This paper was prepared by Markus W. Gehring of the Centre for International Sustainable Development Law, Montreal, Canada, as a contribution to the OECD/ITF Global Forum on Transport and Environment in a Globalising World that will be held 10-12 November 2008 in Guadalajara, Mexico. It addresses policy instruments to limit negative environmental impacts from increased international transport - constraints and opportunities in international law.

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NOTE FROM THE SECRETARIAT

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ACTION REQUIRED: For discussion.

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EXECUTIVE SUMMARY

Introduction

This paper examines the limits and opportunities provided by diverse international legal instruments to address the negative environmental impacts arising from a range of different modes of transport, focusing on air, sea, space and road transport. International legal instruments are considered to address potential environmental impacts in terms of all forms of pollution, including SO\textsubscript{x} and NO\textsubscript{x}, noise, particulate matter and greenhouse gas emissions (GHGs), especially CO\textsubscript{2}. In accordance with the agreed scope, this paper does not examine environmental impacts and their likelihood, nor does it discuss new unilateral or plurilateral market mechanisms to address these problems, such as emission trading or environmental taxes. It focuses instead on providing an up-to-date overview of international law’s limits and opportunities in advancing such instruments. The paper also briefly examines the possibilities for regulation of transport of particular hazardous goods.

International Legal Instruments to Address Potential Impacts of Aviation

The principal potential impacts of increased aviation include SO\textsubscript{x} and NO\textsubscript{x}, noise, and GHGs. The 1944 Chicago Convention, which establishes the International Civil Aviation Organization (ICAO) and serves as the major multilateral convention covering international air transport, confirms the basic principle of sovereignty over airspace in customary international law. While this principle allows regulation of aircraft overflying a country’s territory, it prevents any wider regulation by one country of aircraft over other countries’ territory. The Convention, in setting up the multilateral ICAO, also created a forum requiring much co-operation and unanimity before regulation can occur. While wide agreement is, of course, desirable, it can be difficult to obtain, as the ICAO’s discussions on climate emissions trading currently demonstrate. The ICAO’s promulgation of Standards and Recommended Practices (SARPs) constitute another tool based on reciprocity that can restrict unilateral action to protect the environment. There are also many bilateral agreements in place that may affect the possibility of environmental regulation. As a case study, the paper examines the EU’s unilateral attempts to address noise pollution. The US successfully challenged EU regulations, claiming that they advantaged European states and violated the multilateral framework of the Chicago Convention. However, the end result was that the dispute encouraged a revision of ICAO standards on noise pollution, meaning ultimately that the EU achieved its desired standards through initially unilateral action.

Three other opportunities for international regulation of environmental impacts from aviation are discussed. First, provisions can be made within ICAO for countries to adopt differing standards, provided that other countries are made aware of the variances. Second, the “effects” doctrine in international law may allow states to regulate to avoid harmful effects in their territory caused by another country. Third, opportunities may exist to regulate in favor of the environment under international trade law, particularly via the environmental exceptions to GATT and GATS, or via the subsidies, labeling or procurement rules. Recent debates on accounting for greenhouse gas emissions are also canvassed, as these raise questions that require resolution if the impact of aviation (and shipping) on global climate change is to be meaningfully addressed.

International Legal Instruments to Address Potential Impacts of Space Transport

Potential impacts of space transport include air pollution, GHGs and space debris. While the reach of State sovereignty into space is contested under international law, possibilities exist for new international legal instruments to regulate this potentially highly damaging form of transport. The Convention on International Liability for Damage Caused by Space Objects provides a good example for the problem of space debris.
International Legal Instruments to Address Potential Impacts of Shipping

Potential impacts of shipping include SO\textsubscript{x} and NO\textsubscript{x}, GHGs, as well as particulate matter, waste, sewage and invasive species. The International Maritime Organization, in accordance with the role assigned to it under the Kyoto Protocol, has begun efforts to include GHGs from shipping into a global scheme. Although the basic principles of an emissions regulation scheme for shipping have been agreed on, developing countries have resisted the adoption of any mandatory scheme. The EU and the US have thus been pushed to propose their own regulatory schemes which, while beneficial in themselves, could threaten the progress of a more comprehensive multilateral solution. International law of the sea poses a constraint to some efforts to regulate shipping, given the principle of the freedom of the high seas. However, regulation by flag states or port states may be possible, and market-based solutions are also being discussed. Various studies have examined the different options in maritime greenhouse gas emissions regulation, noting a gap between the ideal scheme and current practical possibility. MARPOL 73/78 is the major treaty regulating the maritime environmental pollution. Its Annex VI, which entered into force 19 May 2005, regulates NO\textsubscript{x} and SO\textsubscript{x} emissions as well as ozone depleting substances. The Convention also establishes geographical Emissions Control Areas, in which NO\textsubscript{x} and SO\textsubscript{x} emissions are more tightly controlled than elsewhere. MARPOL 73/78 Annex VI also addresses the use of ozone-depleting substances on ships. A separate section analyses the innovations and opportunities in regional seas conventions.

As with aviation, international trade law may provide opportunities to combat the negative environmental effects of shipping, through GATT/GATS exceptions, subsidies laws, labeling and information provision, or procurement.

Port states can also use their authority to regulate certain environmental impacts from international transport for example through MOUs based on UNCLOS.

International Legal Instruments to Address Potential Impacts of Land Transport

Potential impacts of road transport include GHGs, SO\textsubscript{x}, NO\textsubscript{x}, particulate matter and noise. Road transport remains relatively unregulated by international law, except in so far as it touches on existing global schemes – for instance, greenhouse gas emissions from road vehicles covered under Kyoto targets. As one example of regional efforts, the EU has progressively introduced emissions standards for its vehicles, with the latest Euro VI standards to be phased in over the next 5 years. Similarly, train transport has only been subject to formal rules on security and networks but received little legislative attention with regards to environmental impacts of this mode of transport.

Other International Regimes of Relevance

Potential impacts of hazardous goods transport include pollution in cases of accidents and unintended release of substances into the environment. The Rotterdam Convention addresses a different aspect of transport – the hazardous nature of the goods themselves being transported. It establishes a prior informed consent procedure that covers all import and export of certain listed chemicals, thus requiring countries specifically to consent to the transport of those chemicals in their territory. Several other regional treaties and arrangements are also relevant in addressing the environmental impacts of transportation.

Conclusions

International law provides a range of opportunities to reverse or prevent the negative environmental impacts of international transport. While some regimes are more cautious than others, calling for multilateral agreement before regulation occurs, States have various tools available to combat greenhouse gas emissions, NO\textsubscript{x} and SO\textsubscript{x} emissions and other hazards arising from the proliferation of international aviation, shipping, road and eventually space transport. In particular, the established international organizations such as the ICAO and IMO have new opportunities to rise to the challenge posed by the increased environmental impact of increased international transport.
POLICY INSTRUMENTS TO LIMIT NEGATIVE ENVIRONMENTAL IMPACTS FROM INCREASED INTERNATIONAL TRANSPORT - CONSTRAINTS AND OPPORTUNITIES IN INTERNATIONAL LAW

1. Introduction

1. In recent decades, international trade in goods and services has grown at average rates of 6% or more per year and, according to the latest figures from the WTO, international transport and travel has grown at an average 14% to the value of 3260 billion US dollars in 2007. Since 1950, trade in agricultural products has increased fivefold, and trade in manufactured goods has increased by a factor of more than 500. These upwards international economic trends have naturally led to corresponding increases in transport of goods, largely by sea, and of people, largely by air. However, transport can adversely affect the environment in a number of ways, including through the production of greenhouse gases (carbon dioxide and others), nitrogen oxide (NOx) and sulphur oxide (SOx), as well as particulate matter and noise. Efforts to combat these adverse effects are often stymied by concerns over cost, as well as international economic commitments that may prevent States from regulating most effectively to achieve particular environmental goals.

2. International legal instruments are considered to address potential environmental impacts in terms of all forms of pollution, including SOx and NOx, noise, particulate matter and greenhouse gas emissions (GHGs), especially CO2. GHG emissions are particularly relevant for their negative contribution to climate change. As resource-intensive production and resource extraction has tended to shift overseas from developed countries to developing countries, the pattern of global CO2 emissions has changed, since the emissions arising from these activities will be assessed as part of the developing country’s total where they occur, rather than as part of the generally developed country’s total where the relevant goods are eventually consumed. While developed country emissions might fall as a result, overall emissions might increase following this cross-border shift due to the use of less efficient production techniques in developing countries. Policy-makers seeking to impose costs on CO2 abatement must therefore be careful to ensure that their policies do not backfire and result in increasing CO2 emissions.

