Bows-Larkin, K Anderson, C McGlade, P Wrobel, CO<sub>2</sub> Targets, Trajectories and Trends for International Shipping, Report, 2015 (summarized at [www.ucl.ac.uk/bartlett/energy/publications/2015/may/co2-targets-trajectories-and-trends-international-shipping](http://www.ucl.ac.uk/bartlett/energy/publications/2015/may/co2-targets-trajectories-and-trends-international-shipping)), Table 3. See also Scott et al., note 3 above, 235.

<sup>82</sup> The use of the word 'organization' in the singular in some parts of LOSC that deal with ship-source pollution (e.g. Article 211(1) does not preclude that several organizations may be competent for different aspects of the topic (note e.g. the division of competence between the IMO and ILO on different aspects of regulation of seafarers). Note also that the reference is frequently coupled with the phrase 'or general diplomatic conference' (e.g. Articles 211(2)). This addition was made precisely to preclude a monopoly for a single organization. See e.g. HB Robertson, 'Navigation in the Exclusive Economic Zone', 24(4) *Virginia Journal of International Law*, 1984, 899; D Bodansky 'Protecting the Marine Environment from Vessel-Source Pollution', 18 *Ecology Law Quarterly*, 1991, 772. In conclusion, 'general acceptance' of a given standard seems more important than the forum in which it has been adopted. See also S Rosenne, 'The International Maritime Organization Interface with the Law of the Sea Convention', in M Nordquist, J Moore (eds.), *Current Maritime Issues and the International Maritime Organization* (Martinus Nijhoff 1999) 263; L Sohn, 'Managing the Law of the Sea: Ambassador Pardo's Forgotten Second Idea', 36 *Columbia Journal of Transnational Law*, 1997, at p. 295; and Y. Shi, 'Are Greenhouse Gas Emissions from International Shipping a Type of Marine Pollution?', 113 *Marine Pollution Bulletin* 2016, 187–192.

<sup>83</sup> Martinez Romera, note 2, 224.

<sup>84</sup> *Ibid.*, 221.

the past few years, and at present the organization appears to feel little pressure from the UNFCCC.<sup>85</sup> The debate on the appropriate regulatory forum may be more settled than it has been for decades, but continued consensus will depend on the IMO achieving concrete emissions reductions from the shipping sector in the next few years.

### 4.3 The Aviation Sector

The regulatory achievements of the ICAO since the conclusion of the Paris Agreement have brought increased pressure to bear on the IMO, as aviation and shipping have been deemed similarly situated as regards the nature and magnitude of emissions,<sup>86</sup> growth scenarios, international dimension, problems in accommodating state-based solutions and in differentiating among various categories of states. The two industries, with their respective organizations, have traditionally been treated in parallel in the international climate negotiations.

While aviation, generally speaking, has greater difficulties than shipping in achieving emissions reductions by technical or operational measures,<sup>87</sup> there has been some with respect to market-based measures. In 2016, the ICAO Assembly adopted a resolution on establishing the 'Carbon Offsetting and Reduction Scheme for International Aviation' (CORSIA).<sup>88</sup> Participation in the pilot phase (2021–2023) and the first phase (2024–2026) is voluntary,<sup>89</sup> but the second phase (2027–2035) will be mandatory for all states, based on certain economic parameters which permit differentiation on the basis of the economic capabilities of states to contribute.<sup>90</sup>

CORSIA is route-based and thereby treats all airlines on the same routes in the same way. It covers only routes between two participating countries. Operators are to estimate their CO<sub>2</sub> emissions for these voyages and report to their countries. Until 2030 the required offsets will be calculated on the basis of the growth factor for the whole industry, rather than individually for each operator. The scheme will be reviewed every third year from 2022; the longer-term intention is to serve as a vehicle to assist the industry, through off-setting, to achieve the aspirational goal of carbon-neutral growth from 2020.<sup>91</sup>

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<sup>85</sup> Singapore workshop report, note 69 above, para. 47.

<sup>86</sup> While aviation's share of CO<sub>2</sub> emissions is usually estimated to lie at around 2%, the climate impact is larger, due *inter alia* to the release of certain other GHGs and because most CO<sub>2</sub> emissions occur at high altitude, amplifying their effect. A more accurate figure for measuring climate effect, the global anthropogenic radiative forcing, has been estimated to lie at around 3.5%. See CIGI Report, note 16 above, 57 with further references.