3. In accordance with the agreed scope, this paper does not examine environmental impacts and their likelihood, nor does it discuss new unilateral or plurilateral market mechanisms to address these problems, such as emission trading or environmental taxes. It focuses instead on providing an up-to-date overview of international law’s limits and opportunities in advancing such instruments. It examines these limits and opportunities in turn for international air transport, space transport, international shipping, road transport and other regimes which regulate, for instance, the transport of hazardous waste. This paper thus examines the opportunities and limits of international legal instruments in addressing negative environmental impacts arising from transport.

2. International Air Transport

4. At present, many industry sectors are being scrutinised for their ‘carbon footprint’ and impact upon the environment. However, the aviation industry has come under particular inspection. Although figures vary, the International Civil Aviation Organization (ICAO) cites a report from the

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4  Ibid p. 3.
Intergovernmental Panel on Climate Change that estimates aircraft do, currently, ‘contribute about 3.5 percent of the total radiative forcing (a measure of change in climate) by all human activities’. It is widely accepted that this figure will rise, and carbon dioxide emissions from aviation are expected to grow by 176% between 1990 and 2050. In addition, during their take-off and landing cycle, aircraft emit nitrogen oxide (NOx). This gas will contribute indirectly to radiative forcing, though its effect is mixed – it contributes both to warming by assisting the production of ozone, and to cooling by removing methane from the atmosphere.

**Figure 1. Example Take-Off and Landing Cycle**

5. International progress has been sought on this matter, with the most recent 2005 agreement seeking reductions by the end of 2008. Nevertheless, it is anticipated that 2025 NOx levels will be 2.75 times higher 2005 levels. Similarly, SOx, emitted from aircraft predominantly as SO2 but often oxidized in the process, contributes to the wider impact of aviation transportation on the environment. Both NOx and SOx are likely to lead to radiative forcing which is regionally located near the flight routes and can cause greater concern for cities with airport hubs. Moreover, local noise pollution can generate disquiet for residents living near airports and airfields. International progress has been made on these issues, though there remain concerns for many States and their populations.

6. Certain legal boundaries also affect initiatives aimed at addressing these environmental concerns, as is briefly outlined in the following section of this paper.

### 2.1 Limits in International Law

#### 2.1.1 Multilateral Initiatives

7. The principal legal instrument regulating international air transport is the Chicago Convention of 1944, which established the International Civil Aviation Organisation (ICAO) with its headquarters in Montreal. The Convention and Organisation both have virtually global membership. As such, their

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6. RCN Wit et al. (2005), 1.
9. ICAO Council, March 3, 2005, Committee on Aviation Environmental Protection.
principles and policies are fundamental in the shaping of initiatives designed to confront the environmental impact of international air transport.

8. The principle of respect for national sovereignty is extremely important in international law. Rules of international air transport are no different. The concept of a State’s sovereign jurisdiction over its territory extends to the airspace above its land. Article 1 of the seminal 1944 Chicago Convention, entitled ‘Sovereignty’, ‘recognize[s] that every State has complete and exclusive sovereignty over the airspace above its territory’. Article 6 expands upon this notion, stating that ‘[n]o scheduled international air service may be operated over or into the territory of a contracting State, except with the special permission or other authorisation of that State, and in accordance with the terms of such permission or authorisation’.

9. It is immediately noteworthy that Article 1 refers to ‘every’ State, rather than, as it does in other articles, ‘contracting States’. Furthermore, the article does not claim to create or establish the rule regarding airspace sovereignty, but rather ‘recognizes’ the principle. The use of this language, in applying to all States irrespective of their voluntary adhesion to the treaty and in codifying an already existing rule, has important implications. First, it indicates that the rule is one of customary international law. It is both respected by States in practice and constitutes the opinio juris of the international community. Second, and consequently, it indicates that the principle is, to all intents and purposes, inviolable. This creates a very powerful tool for States to utilise in seeking to regulate its own airspace in terms of environmental impact. Of course, it also poses a significant obstacle to a State wishing to take action to regulate the environmental impact of international air transport more widely.

10. It is also important to be aware of the Annexes that the International Civil Aviation Organisation promulgates from time to time. These Annexes establish standards regarding international air transport, including environmental standards. ICAO set up the Committee on Aviation Environmental Protection (CAEP) in 1983 to deal precisely with the environmental impacts from international air transport, including both noise pollution and engine emissions.

11. At its most recent meeting, the ICAO Assembly adopted Resolution A36-22 on the recommendation of work undertaken within the CAEP during early February 2007. Appendix L addressed ‘market based measures, including emissions trading’. The Preamble to this Appendix recognised that ‘[c]ontacting States are responsible for making decisions regarding the goals and must use appropriate measures to address aviation’s greenhouse gas emissions taking into account ICAO’s guidance’. However, it also recognised that ‘the majority of the Contracting States endorse the application of emissions trading for international aviation only on the basis of mutual agreement between States’, which resulted in the ‘need to engage constructively to achieve a large degree of harmony on the measures which are being taken and which are planned [to be taken]’. Indeed, the interaction between States in air transport is at the heart of understanding the limits and opportunities.

12. Therefore, State-level action aimed at addressing international transport seems to be limited by the need to engage with other States, on the basis of mutual agreement, to ensure harmony on any particular initiative. And as the matter currently stands, States appear somewhat restricted to multilateral negotiation forums within the ICAO. This does not prevent any State from adopting a leadership role to push forward with discussions or tabling motions aimed at addressing more determinedly the issue of air transport’s environmental impact. But the lack of progress to date raises broader questions concerning the

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11 ICJ, Nicaragua Case (1986) at 128. ‘The principle of respect for territorial sovereignty is also directly infringed by the unauthorised overflight of a state’s territory…’.

12 Mendes de Leon (2002) at 484.
most appropriate and efficient body in which to vest regulatory authority over environmental matters related to aviation, and the role of the ICAO in a post-Kyoto world.

13. The ICAO Annexes contain what are known as Standards and Recommended Practices (SARPs), which place further limits on the unilateral undertaking of environmental measures. The SARPs, though without the force of an international treaty, entail legal obligations for the contracting States to the Chicago Convention. Such States have ‘accepted an explicit legal undertaking to collaborate in securing the highest practicable degree of uniformity in regulations, standards, procedures and organization in relation to [air navigation]’.

14. The ICAO SARPs are the current multilateral mechanism used to govern or guide, at an international level, the consequential national regulations concerning air transport. Compliance with these standards is the central cause for concern for most States. Without that compliance, the inherent need for cooperation on uniform rules in international air transport is jeopardised. Article 33 of the Chicago Convention seeks to ensure that compliance by ensuring that these SARPs are recognised, on a reciprocal basis, by every contracting State. This means that certificates of airworthiness and certificates of competency and licences ‘issued or rendered valid by the contracting State in which the aircraft is registered, shall be recognized as valid by the other contracting States, provided that the requirements under which such certificates or licences were issued or rendered valid are equal to or above the minimum standards which may be established from time to time…’. This Article therefore dictates that one State may not reject or discriminate against the aircraft of another State, where that aircraft is complying with the standards annexed to the Chicago Convention. Article 33 therefore represents a further constraint on States seeking to take unilateral action to curb international air transport’s contribution to global warming and CO₂ emissions. Using a method of reciprocity in international air transport can have the unfortunate side effect of hindering positive unilateral progress in a given area, such as the environment. States must therefore ensure that any initiatives put in place do not have the effect of invalidating another State’s Annex-compliant air transport framework.

2.1.2 Bilateral initiatives

15. International air transport, since the late 1940s, has been conducted on a bilateral basis. Departing from the multilateral treaty approach at Chicago, States sought to establish more detailed agreements which would determine the capacity, frequency and cost of air traffic flowing between two territories. That model remains the predominant model today and there exist tens of thousands international bilateral treaties between air-faring nations. These treaties include legal conditions for their members. There is an increasing tendency to include environmental clauses within such agreements. The US and EU Agreement in March 2007 provides an example of such an accord. Article 15(2) of the Agreement states:

16. ‘When a party is considering proposed environmental measures, it should evaluate possible adverse effects on the exercise of rights contained in this Agreement, and, if such measures are adopted, it should take appropriate steps to mitigate any such adverse effects’.

17. Ultimately, therefore, both parties to this agreement are obligated to first evaluate the possible adverse effects that any State-level action might have and, second, take appropriate steps to mitigate those adverse effects. Failure to do so would result in the violation of this Article of the Agreement. Regarding international law, the breach of a signed and ratified international convention is a serious matter. As such, a

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14 Chicago Convention (1944) Article 33.
material breach of this Agreement could lead to the other Party invoking that breach ‘as a ground for terminating the treaty or suspending its operation in whole or in part’. As such, another important limit within the environmental field of international aviation is the possible existence of an international treaty between two Parties which places stipulations upon the commencement of any given initiative to address environmental impacts, including emissions. These agreements affect the economic investment and growth of the air transport industry between the two States, and are generally respected in international aviation matters.

2.1.3 Unilateral initiatives

18. A recent dispute between the US and the EU concerning the noise pollution generated by certain aircraft provides a useful case analysis of how regulation at the European level fares on the international stage. At the heart of the matter was an EU Regulation addressing environmental concerns of international air transport which was adopted outside, and in opposition to, the cooperative framework of ICAO. This Regulation sought to address the growing disquiet surrounding the noise pollution created by civil aircraft around the airports of the EU Member States. In the period between the Proposal and its adoption, several rounds of negotiations between the US and the EU took place in an attempt to placate the US’s reservations concerning what it regarded as a ‘purely protectionist’ measure which had a ‘disparate impact on US interests’.

19. The EU stated that it was adopting this measure because the US had deviated ‘from the internationally agreed upon ICAO Chapter 2 phase-out schedule’. Each ‘Chapter’ indicated an ever-decreasing limit on the noise that registered aircraft were permitted to make. The US had progressed on this phase-out faster than agreed upon and there were worries from both the EU aviation market and the noise-abatement lobbyists that this would be an incentive to the US owners and operators to move their Chapter 2 aircraft into the territory of the Community. The method of hushkitting such ‘Chapter 2’ aircraft to comply with the standards under Chapter 3 of Annex 16, thereby facilitating their operational use within the EU, was therefore countered by the EU with the promulgation of this Regulation. Although ‘hushkitted aircraft meet Chapter 3 standards,... their performance is near the bottom of the acceptable noise range allowed by [that] Chapter...’. Therefore, according to the EU, while these aircraft technically complied with the Chapter 3 requirements, this did not mean that they were required ‘to accept them as Chapter 3 aircraft’.

20. A number of policy and economic arguments to this EU Regulation were fielded by the US. More important for this paper, however, were the purely legal objections. What limit did the US allege the EU had transgressed in adopting this Regulation? Principally, their concern was that both the design and effect of the measure was discriminatory. For instance, the measure appeared to advantage European States over non–European ones regarding the use of the aircraft in question. Importantly, the measure was also alleged to be discriminatory in that it distinguished between Chapter-3-compliant aircraft which had been recertified and Chapter-3-compliant aircraft which had always been so certified. As such, the Regulation also violated Article 33 of the Chicago Convention, requiring all States to recognise the validity of

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18 United States Department of State (2000), at p. 17.
20 Fischer (2000).
21 Ibid.
airworthiness certificates issued by any other contracting State. As the US had technically complied with those standards, the EU’s decision not to recognise those certificates violated Article 33.

21. However, before the matter reached a formal court, the ICAO Council, in June 2001, adopted Chapter 4 noise standards within Annex 16. These standards offered ‘member-states a great deal more flexibility in the definition and enforcement of their national and local noise abatement policies’ than did the previous set of standards. As a consequence, the EU Council, in mid-October 2001, officially recognised the ‘prospect of repealing the ‘hushkits’ Regulation in the near future’. It finally took those steps in late March 2002, adopting Directive 30/2002 ‘on the establishment of rules and procedures with regard to the introduction of noise-related operating restrictions at Community airports’. Article 15 of that Directive explicitly repealed the “hushkit” Regulation. The Directive avoided stipulating design methods to carriers seeking to comply with the Directive and effectively diffused the dispute between the two Parties.

22. This brief case analysis provides useful lessons for States seeking to understand the limits and opportunities within international aviation law for taking initiatives within the environmental sphere. First, it indicates, as noted above, that Article 33 of the Chicago Convention presents a sticking point for States seeking to take unilateral action. Second, it is clear that any measures must not be seen by another State as discriminating against them, either legally or as regards their air transport economy. However, these aspects of the case do not ultimately rule out unilateral action aimed at international air transport. Indeed, an equally important lesson to be taken from this case is that the EU ultimately achieved its desired goal of quieter planes by establishing Chapter 4 noise standards within the ICAO framework. A State must be aware, therefore, of the restrictions in place whilst also being alive to the fact that global standards can be achieved from initially unilateral beginnings.

23. Indeed, the EU itself has not been deterred by the above dispute. It is currently planning to bring all flights that land or take off from a European airport within its emissions trading scheme from 2012, though the precise design of the scheme remains subject to change. Again, this will be originally a Europe-wide scheme that could ultimately lead to a more global system of carbon trading. It has been argued that the scheme is compatible with the Chicago Convention and general rules of international air law, given that the intended EU scheme is a market-based initiative, expressly recognised as a legitimate progression of air transport within the preamble to the Chicago Convention. Whether this initial scheme will in fact survive legal challenges from other ICAO members will be seen in the coming years.

2.2 Opportunities in International Law

24. Article 38 of the Chicago Convention provides, in part, that ‘Any State which... deems it necessary to adopt regulations or practices differing in any particular respect from those established by an international standard, shall give immediate notification to the International Civil Aviation Organisation of the differences between its own practice and that established by the international standard.’

25. The principal goal of this Article is to ensure that States are fully aware of the practices and regulations in operation in any given State. Therefore, where a State considers it ‘impracticable to comply in all respects with any international standard, it has an unconditional legal duty, under Article 38 of the

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22 EU (1999), at p. 7.
25 Delft et al. (2005), at 17.
[Chicago] Convention, to give immediate notification to... ICAO'.

Through this mechanism, it was anticipated that contracting States within ICAO could assess, with full information, the air navigation standards of every other contracting State. Although safety and efficiency was the principal goal behind this Article, the passage of the Convention Article reproduced above does not distinguish between differing standards below or above that of the international standard. Therefore, the Article permits States to deviate from the international standard, such as an aircraft’s carbon dioxide emission, provided immediate notification is given to the ICAO. Use of this Article is therefore possible by States seeking to implement unilateral measures regarding the environmental impact of air transport.

26. States may also seek recourse to what has become known as the ‘effects’ doctrine in seeking to regulate international air transport. This essentially allows a state to ‘assume jurisdiction on the grounds that the behaviour of a party is producing ‘effects’ within its territory’. For instance, placed in an aviation context, Professor Abeyratne is of the opinion that ‘if... engine emissions of aircraft adversely affect the territories of [other] states... the state in which such aircraft are registered or leased or chartered would incur legal liability at international law’. As such, the injured State might legitimately exercise prescriptive jurisdiction over the activity. Such a principle is fully embraced by a number of States, the United States and the United Kingdom being robust in its use of the doctrine within the area of competition law. Classically expounded in US v. Aluminium Co. of America, “any State may impose liabilities, even upon persons not within its allegiance, for conduct outside its borders that has consequences within its borders which the State reprehends”.

27. As a consequence, where a State is seeking to regulate activity outside its borders, such as aircraft emissions which adversely affects that State, it might employ this doctrine in executing State-level regulations. Clearly, the political and economic ramifications of unilaterally restricting the freedom of another State’s air transport are a separate consideration and the ‘effects’ doctrine has yet to be confirmed directly for areas beyond competition law.

28. Environmental air taxes which do not specifically address fuels themselves could probably be justified under international law related to air quality or long-range transportation of pollutants. These would need to be strictly non-discriminatory regulations, affecting the goods and services from different States equally, as otherwise they could face challenges in the ICAO and the WTO.