<sup>87</sup> For an overview, see CIGI report, note 16 above, 58–59.

<sup>88</sup> ICAO Resolution 39-3. See also Annex 16 to the Convention on International Civil Aviation, Environmental Protection, International Standards and Recommended Practices, Vol. IV, Carbon Offsetting and Reduction Scheme for International Aviation, 1st edn., October 2018

<sup>89</sup> Despite the voluntary nature of the system, states have shown great interest in participating. By 6 May 2019, 80 states, representing 76.63% of international aviation activity, had opted to participate. See [www.icao.int/environmental-protection/CORSIA/Pages/state-pairs.aspx](http://www.icao.int/environmental-protection/CORSIA/Pages/state-pairs.aspx)

<sup>90</sup> The parameters are linked to the size and share of the country's revenue by tonne kilometre; certain categories of developing countries are specifically excluded.

<sup>91</sup> ICAO Resolution 39-3, para. 4.

In 2017 a supplementary measure to support CORSIA was adopted in the form of an amended Annex 16, Volume III, to the Chicago Convention on Civil Aviation. The new rules impose new CO<sub>2</sub> standards for new aircraft, as from 2020, depending on the type and size of the aircraft.<sup>92</sup> Aircraft that do not meet these standards are to be phased out by 2028.

The environmental effects of CORSIA remain to be seen. The scheme will enter its pilot phase in 2021, but individual reduction obligations – the only true incentive for air operators to reduce their emissions – will apply only from 2030. Nevertheless, it is already clear that establishing CORSIA has contributed to a convergence of regimes governing international and national emissions, and that that many arguments about the impossibility of finding solutions for international bunker fuels have weakened along the way. This clearly increases pressure on the IMO to prepare regulatory measures, notably in the field of MBMs.

#### 4.4 Unilateral Regional Action (the EU)

In addition to the global pressures on the IMO, its work on GHGs has from the outset been marked by tensions with the EU regarding format and pace. The EU has taken a very broad interest in climate policy more generally, with limited sympathy for the special needs of shipping. The absence of emissions reduction rules for shipping has repeatedly been indicated as a concern for the EU, more recently coupled with the observation that shipping is the only sector *not* expressly addressed by an EU emissions reduction objective or specific mitigation measures.<sup>93</sup> Warnings have been voiced that specific EU rules may be introduced in this area, if satisfactory global rules cannot be established at the IMO.<sup>94</sup>

Yet, at least at policy level, the starting point for the EU has always been that it will act in the field of GHG and shipping only if global regulation fails.<sup>95</sup> What the EU expects from the global regime in terms of reduction standards has not been specified; and earlier deadlines for when global measures must be in place to satisfy the EU have been postponed. Both aspects serve to undermine the threat element of the EU's position. Most recently, the EU has agreed to postpone its threat of unilateral action, to allow the IMO time to make concrete its initial strategy.<sup>96</sup> The current EU deadline for IMO measures that 'duly contribute' to achieving the climate goals of the Paris Agreement is accordingly set to 2023.<sup>97</sup>

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<sup>92</sup> For details, see [www.icao.int/Newsroom/Pages/ICAO-Council-adopts-new-CO2-emissions-standard-for-aircraft.aspx](http://www.icao.int/Newsroom/Pages/ICAO-Council-adopts-new-CO2-emissions-standard-for-aircraft.aspx)

<sup>93</sup> See e.g. COM (2019) 38 final, 1.

<sup>94</sup> See e.g. third recital of Directive 2009/29 amending Directive 2003/87/EC.

<sup>95</sup> See e.g. the European Commission's strategy as reflected in COM(2013) 479 final. But see the political guidelines of the (then candidate for) President of the Commission Ursula von der Leyen: 'I will propose to extend the Emissions Trading System to cover the maritime sector and reduce the free allowances allocated to airlines over time', *A Union the strives for more, My agenda for Europe*, Brussels 2019.