29. International trade law, under the disciplines of the WTO Agreements, is often seen as limiting States’ regulatory autonomy, particularly in social and environmental fields. However, both the General Agreement on Tariffs and Trade (GATT) and the General Agreement on Trade in Services (GATS) include specific exceptions designed to allow Member States to pass measures that are aimed at environmental protection. Thus, Article XX of GATT reads: “[N]othing in this Agreement shall be construed to prevent the adoption or enforcement by any contracting party of measures ... (b) necessary to protect human, animal or plant life or health; ... (g) relating to the conservation of exhaustible natural resources if such measures are made effective in conjunction with restrictions on domestic production or consumption.” Any measures taken must, nevertheless, not be applied in such a manner that would constitute a disguised restriction on international trade, or a means of arbitrary or unjustifiable discrimination between countries where the same conditions prevail. Similarly, Article XIV of GATS contains environmental and health exceptions in similar terms to the GATT.

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29 Abeyratne (1996) at 291.
30 US v. Aluminium Co. of America (1945).
30. Countries are thus permitted under WTO law to take environmental protection measures, as long as the same standards are imposed on both domestic and foreign producers and providers, and there is no disguised protectionism. The essential compatibility of the WTO regime with domestic environmental and health measures has been confirmed by the WTO Appellate Body in cases such as Gasoline and Asbestos. In the context of international air transport services, however, the relevance of trade law may be limited by most States’ reluctance to commit to full liberalization of the sector under GATS’ positive list approach.

31. WTO law on subsidies, labeling and procurement provide other potential opportunities to combat the negative environmental effects of transport. First, the WTO subsidies regime under the Agreement on Subsidies and Countervailing Measures does not prohibit outright all payments made by a government to its industries. Under the “traffic-light” approach, subsidies in the “green light” category are likely to be permitted; these include subsidies that are not tied to export performance, do not require domestic content, and do not target specific industries. As long as the subsidy is carefully implemented, then, domestic governments may be able to encourage more energy-efficient air transport through payments to good performers or to advance technological developments.

32. Second, a domestic government may wish to encourage the use of “eco-labels”, or the provision of information to the consumer on the environmental impacts of the goods or services being consumed. In the context of air transport, for instance, airlines could begin voluntarily reporting on the efficiency of their aircraft, allowing consumers to choose the most energy-efficient and least polluting airline to travel with. As long as the labeling scheme (or other scheme for information provision to consumers) remained voluntary, it would most likely not breach any relevant WTO Agreements. If the scheme became mandatory, implemented through domestic laws, there is more risk that it would violate the non-discrimination provisions of GATT or GATS, or that it would constitute an unnecessary obstacle to international trade under the Agreement on Technical Barriers to Trade. However, for the non-discrimination provisions to become relevant, environmentally damaging goods and services must be considered “like” (that is, equivalent to) cleaner goods and services, since the provisions only apply to like products. The “process and production method” debate then becomes relevant here to a discussion of whether air transportation services that are delivered using highly environmentally damaging aircraft are “like” competitors’ services that are delivered using more efficient planes. There is no clear answer as yet from the Appellate Body on this issue, and so the use of mandatory labels, certification requirements or information provision requirements remains only a potential opportunity for environmental regulation.

33. Third, public procurement provides another potential opportunity for governments to encourage environmentally friendly air transport. Governments might, for instance, express a preference for less polluting airlines (those using newer planes, or those who actively engage in carbon offsetting programs) when purchasing transportation services for their staff. Although procurement is partly covered by the plurilateral WTO Agreement on Government Procurement (GPA), where it applies, the GPA does permit

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34  SCM Agreement (1995) Parts II and III.
35  Articles I:1 and III:4.
36  Articles II:1 and XVII:1.
37  Article 2.2.
38  See WTO (2000).
the consideration of non-economic factors, including the GATT/GATS-style exceptions for human, animal or plant life or health. Nevertheless, the extent of this possibility under the GPA is uncertain, and, as for eco-labels, governments’ ability to incorporate environmental criteria into their purchasing decisions while still remaining GPA-compliant is thus somewhat unknown.

34. Attempts to address the climate change impacts of aviation must contend with a substantial number of other issues. A major one is the issue of accounting – exactly how to account for GHG emissions coming from the aviation industry. Under Kyoto, for instance, countries’ emissions are assessed against a baseline, but while domestic aviation and marine emissions are included in the country’s total, emissions from international shipping and aviation are currently separately reported. In 1996, the Subsidiary Body for Scientific and Technological Advice (SBSTA) of UNFCCC identified eight options for emissions accounting:

- No allocation (that is, emissions from international aviation would remain in the international sphere rather than be allocated to any particular country);
- Allocation of global bunker fuel sales and associated emissions to Kyoto Parties in proportion to their national emissions;
- Allocation to Parties according to the country where the bunker fuel is sold;
- Allocation to Parties according to the nationality of the transport operator;
- Allocation to Parties according to the country of destination or departure of the aircraft or vessel;
- Allocation to Parties according to the country of destination or departure of passengers or cargo;
- Allocation to Parties according to the country of origin of passengers or owner of cargo;
- Allocation to the Party of all emissions generated in its national space.

35. A study carried out for the Dutch Civil Aviation Authority in 2000 examined the quantitative effect of each of these eight scenarios on the national emissions of 23 major aviation nations (the EU-15, Switzerland, Norway, the USA, Canada, Russia, Brazil, Japan and Australia). The considerable differences in results, as shown by the study, highlights the effect that the various accounting policies can have on a State’s ability to meet its Kyoto targets. Consensus on the most appropriate means of accounting will thus be required before market-based mechanisms for addressing the GHG impact of international air transport are likely to be successful.

36. One final note is important. In aviation, GHGs and carbon dioxide in particular are not the only contributors to climate change – they may in fact represent only 25-33% of the total contribution. One study concludes that condensation trails (contrails) from aircraft may have contributed to a 0.2-0.3°C/decade temperature increase between 1973 and 1994. However, contrails are probably best addressed through technical and optimization tools, such as altering flight paths to reduce their formation, rather than policy instruments backed by international law.

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40  Decision 2/CP.3 of the Conference of the Parties under the UNFCCC.
41  van Velzen and Wit (2000).
42  Ibid.
43  Centre for Clean Air Policy (2004).
44  Minnis et al. (2004).
45  Centre for Clean Air Policy (2004).
While unilateral action or regional action is not encouraged under international law, flag State jurisdiction over carriers can be used to increase environmental standards, as can certain provisions of international trade law. In conclusion, it can be noted that multilateral action in many fields (including new international environmental instruments) presents a broad array of options to regulate environmental consequences from international air transport, while avoiding discrimination against one particular air-faring State.

3. International Space Transport

As commercial space travel becomes an increasing likelihood over the coming decade, States are becoming aware of potential legal implications. The opportunities and limits in place for State-level action to sustainably manage the environmental impact of this new means of transport are, currently, uncertain. For instance, the point at which air transport becomes space transport has no accepted international definition. This is obviously important, as a State maintains sovereignty over its airspace and would usually be keen to enlarge its territorial jurisdiction. Indeed, at State level, this delimitation has been defined, though in dissimilar ways. Australia, for instance, regards space activities as those occurring or intending to occur 100 km in altitude. The UK, on the other hand, has stated that ‘for practical purposes the limit is considered to be as high as any aircraft can fly’. Therefore, neither the limit itself, nor its method of calculation is stipulated by international law. This currently leaves a State free to determine ‘outer space’ above its own airspace. However, the ability for a State to potentially extend this limit indefinitely, far into the reaches of outer space, and thereby to extend the sovereignty it possesses over its own airspace, seems doubtful. A geostationary orbit around the earth, on which many satellites are placed due to its advantageous geosynchronous properties, lies 36,000 km from the earth’s equatorial surface. Although the Bogota Declaration, signed in 1976 by a number of equatorial States, claimed that ‘the segments of geostationary synchronous orbit are part of the territory over which equatorial States exercise their sovereignty’, many States and legal authors have rejected this. It seems, therefore, that the international community rejects claims of sovereignty at 36,000 km (over a limited resource, it must be added), but have reached no agreement below that limit.

States must also begin to be aware of the environmental impact of transport vehicles such as Virgin Galactic’s aeroplane/space ship hybrid that will soon undertake space tourism and, in the not too distant future, space transport between countries. As Virgin itself admits, ‘the technology that still delivers payloads and people to space has a high negative environmental impact and has remained essentially unchanged for half a century’. An average rocket will use 3.5 million pounds of fuel in each launch. For comparison, 2.5 thousand million pounds of gasoline is used in the entire US in one day. The contribution is therefore not negligible, and its use will increase dramatically over the coming years. How States wish to proceed in ensuring the sustainable development of this means of transport remains largely undefined.

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Australia Space Activity Act (2002). Australia, however, in a note to the Secretariat of the UN General Assembly Committee on the Peaceful Uses of Outer Space, stated that, despite the Act’s amendments, there remained no definition of ‘outer space’ in Australian domestic law.


See Jakhu (2007).


Virgin Galactic’s space access system claims to be ‘radically different’ and will use much less than this figure.
40. The opportunities available to States to ensure that CO₂, SOₓ, NOₓ and other harmful emissions do not outweigh the benefits offered by this mode of transport are currently only starting to be discussed in international legal circles. For instance, one of the environmental problems of this mode of transport appears to have been addressed in the UN Convention on International Liability for Damage Caused by Space Objects, which establishes absolute liability for damage due to space debris.52

4. International Sea Transport

41. Ships are major sources of greenhouse gas emissions and other environmental pollution. Although estimates vary, recent studies suggest that the global fleet of marine vessels releases up to three percent of the world's carbon dioxide.53 This is up from 1.8% of global emissions in 1996.54 If shipping emissions continue growing at the current pace, they could more than double by 2050.55 Furthermore, sea-based transport accounts for 90% of world freight transport, and contributes twice as much to carbon emissions as freight transport by air - even though shipping emissions are 40 times lower than air emissions per tonne of freight.56 While the aviation and road transport sectors have come under heavy pressure to limit their emissions, the shipping industry has thus far been spared; greenhouse gas emissions from ships are not presently regulated by national, regional or international regimes. The need to regulate bunker fuel emissions was recognized during early UNFCCC negotiations, but no decision was made to allocate ship emissions to national totals.57 However, efforts to regulate maritime carbon emissions on a global scale are taking place at the IMO, as provided for under Article 2.2 of the Kyoto Protocol.58 Sea transport is also responsible for other environmental impacts such as sewage, invasive species, SOₓ/NOₓ pollution and particulate matter.59

42. The Convention on the Inter-Governmental Maritime Consultative Organization was adopted by the United Nations Maritime Conference in Geneva, March 6, 1948. Although the Organization changed its name to the International Maritime Organization (IMO) in 1982, it retained the broad mandate to “provide machinery for co-operation among Governments in the field of governmental regulation and practices relating to technical matters of all kinds affecting shipping engaged in international trade”60 and “provide for the consideration by the Organization of any matters concerning shipping and the effect of shipping on the maritime environment that may be referred to it by any organ or specialized agency of the United Nations.”61 Furthermore, the Organization serves as the specialized agency of the UN in the field of shipping and the effect of shipping on the marine environment.62 This mandate justifies the role assigned to

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53 IMO BLG 12/6/1, online: www.guardian.co.uk/environment/2008/feb/13/climatechange.pollution.
54 IMO (2000).
57 Refer to UNFCCC INC 2 Decision 9/2, COP Decision 4/CP.1, COP Decision 2/CP.3, referenced in IISD report of Norwegian non-UNFCCC Technical workshop on emissions from aviation and maritime transport at www.iisd.ca/YMB/SDOSL/.
58 Art. 2.2: “The Parties included in Annex I shall 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.”
60 Ibid., Article 1(d).
61 Ibid., Article 59.
the IMO under Article 2.2 of the Kyoto Protocol. To fulfil its mandate, the organization can consider and
make recommendations on matters remitted to it, draft conventions, agreements or other instruments for
consideration, and provide machinery for consultation and the exchange of information.62 Membership in
the Organization is open to all States - it currently has 168 members and three associate members (Hong
Kong, Macau, Faroe Islands) - making it one of the most inclusive routes to a global emissions scheme. In
the UN Convention on the Law of the Sea at Art. 192 (Part XII – Protection and Preservation of the Marine
Environment), States agreed on general obligations to protect and preserve the marine environment. These
obligations mandate States to jointly or individually take necessary measures to prevent, reduce and control
pollution of the marine environment from any source (Art. 194 UNCLOS63).

4.1 Limits in International Law

4.1.1 Multilateral initiatives

43. Developments in regulating maritime carbon emissions started at the IMO in 1997, when it
adopted a resolution requesting that the Marine Environment Protection Committee (MEPC) consider the
feasibility of CO2 reduction strategies for ships.64 The language was strengthened and clarified in 2003
when the IMO passed Assembly Resolution 963(23), which dictated that the Marine Environment
Protection Committee identify and develop the mechanism or mechanisms needed to achieve the limitation
or reduction of GHG emissions from international shipping. In doing so, MEPC must give priority to the
establishment of a CO2 baseline, develop a ship profile index and guidelines for a CO2 emission indexing
scheme, and then evaluate technical, operational and market-based solutions.65 Two years later, the MEPC
approved a set of interim guidelines for voluntary ship CO2 emission indexing on a trial basis that would
allow shipowners to evaluate vessel and fleet performance in regards to fuel efficiency and CO2
emissions.66 The following year, MEPC 55 (Oct. 2006) set out a work plan to have the CO2 baseline, CO2
emission indexing scheme and technical, operational and market based solutions complete by MEPC 59 in
July, 2009.67

44. IMO meetings in the past year have been the most productive and contentious due to the issues to
be resolved. MEPC 57 (Apr. 2008) considered follow-up actions to resolution A.963(23), including
progress made in line with the ‘work plan’ adopted by MEPC 55 in 2006. One of the meeting’s major
contributions was the development of fundamental principles as a basis for future regulation of shipping
GHG emissions. In the MEPC’s view, a coherent and comprehensive framework should be:

1. effective in contributing to the reduction of total global greenhouse gas emissions;
2. binding and equally applicable to all flag States in order to avoid evasion;68
3. cost-effective;
4. able to limit, or at least, effectively minimize competitive distortion;

62 Ibid., Article 2.
63 United Nations Convention on the Law of the Seas (UNCLOS) available online UN:
64 COP (1997) MARPOL 73/78, Resolution 8.
65 IMO Resolution A.963(23), IMO POLICIES AND PRACTICES RELATED TO THE REDUCTION OF
GREENHOUSE GAS EMISSIONS FROM SHIPS (2003), s. 1.
68 This point was highly contested by developing nations (Brazil, China, India, Saudi Arabia, South Africa
and Venezuela) based on common but differentiated responsibilities. See MEPC 57/WP.8, 2.2.
5. based on sustainable environmental development without penalizing global trade and growth;
6. based on a goal-based approach and not prescribe specific methods;
7. supportive of promoting and facilitating technical innovation and R&D in the entire shipping sector;
8. accommodating to leading technologies in the field of energy efficiency; and
9. practical, transparent, fraud free and easy to administer.69

45. Given these considerations, the MEPC 57 Working Group on GHG Emissions from Ships moved to consider short-term and longer-term measures for such a framework during an inter-sessional meeting of the Working Group on GHG Emissions from Ships, held in Oslo, 23-27 June 2008. The Working Group was instructed to consider short and long term measures brought up at MEPC 5770, and:

1. Develop a mandatory CO₂ Design Index for new ships and submit it to MEPC 58 for approval;
2. Review the existing CO₂ operational index guidelines (MEPC/Circ. 471) with a view to finalization at MEPC 58 and, in particular:
   1. develop a methodology for a CO₂ baseline in terms of efficiency; and
   2. consider the purpose of the CO₂ operational indexing scheme;
3. Further develop mechanisms with GHG reduction potential for international shipping with a view to selecting the most promising measures for consideration at MEPC 58, inter alia:
   1. global levy/cap and trade hybrid mechanism;
   2. Emissions Trading Schemes (ETS) and/or Clean Development Mechanism(CDM); and
   3. best practices on the range of measures as identified by MEPC 57 and how they can be implemented by ship builders, operators, charterers, ports and other relevant partners to make all possible efforts to reduce GHG emissions, with the aim of developing a resolution as appropriate;
4. Consider the level of reductions that can be achieved, address the design, implementation, cost benefit, capacity building and regulatory/legal aspects as well as the impacts for the shipping industry, the flag and port States and other stakeholders as appropriate, associated with each of these options.71

46. The Oslo inter-sessional meeting was meant to develop and finalize certain aspects of a GHG emissions framework, but the process stalled because of the contentious issues at hand. A draft CO₂ Design Index was developed for submission to MEPC 58, but mandatory application was questioned by ‘non-Annex I’ nations, and those same nations did not support the development or implementation of reduction mechanisms proposed by Denmark (a global fuel levy) and the EU (an emissions trading

70 See MEPC 57/WP.8, Annex 1 for a list of short and long-term measures proposed.
71 Draft TOR for the meeting, MEPC 57/WP.8, Annex 3.
Ultimately, a decision will have to be made as to whether an emissions scheme will be pursued under the auspices of the IMO, or under the UNFCCC.