<sup>96</sup> Recital No 4 of Directive 2018/410, amending Directive 2003/87, reads: 'The adoption of an ambitious emission reduction objective as part of this initial strategy has become a matter of urgency and is important for ensuring that international shipping contributes its fair share to the

Regarding substance, the current EU climate strategy for shipping is based on three steps:<sup>98</sup>

- 1) monitoring, reporting and verification of CO<sub>2</sub> emissions;
- 2) GHG reduction targets for the shipping sector; and
- 3) further measures, including MBMs in the medium to long term.

The first step has already resulted in EU regulation: the MRV Regulation was adopted in 2015.<sup>99</sup> The EU Regulation and the IMO's global data collection system are largely similar regarding data to be included in the report, but there are significant differences between the two systems, notably in relation to the scope (global/regional reach, coverage of port emissions), the calculation of cargo carried, transparency of data, and the process for verifying data submitted by shipowners.<sup>100</sup> Where the IMO data collection system places the responsibility for monitoring and reporting on the flag state, the EU system is based on independent verification of the data by accredited third parties and on port-state jurisdiction in the sense that it covers only those ships which call at a port of the EU.<sup>101</sup>

An EU proposal to align the two systems has been presented by the European Commission,<sup>102</sup> but even if approved in the proposed form, it would not amount to full harmonization between the regional and global regimes.<sup>103</sup> It is thus unlikely that all differences will be removed even once an alignment measure has been adopted by the EU. The more probable outcome of a forthcoming alignment is therefore largely harmonized reporting procedure – but, apart from that, the parallel regimes look set to continue.

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efforts needed to achieve the objective of well below 2 °C agreed under the Paris Agreement. The Commission should keep this under regular review, and should report at least once a year to the European Parliament and to the Council on the progress achieved in the IMO towards an ambitious emission reduction objective, and on accompanying measures to ensure that the sector duly contributes to the efforts needed to achieve the objectives agreed under the Paris Agreement. Action from the IMO or the Union should start from 2023, including preparatory work on adoption and implementation and due consideration being given by all stakeholders.'

<sup>97</sup> See previous note.

<sup>98</sup> COM(2013) 479 final.

<sup>99</sup> EU Regulation 2017/757. In preambular para. no. 34 it is considered that the EU MRV system also should serve as a model for the implementation of a global system. See also Delegated Regulation 2016/2071 (amendment of Regulation), Delegated Regulation 2016/2072 (on verification and accreditation activities) and Implementing Regulations 2016/1972 (on templates) and 2016/1928 (on the definition of cargo carried for certain ship categories).

<sup>100</sup> See e.g. [www.verifavia-shipping.com/shipping-carbon-emissions-verification/press-media-eu-mrv-vs-imo-fuel-consumption-data-collection-system-155.php](http://www.verifavia-shipping.com/shipping-carbon-emissions-verification/press-media-eu-mrv-vs-imo-fuel-consumption-data-collection-system-155.php) and COM (2019) 38 final.

<sup>101</sup> EU Regulation 2017/757, Article 2(1).

<sup>102</sup> In COM(2019) 38 final it is proposed, *inter alia*, to harmonize the use of certain key definitions to ensure that same entities are in charge of monitoring and reporting obligations under the two regimes. Alignment is also made relating to the calculation of distance and cargo, as well as the reporting period and the minimum requirements for monitoring plans. Alignment between the EU and (a future) IMO reporting schemes was already foreseen in Article 22 of the MRV Regulation (Regulation 2015/757).

<sup>103</sup> Under the Commission's proposal, the MRV system will be revised in order for the EU to take 'appropriate account' of the IMO's global data collection system 'with a view to allow for streamlining and reducing administrative effort for companies and administrations as possible [sic], while preserving the objectives of the EU MRV Regulation.' COM (2019) 38 final, 2

As to the second step, the strategy sets no specific reduction targets for shipping at EU level. The strategy discusses global reduction targets set by the UNFCCC and general targets set by the EU, but mentions no specific targets for shipping. Indeed, it is pointed out that shipping is the only industry sector and transport mode which is not covered by legislation to contribute to the EU general CO<sub>2</sub> reduction targets.<sup>104</sup>

The main focus of the EU strategy is accordingly on reduction measures (third step). As measures linked to strengthening the requirements linked to the EEDI and SEEMP need to be taken at the IMO, there is no regional alternative available, even if the IMO should fail to deliver such measures by 2023.<sup>105</sup> By contrast, as regards MBMs, the EU has been quite open about its readiness to implement such a scheme on a regional level, if necessary. The EU strategy highlights both a compensation fund and an ETS as potential MBMs for shipping; but, given the inclusion of aviation in the regional ETS,<sup>106</sup> it is not far-fetched to assume that a preferred option for the European Commission would be to include shipping in an ETS. Whether that also means that a global ETS is the preferred option for the EU for a global market-based measure is not clear, however.