4.1.2 Unilateral initiatives

47. Due to the failure to reach a consensus within the IMO, the European Commission is likely to launch consultations later in 2008 on potential legislative proposals to amend the ETS to include the maritime industry. The United States may also be forced by the courts into adopting a unilateral solution - several US states and NGOs have filed formal letters of intent to sue the EPA over its failure to regulate CO₂ emissions from ships and aircraft. These unilateral efforts may make international solutions to shipping emissions more difficult to achieve, though the nature of the shipping industry necessitates global action.

4.2 Opportunities in International Law

48. The regulation of shipping emissions represents a significant legal challenge as ships operate largely outside of national boundaries. States have limited jurisdiction over maritime emissions that occur outside their borders, especially when those emissions happen on the high seas. But UNCLOS itself contains provisions on the protection and preservation of the marine environment (Part XII). This mandates States to take jointly or individually as appropriate, necessary measures to prevent, reduce and control pollution of the marine environment from any source (Art. 194 UNCLOS). Part XII provides States with an opportunity to regulate the environmental impacts and while Art. 211 UNCLOS largely refers to IMO or other global initiatives, it also mandates flag States to adopt laws and regulations for the prevention, reduction and control of pollution.

49. The international process for establishing new regulatory requirements is further complicated by the complex relationships that exist between the flags of convenience and the large shipping interests. Specifically, 75% of the world’s merchant vessel fleet is registered in non-Annex I Kyoto parties, yet is mostly owned by shipping interests in Annex I countries. Political willpower is hard to come by due to the key role that maritime transport plays in the global economy. Estimates suggest that 90% of the world’s goods are transported by sea, and this trend shows no signs of abating given increasing global economic integration and the growth of world trade. However, shipping is also the most efficient form of transport and could play a key role in reducing worldwide GHG emissions if the right actions are taken.

50. Port states generally have considerable freedom to impose requirements on ships passing into their internal waters for docking, or to refuse permission to enter to ships not meeting the requirements. Thus, although regulation on the high seas is legally complicated, regulation could effectively be imposed at points of departure or arrival with sufficient coordination of port state laws. Regulation from flag states

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72 Lloyd’s Register (2008), pp. 3-5.
75 Consider the following UNCLOS provisions: Art. 45 - Innocent Passage, Art. 87 - Freedom of the High Seas, Art. 91. - Nationality of Ships, Art. 92. - Status of Ships, Art. 94. - Duties of the Flag State.
76 ICCT (2007).
77 Eivind Vagslid, IMO, in IISD (2007).
also serves as an opportunity to take responsibility for pollution caused by vessels, though as indicated this may depend on the political will of the flags of convenience, who may be concerned about losing their comparative regulatory advantage over other potential flag states.

51. The IMO’s Study of Greenhouse Gas Emissions from Ships\(^\text{80}\) provides the most comprehensive evaluation of potential avenues for the reduction of shipping related GHG emissions. First, it assessed international regulative measures related to maritime safety (SOLAS) and marine environmental protection (MARPOL 73/78) to identify restraints to the potential for emissions reduction from international shipping.\(^\text{81}\) Safety and environmental regulations that may conflict with the objective of greenhouse gas emissions reduction include measures limiting cargo carrying capacity (e.g. double-hulling), measures introducing additional energy consumers (e.g. increase in onboard equipment), measures affecting general efficiency (e.g. traffic routing) and miscellaneous measures (e.g. mandatory retention of slops, reduction of NO\(_x\) and SO\(_x\) emissions, ballast water management, prohibiting Tributyltin in antifouling paints).\(^\text{82}\)

52. The Study also considers market-based approaches to emissions reductions, but cautions that a number of facts must be understood before attempting to seek an effective solution:

- It is difficult to define the nation or territory where “generation” of sea transport services takes place.
- It is also difficult to determine the country of ownership of a vessel, or who is the real owner or responsible for its operation.
- The majority of the world’s bulk shipments either start or finish their journey in an Annex I country.
- Bunker-fuel is commonly sold to ship operators by dealers independent of the major oil companies, making tax collection administratively difficult.
- Measures to reduce industry-wide emissions must be global in scope if they are to be equitable and avoid “free riders”, but some actions taken by Annex I countries may have a significant impact on global emissions.
- The international shipping industry has a history of adopting solutions to common safety and pollution problems through the adoption of global uniform standards.\(^\text{83}\)

53. Market-based measures addressed by the Study include environmental indexing, a voluntary agreements programme, a carbon charge on bunker fuel, common emissions standards, and emissions trading.\(^\text{84}\) Its conclusions include:

- \textit{Carbon charges} on bunker fuels are not a viable option, due to huge evasion possibilities.
- \textit{A voluntary agreements programme} does not seem to be a very efficient policy tool towards international shipping. However, some reductions may be achieved by local agreements etc. or agreements between Annex I-countries/IMO and ship owners, where Annex I-countries coordinate their efforts.
- \textit{Environmental indexing} does not seem to be a very efficient tool to reduce emissions, even if some reductions may be achieved on voluntary basis.

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\(^{80}\) IMO (2000).
\(^{83}\) IMO (2000), p. 149.
\(^{84}\) See IMO (2000), p. 150-162 for an in-depth discussion of each possibility.
• *Emission allowance trading*, either along with other sectors in Annex I-countries or as a separate system outside the Annex I-countries seems to be a non-viable option, due to severe problems capturing emissions from the shipping industry.

• *Energy or emission efficiency standards* seems to be a promising option, especially for new vessels.

• *Emissions credits sales*, resulting from abatement measures on new ships and possibly also existing ships, is also a very promising option, and could in the long run provide very strong economic incentives for ship owners to reduce emissions through technical measures.85

54. In December 2007, the Centre for International Climate and Environmental Research (CICERO) released a report building on the IMO’s Study and examining five different schemes for the regulation of carbon dioxide emissions from ships: a cap-and-trade scheme, a design emission standard, an operational emission standard with fee, a charge (tax) on emissions from ships, and a combined cap and charge scheme.86 The schemes studied were assessed for three kinds of efficiency – *environmental* efficiency, actually achieving reductions in GHGs; *cost* efficiency, aiming to minimize the cost to society of the regulation; and *administrative* efficiency, seeking as little use of resources to implement the regulation as possible.87 The schemes include some market-based instruments, such as emissions taxes and emissions trading, as well as some “command-and-control” instruments, such as mandating emissions standards that ships must meet. Hybrid schemes are also considered; for instance, a standard combined with a tax for not meeting the standard, or a credit for operating at a higher level than the standard requires.

55. The report concluded that standards-based mechanisms are likely to be more acceptable than a tax or a cap-and-trade system, but provide less incentive to reduce emissions than market-based mechanisms. The combined cap and charge scheme was found to be a compromise position with medium performance both on acceptability and incentive. The report notes a gap, though, between what is currently feasible and what is ultimately desirable in regulating maritime GHG emissions.