The EU can be criticized for not indicating more precisely what it wants the IMO to achieve or providing any guidance on what it considers to be sufficient as an output. The approach provides great flexibility for the EU to decide on its actions in the future, but is not a very helpful stance from the perspective of the international maritime community. It gives the impression that the EU wants to place pressure on the IMO without being certain about what the consequences of failure would be – which in itself serves to reduce part of that pressure.

That said, the EU has certainly been a significant driver in this field at global level to date and a power behind many of the actions of the IMO. The EU has been more vocal than any other source of pressure and has played a major role in advancing the global data collection system at IMO. In addition, the EU and the European Maritime Safety Agency undertake a significant amount of behind-the-scenes work to support e.g. fact-finding and capacity-building measures and by

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<sup>104</sup> COM(2013) 479 final, 7.

<sup>105</sup> Among the other measures listed in para. 4.7 of the IMO initial strategy, new operational measures on the basis of new indicators have found support at the EU level. For an example, see IMO Doc. MEPC 66/4/6.

<sup>106</sup> The ETS Directive (2003/87) was amended by Directive 2008/101 to include aviation within the scope of the EU ETS as from 2012. However, due to strong protests from third countries, it was decided to postpone application of this amendment for flights between the EU and third countries. Intra-EU flights thus remain included in the ETS, but inclusion of flights to and from third countries will depend on progress made at the ICAO, notably with CORSIA. (See e.g. [https://ec.europa.eu/clima/policies/transport/aviation\\_en](https://ec.europa.eu/clima/policies/transport/aviation_en)). The application of EU rules to non-EU countries raised legal concerns, too, but in Case C-366/10, the Court of Justice of the European Union considered that the extension did not amount to a breach of international law. See e.g. S. Bogojevic, 'Legalising Environmental Leadership: A Comment on the CJEU's Ruling in C-366/10 on the Inclusion of Aviation in the EU Emissions Trading Scheme', 24(2) *Journal of Environmental Law*, 2012, 345–356.

supplying data to member states and others, contributing to studies, developing methodologies etc.<sup>107</sup>

#### 4.5 Assessment

The review above indicates that the challenge facing the IMO – to turn its initial strategy into concrete regulatory tools and reductions – is under significant pressure from several directions. From an IMO perspective the GHG file involves an unusually broad range of international institutions and other players with an interest in designing a future regulatory regime. It also involves a wider than usual set of governance mechanisms applied to bring about the change.

The three institutions discussed above exercise different kinds of pressures on the IMO. Most effective among them is probably the UNFCCC regime. Action through the global climate regime and the Paris Agreement framework can provide a real alternative to the IMO if the regulatory efforts there should come to a halt. The necessary mandate to take action is already in place; from an institutional point of view would be nothing extraordinary in the global climate change institution taking the lead here, rather than the global shipping institution. While it is true that decades of relative inaction in the field within UNFCCC has reduced its chances of claiming exclusive authority over the file, its action could be more specified by covering only certain aspects. UNFCCC could, for example, be entrusted with setting the regulatory goals for international shipping, e.g. in the form of a sectoral reduction target, leaving the modalities of achieving the target to the IMO.<sup>108</sup>

Involving the UNFCCC regime in regulation of shipping would place the focus on the climate-change perspective, bringing the environmental aspects to the forefront. Inconveniences caused to the shipping industry or the practicalities of trade would probably receive less attention. While not ideal from a shipping perspective, this option represents a real safety valve available if negotiations at the IMO should lose momentum or ambition. Given the nature and urgency of the climate-change challenge, no organization should be entrusted with a mandate that could be (ab)used for postponing meaningful measures. An institutional fallback regime with its specific point of departure in environmental demands and the relationship to commitments undertaken by other industries is a valuable mechanism for complementing the primary mandate of the IMO and for exercising some healthy pressure on it to proceed with the urgency entailed in the nature of the challenge. It is also the only one of the regulatory institutions discussed here for which support may be found in LOSC.<sup>109</sup>

The EU has gradually lost some of its potential to exercise such pressure. The very explicit threat of regional action in the field has no doubt served as a trigger

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<sup>107</sup> See e.g. 'EC funding gives green light to ambitious IMO energy-efficiency project', Press Release by IMO of 12 January 2016 ([www.imo.org/en/MediaCentre/PressBriefings/Pages/01-2016-MTCC-.aspx](http://www.imo.org/en/MediaCentre/PressBriefings/Pages/01-2016-MTCC-.aspx)).

<sup>108</sup> See also, in this sense, the CIGI Report, note 16 above, 92.

<sup>109</sup> This support presumes that the UNFCCC is regarded as the competent international organization to address climate change for shipping, and that that its rules meet the standard of general acceptance (see sections 2.1 and 4.2 above). By contrast, regional or non-governmental action has no explicit role in the LOSC provisions that address regulation of shipping.

for several achievements of the IMO, and that pressure has not disappeared. However, the adoption of the Paris Agreement has opened the door for other mechanisms for handling stalemates at IMO. In addition, the EU's unclear policy positions (including its inability to specify the conditions on which acceptance of global measures would be based), combined with repeated postponements of the critical cut-off dates in question, has reduced the credibility of the EU to serve as the key challenger to the IMO in this matter.

In addition come several legal considerations which weaken the case for regional action in a field so global as climate change and shipping. That the LOSC fails to specify a role for regional organizations for regulating shipping does not mean that the EU is toothless in jurisdictional terms, as port-state jurisdiction offers opportunities to regulate ships of any nationality that enter EU ports. However, regional action necessarily entails more limited coverage than a global solution. Moreover, various other legal uncertainties (notably in relation to the law of the sea, general international law and, possibly, international trade law) are more likely to be raised by regional action in this field.<sup>110</sup> Such concerns can be reduced or eliminated if action is taken at the global level, whether by the IMO or by another global organization.

The pressure exercised by the ICAO is more psychological in nature. The most recent advancements in aviation represent a model for what can be achieved, not least with respect to MBMs. While the solutions agreed for aviation may not be suitable or even workable for shipping, given the many features that distinguish the two modes of international transport, their adoption at ICAO does dilute one of the key defences used by the IMO to postpone regulatory action, in particular relating to MBMs. Even at this early pre-implementation stage, the very presence of CORSIA illustrates that there are solutions for, *inter alia*, linking international transports to reduction commitments made by other sectors, and for combining the principle of non-discrimination with privileged treatment of states with greater needs. Through the mitigation measures agreed in recent years, ICAO has essentially highlighted that what is really lacking at the IMO is political willingness on the part of states to take effective regulatory measures.

However, the IMO is not particularly receptive to such pressures. It is widely, and rightly so, considered to be the body that is best placed to take effective measures to reduce greenhouse gases from shipping. Recent developments – notably, the adoption of the data collection system – have strengthened the impression that this is the body in charge and best informed to lead discussions, and indeed the only global body that has been active in the field thus far. The broad agreement on the initial strategy has provided more time and directions for elaborating specific emissions reduction measures without interference from others.

The bigger question is whether the IMO will be capable of delivering specific measures by the key target date of 2023. The credibility of both the IMO and the

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<sup>110</sup> Ringbom, note 9 above.



EU as actors on climate change and shipping will be at stake, and neither institution can afford further postponement of effective IMO measures.

## 5 Concluding Observations

Despite the broad range of activities, at the IMO and elsewhere, aimed at curbing GHG emissions from shipping, very little has been accomplished in terms of legally binding emission reductions. The only rules with some normative implications that have been adopted to date relate to ship design – but, given the threshold levels and timing of their introduction, and their applicability to new ships only, even those rules are set to remain almost without effect for many years to come.

The past few years have seen several important developments that could indicate a shift towards a better regulatory climate in the field. In particular, the adoption of the Paris Agreement and subsequent developments at the IMO have removed some of the longstanding difficulties that have beset the regulation of GHGs from international shipping. And that may give reason for optimism with respect to regulatory progress in the future.