4.2.1 **SOx/NOx and Sewage**

56. Of course, greenhouse gases are not the only environmental concern posed by international shipping. The major international legal instrument in the area, the International Convention on the Prevention of Pollution from Ships (known as MARPOL 73/78)88, contains rules on the emission of various polluting substances, including NOx and SOx. Annex VI of MARPOL 73/78 sets up SOx Emission Control Areas (SECAs), which impose stricter limits on SOx emissions in a geographical area. While the global limit for the sulphur content of fuel oil was set after 20 years of debate at a relatively ineffectual 4.5%, within SECAs the limit is reduced to 1.5%.89 Following agreement at MEPC 57, these limits are both set to progressively reduce over time until 2020. Ships can also use certain emission reduction techniques (such as an exhaust gas cleaning system) instead of meeting the 1.5% sulphur content, as long as SOx emissions are kept below 6 g SOx per kWh.90 There are currently two SECAs in operation – one in the Baltic Sea and another in the North Sea/English Channel. Any MARPOL Annex VI party can propose a new SECA, and the EU has indicated91 that it may seek to have the Mediterranean Sea designated as a

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86 CICERO (2007).
SECA. The US EPA has also proposed a SECA extending for 200 nautical miles from the entire North American coast, with an even lower sulphur content requirement of 0.1% to be imposed. Compliance with and enforcement of SECA limits may be a problem, though, under UNCLOS rules which give states little jurisdiction over vessels outside their territorial waters. Although nations could report foreign flag vessels that breach SECA limits to the flag state authority, there is no guarantee that any action will be taken against the ship owner.

57. NO\textsubscript{x} is regulated in a similar fashion to SO\textsubscript{x}, with certain global limits in place and stricter limits applying in NO\textsubscript{x} Emission Control Areas. The global limits are set to decrease over time to 2016, down to around 3 g NO\textsubscript{x} per kWh. These standards are expected to be met through technological advancements and combustion process optimization.

58. Annex VI of MARPOL 73/78 also addresses ozone-depleting substances, including halons and CFCs. Ozone-depleting substances are now banned on all ships, except for new installations of hydro-CFCs which are permitted until 1 January 2020.

59. Other environmental problems such as sewage have also been subject to regulation under MARPOL 73/78. Annex IV (as reformed in 2004) prohibits old ships from discharging sewage close to land and mandates port facilities for sewage treatment. It also requires new ships to be equipped with sewage treatment facilities aboard or a special tank system. On 27 September 2008, these rules became binding. The IMO has also become a forum for debates on the problem of invasive species carried mainly through ballast water. The International Convention for the Control and Management of Ships’ Ballast Water and Sediments has been negotiated under the auspices of the organization. In September 2008, this Convention required only 16 further ratifications to enter into force. It contains the general obligation in Art. 2 to “undertake to give full and complete effect to the provisions of this Convention and the Annex thereto in order to prevent, minimize and ultimately eliminate the transfer of Harmful Aquatic Organisms and Pathogens through the control and management of ships’ Ballast Water and Sediments.” [emphasis added].

4.2.2 Regional Seas Agreements

60. Various regions of the world have adopted agreements designed to protect the regional marine environment, and these agreements provide a further opportunity to regulate maritime transport in those areas. The OSPAR Convention, signed in 1992 and entering into force in 1998, sets out a strategy on (inter alia) the discharge and emission of hazardous substances in the North-East Atlantic Ocean. The Convention strategy aims to achieve by 2020 a near-zero concentration of man-made synthetic substances in the marine environment, and close to background values for naturally occurring substances. To that end, the OSPAR Commission maintains a List of Chemicals for Priority Action, as well as a List of Substances
of Possible Concern. OSPAR’s “sister agreement”, the 1969 Bonn Agreement, establishes rules on surveillance of the North Sea for pollution from shipping, and requires information-sharing, joint clean-up operations, and research and development. Under the work of the Bonn Agreement, oil slick pollution from marine transport has reduced by around 50% since 1990.

61. The 1976 Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean contains a “Dumping Protocol” aimed at combating pollution by dumping from ships and aircraft. Dumping of listed material is either prohibited outright, or permitted with certain authorizations. The Protocol applies to all ships and aircraft registered in a party’s territory or flying its flag. The 1981 Lima Convention for the Protection of the Marine Environment and Coastal Area of the South-East Pacific commits its Parties to take all necessary measures to prevent, reduce and control pollution, particularly from vessels. The 1983 Cartagena Convention includes similar obligations covering the wider Caribbean region, while the 1985 Nairobi Convention covers the Indian Ocean adjacent to the East African States, and the 2002 Antigua Convention (not yet in force) covers the North-East Pacific. Such regional conventions provide an important opportunity within international law to regulate the pollution caused by international shipping.

4.2.3 Trade Law

62. As mentioned above in the context of international air transport, trade law provides the possibility of regulation for environmental purposes, under Article XX of GATT and Article XIV of GATS. Since much international trade in goods, and some movement of people, occurs by sea, the GATT/GATS exceptions present an opportunity for regulation under international law. Domestic governments could, for instance, take measures restricting the delivery of goods from ships that do not meet environmental standards on GHG, SOx or NOx emissions. Under the terms of GATT/GATS, the governments would need to ensure that the measures taken do not constitute arbitrary or unjustifiable discrimination between countries, nor a disguised restriction on international trade. International trade law also does not override other disciplines, and so measures taken under GATT or GATS affecting maritime trade in goods must be compliant with any other relevant laws (such as UNCLOS, MARPOL 73/78 or other IMO Conventions). Nevertheless, trade law does not necessarily represent as important a limit on environmental regulation as it is occasionally made out to be, and indeed it could provide an initial opportunity to frame protective measures.

63. WTO rules on subsidies, labeling and procurement all apply similarly in the present context of marine transport as for air transport, discussed earlier. Thus, there may be scope for domestic governments to encourage more environmentally friendly sea transport via the use of carefully implemented subsidies, labeling of goods delivered by standards-compliant vessels, or procurement preferences for cleaner

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100 www.bonnagreement.org.
102 The Protocol for the Prevention and Elimination of Pollution of the Mediterranean Sea by Dumping from Ships and Aircraft.
103 Arts 3 and 4.
104 Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region, arts 4, 5 and 6.
shipping providers. However, as noted, the exact scope of this opportunity to regulate remains uncertain within WTO law.

4.3 **Constraints and Possibilities for Port States to Apply Environmental Policy Instruments**

4.3.1 **Port State Authority**

64. The last pre-ambular statement in UNCLOS affirms that “matters not regulated by this Convention continue to be governed by the rules and principles of general international law.” As a result, new or separate conventions may give states the authority to apply new international environmental policies to vessels. Port states have a high degree of jurisdiction over visiting vessels, second only to the flag state. This is because ports/internal waters are considered to be integral parts of a nation’s territory. One way that port states have used this jurisdiction to overcome the pre-eminence of the flag state is through regional memorandums of understanding. The prime example is the Paris MOU on Port State Control. These MOUs derive their authority from Articles 216, 218, 219, 220 and 226 of UNCLOS and require the parties to investigate a certain percentage of ships a year for compliance with UNCLOS and applicable rules and standards established through competent international organizations or general diplomatic conference. If the release of a vessel following such an investigation would present an unreasonable threat of damage to the marine environment, the ship can be detained for repairs or required to proceed to the nearest appropriate repair yard (usually in a state with lower costs).

4.3.2 **Ships in territorial waters**

65. Sovereignty over the territorial sea is exercised subject to UNCLOS and to other rules of international law. The primary constraint on state action is the right of innocent passage. However, the right of innocent passage is limited in several ways. Primarily, any act of wilful and serious pollution contrary to UNCLOS rebuts the presumption of innocent passage. Secondly, the coastal State can prescribe laws (in conformity with UNCLOS and other rules of international law) regarding the preservation of the environment of the coastal State and the prevention, reduction and control of pollution thereof. Where there are clear grounds that the vessel has violated these laws, the coastal state may undertake physical investigation of the vessel and may institute proceedings.