The institutional battle has entered a period of consolidation and relative 'truce' since the adoption of the Paris Agreement in 2015 and with the unanimous approval of the initial IMO strategy. The regime currently provides for 'dynamic stability', with the IMO clearly positioned in the driving seat. The truce will not last forever, however. At the latest, it will come to an end if the IMO fails to deliver significant regulatory results by 2023.

In addition to the jurisdictional considerations flowing from the law of the sea, there are more practical arguments to favour a dominant role for the IMO in this field. It is clearly the international body with the greatest technical knowledge and experience of regulating shipping, including the challenges of workable implementation and enforcement mechanisms. The IMO is also the only body considered legitimate in the view of the targets of regulation – the ship operators.

With respect to guiding principles as well, the shift made in the Paris Agreement towards a more nuanced form of differentiation between states has paved the way for convergence between the two competing principles, so problematic for work at the IMO. There now seems to be a good basis for continuing the IMO tradition of regulating ships without differentiation to their flag in this field. The objectives of the CBDR principle remain relevant – but the principle may be expected to feature mainly in the form of allocation of revenues to developing countries for financing mitigation and adaptation measures, or through technical assistance, while playing a limited role (if any) in the design of technical, operational or market-based measures as such. This is indeed a welcome development, and a condition for an effective regulatory regime in shipping.

As to timing, the Paris Agreement and the initial strategy are based on the premise that measures and commitments should be reviewed and updated every five years, and the processes seem aligned. In the longer run, this can pave the way for a development, which would seem natural, whereby international shipping could be introduced as a separate international sector under the Paris Agreement.

Whereas the Paris Agreement is neutral as to the measures to be taken to achieve the targets, the IMO has indicated a range of potential measures to be studied in the short, mid-, and long term. Given the current state of technical development, it seems inevitable that technical and operational measures will need to be complemented by market-based measures if the stated goals for shipping are to be achieved. The type of MBM remains as open a question as ever, and is not advanced in any of the instruments agreed.

The development of workable operational and market-based measures that actually serve to reduce emissions and/or produce sufficient offsets for compensating for them in other sectors will be the ultimate test of the IMO's capability to regulate GHGs. By setting itself ambitious goals, the IMO has secured another period of regulatory calm that should last at least until 2023, at which point all pressures seem poised to converge.

The main challenge is the difficulty of achieving the long-term reduction goals to which the IMO has committed itself, or the Paris climate goals, without a large-scale shift to technologies that are not yet available in shipping. Success will depend on some form of technological breakthrough, notably in the area of alternative fuels. The current mismatch between goals and technologies has made clear both the urgent need to take measures to reduce emissions by means of existing technologies and to provide financial incentives for ship operators to reduce emissions. This can be achieved only by strengthening the legal requirements in all categories of measures: technical, operational *and* market-based. MBMs include the additional advantage of generating funds which may be specifically earmarked for advancing research and development, thereby supporting the shift towards more energy-efficient technologies. This, too, appears to be a condition for meeting the longer-term climate goals set by the Paris Agreement and the IMO's initial strategy.

In terms of international law, the dynamism between the key institutions involved in regulating GHG from shipping calls into question a perception deeply rooted within the international maritime community: that the IMO enjoys some kind of legal monopoly for regulating international shipping. The LOSC provides for no such a monopoly. It highlights the importance of global, generally applicable, rules for shipping but does not identify any particular institution to be in charge of various aspects. The solution adopted in the Paris Agreement, in contrast to that in the Kyoto Protocol, highlights the continued interest and concern of the global climate regime in measures for reducing emissions from shipping. In addition, international law offers other avenues, including for regional rule-making in this field, even in the absence of an explicit mention of such jurisdiction in the LOSC.

We may reasonably conclude that the regime set out in the LOSC has helped to avoid the proliferation of national and international law-making initiatives to curb GHGs from shipping. However, pressure is now mounting on the IMO to agree and implement tangible reduction measures within the next few years. Close involvement by other global institutions, regional bodies or non-governmental actors may not be foreseen in the LOSC, but if the work of the IMO fails to meet expectations, it is only natural – and entirely consistent with the law of the sea – that they should assume a greater role in setting the standards for greenhouse gas emissions reductions from shipping.