66. The end port state may also undertake an investigation of the suspected vessel upon request.

67. The UNCLOS definition of pollution may limit or enhance the ability of states to prescribe and enforce national laws under the Convention, as it only regulates pollution of the marine environment. Specifically: “the introduction by man, directly or indirectly, of substances or energy into the marine environment, including estuaries, which results or is likely to result in... deleterious effects...” Although it was initially seen by the maritime states as impeding coastal/port state excesses relating to enforcement,

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107 UNCLOS, Article 226.1(c).
108 UNCLOS, Article 2.3.
109 UNCLOS, Article 17. Remember that a distinction exists between coastal states and port states.
110 UNCLOS, Article 19.2(h).
111 UNCLOS, Article 21.1(f).
112 UNCLOS, Article 220.2.
113 UNCLOS, Article 218.3.
114 UNCLOS, Article 1.1(4).
the Law of the Sea Convention subjects much of Part XII (Marine Pollution) to a binding dispute settlement mechanism under Part XV (ITLOS). This may present opportunities for vigourous enforcement if a state is clearly within its rights. In conclusion we can summarise: “The LOSC avoided enumerating new standards for particular forms of pollution. Instead, it proclaims a general regime of powers and duties which builds upon the codification and development of existing and future pollution control conventions. Thus, the LOSC incorporates by reference those existing as well as future instruments to be adopted under IMO auspices. In this regard, the convention is riddled with terms of reference such as ‘applicable international rules and standards’, ‘internationally-agreed rules’, ‘international rules’, and ‘generally accepted international rules and standards’. These rules of reference have the advantage of automatically incorporating the technical standards set by IMO as these are continuously adopted and amended to keep up with changing circumstances.” (Khee-Jin Tan, Vessel-Source Marine Pollution, p. 195)

5. International Land Transport

5.1 Road transport

68. While international agreements such as the Kyoto Protocol clearly affect road transport pollution via GHG emissions from vehicles, international law does not contain any specific agreements or conventions relating to road transport pollution. Rather, it is generally regulated at lower levels of government, such as the City of London’s Low Emission Zone.\(^{115}\) The main legal instruments to regulate road transport are the Convention on Road Traffic of 19 September 1949 and the Convention on Road Traffic of 8 November 1968. Both were adopted within the UNECE, though as of September 2008, ratification had broadened considerably to 93 and 67 States respectively.\(^{116}\) These international road transport instruments contain mainly security related provisions (although recent amendments, introducing bike lanes, could be seen as a way of regulating environmental questions). The UNECE lists as future challenges for the transport sector, noting \emph{inter alia} that in the foreseeable future, the transport sector will continue to face the following main challenges: “a continuous increase in the consumption of fossil fuels and related CO\(_2\) emissions, which will result in an increased contribution to climate change; […] and old, unsafe and highly polluting road vehicle fleets, particularly in Eastern and South-Eastern Europe, as well as in the Caucasus and Central Asia, which result in higher accident rates and environmental impacts.”\(^{117}\) However, besides vehicle standards, no international agreements to address these challenges have yet been adopted.

69. Recognising that 44% of its goods are moved by road, and that 84% of CO\(_2\) emissions attributable to transport are due to road transport,\(^{118}\) the EU has made various proposals including harmonizing driving times and fuel taxes, producing uniform road transport legislation, and implementing “Euro VI” standards on NO\(_x\) emissions and particulate matter. The Euro VI standards would reduce NO\(_x\) emissions by 80% (down to 0.4 g NO\(_x\) per kWh) compared with Euro V standards, bringing the EU into closer alignment with US vehicle standards by 2013.\(^{119}\) In addition, the “Greening Transport Package” adopted in July 2008 provides a range of measures aimed at better road transport efficiency, further internalization of the costs of congestion and pollution, and measures to address noise pollution.\(^{120}\)

70. There is thus much opportunity for international law to address issues related to international road transport pollution. Harmonisation of emissions standards for new vehicles is one area of potential that could support international trade in vehicles themselves by removing the technical barrier of a multiplicity of standards, while also serving to impose limits on NOx pollution and GHG emissions.

5.2 Rail transport

71. International rail transport has thus far only received international legislative attention as to its feasibility, mostly on a regional basis. The *Convention relative aux transports internationaux ferroviaires*\(^{121}\) concerns international carriage by rail. Its main aim is to facilitate rail transport by train of passengers and goods. 42 States from Europe, North Africa and the Middle East have ratified the convention. It has adopted the Protocol of Vilnius in 1999, which entered into force in 2006, and which contained *Regulation concerning the International Carriage of Dangerous Goods by Rail* (RID – Appendix C to the Convention) concerning dangerous goods transport.

72. The relevant industry organization, the *International Union of Railways* (UIC), is also studying the impact of rail transport on the environment with studies on for example noise, diesel emission, energy efficiency, climate change and eco-procurement.\(^{122}\)

6. Other International Legal Regimes of Relevance to Emissions

73. The negative environmental impacts of transport can arise not only from the emissions by the transporting vehicle of harmful substances, such as GHGs, NO\(_x\) or SO\(_x\), but also from risks posed by the goods themselves being transported. International law thus provides mechanisms to regulate the transport of hazardous goods in an effort to avoid negative environmental impacts that might occur if the goods are inadequately prepared for transport, or if an accident occurs and the goods are released. One major instrument in this regard is the *Rotterdam Convention*, adopted in 1998 and entering into force in 2004.\(^{123}\) The Convention, with 123 parties, establishes a prior informed consent (PIC) procedure for the import of a wide range of hazardous chemicals. The procedure requires parties to determine, for each chemical listed in Annex III of the Convention, whether they will permit the transportation of the chemical into or out of their territory. Information provision is a key element of the Convention, and a Decision Guidance Document, with information on the Annex III chemical and its effects, is distributed to all parties to assist their decision. Where a decision is made to allow export or import of chemicals, all other parties must be informed, and certain labeling requirements must be met. Exporting countries must ensure that an export does not contravene the importing country’s decision under the PIC procedure. New chemicals can be submitted for inclusion in Annex III by two parties from two of the seven different geographical regions established by the Convention.

74. The *Rotterdam Convention* thus provides an opportunity to regulate the potentially detrimental environmental impacts of both the transport and use of hazardous chemicals.

75. The UNFCCC also aims to regulate all GHG emissions and thus is in general also applicable to emissions from global transport. However, the Kyoto Protocol only mentions the transport sector as a general obligation of Annex I parties to adopt: “(vii) Measures to limit and/or reduce emissions of greenhouse gases not controlled by the Montreal Protocol in the transport sector” (Article 2. 1. a) vii)) and then mandates the IMO and the ICAO with combating GHG emissions in their fields: “The Parties


\(^{123}\) Rotterdam Convention Secretariat, [www.pic.int](http://www.pic.int).
included in Annex I shall 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” (Art. 2.2). It is not certain that a post-Kyoto Agreement will task these organizations again with GHG reduction efforts, since the success has been fairly limited.

7. Conclusion

76. Apart from GHG emissions, possibilities exist in both the IMO and the ICAO to find new ways of regulating and reducing GHG emission. This could follow the (only partly successful) model of regulating NOx and SOx and noise emissions from air and sea transport, while space and land transport remain by comparison under-regulated in international law. Although international law in general does not exclude the possibility of unilateral action, it strongly encourages multilateral approaches. As detailed above, States have considerable freedom to regulate their own vessels and set the rules applicable in their own territory, particularly if they adopt non-discriminatory legislation.

77. Regional initiatives offer several successful models to debate, design and adopt innovative rules which later find their way into global regimes. As shown in the instance of noise regulation for air transport, unilateral and/or regional approaches can serve as a trigger for international or global discussions and regulations. Particularly with regards to climate change, this example could play an important role in the near future, when the EU will apply its ETS unilaterally to international air and potentially even sea transport.

78. While the focus in the past has often been on security of international transport in multilateral fora and instruments, a growing shift can be identified. States are moving towards addressing the environmental challenges posed by increased international transport. Two international organizations, in particular – the ICAO and the IMO – have been tasked with a strong role to address climate change and other environmental challenges arising from international transport. Further more detailed legal research is needed to identify existing rules that might require changes, and to analyse the potential for new rules and environmental instruments that could be likely to be adopted in these international regimes.

79. This paper mentions only a few opportunities below the level of international laws. However, on a practical level, it should be noted that many further innovative instruments have potential as well. For instance, industry self-regulation and business associations have enormous potential to encourage and test new ways to address environmental impacts from increased international transport.

80. Although international regimes on occasion act as constraints on governments’ abilities to regulate activity that is harmful to the environment, the international law provides many opportunities to adopt new instruments to regulate environmental impacts from increased international transport. Indeed, the global environment is waiting for international law to fill the gap that will be left by the Kyoto Protocol’s effective end in 2012, and the December 2009 Copenhagen Meeting of the Parties will prove decisive in this regard.
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