



Air Pollution Prevention and Exhaust Gas Cleaning Systems

Legal analysis on exhaust gas cleaning systems as an alternative compliance mechanism under MARPOL Annex VI from an air quality impact perspective | July 2024

Executive Summary

This document sets out legal analysis on the use of exhaust gas cleaning systems as an alternative compliance mechanism under MARPOL Annex VI from an air quality impact perspective.

This document was ultimately submitted to the International Maritime Organization for MEPC82 through FOEI, WWF, CSC, and Pacific Environment.

Introduction

1. Regulation 4 of MARPOL Annex VI allows for the use of alternative compliance methods for meeting the emissions requirements set out in that Annex, provided that the requisite criteria are met. In the past decade, Regulation 4 has been interpreted to justify fitting ships with Exhaust Gas Cleaning Systems ("**scrubbers**") as an alternative to using low-sulphur fuels.
2. This submission outlines that scrubbers should not be regarded as an alternative compliance method under Regulation 4 of MARPOL Annex VI, considering the total amount of air pollution, including particulate matter ("**PM**"), that scrubbers produce, as well as the adverse effects that scrubbers have on the environment, human health, property and resources.

Factual background

3. Sulphur oxides ("**SO_x**") and PM emissions vary with fuel sulphur content, as the sulphur in the fuel is converted to SO_x and PM upon combustion. SO_x and PM emissions are therefore reduced when a ship is operating on lower sulphur fuels.¹

¹ Jasper Faber and others, *Fourth IMO Greenhouse Gas Study* (International Maritime Organization 2020), 74–75, 278.

4. The use of scrubbers reduces SO_x emissions from a ship's exhaust gas, and intends to enable ships to use heavy fuel oil ("HFO") instead of more expensive low-sulphur fuels such as marine gas oil ("MGO"). Scrubbers may also be used in conjunction with very-low-sulphur fuel oil ("VLSFO") to comply with emission control areas ("ECAs"). However, PPR 9/INF.21 (Canada) found that PM, such as black carbon ("BC"), and carbon dioxide ("CO₂") emissions from ships using HFO with a scrubber are higher than those using MGO.
5. The increase in these emissions is of serious concern. The shipping-related emissions of PM (tiny harmful particles which form when fuel is burnt) amount to approximately 1.8 million tonnes annually.² The health impacts of fine PM are backed by ample scientific evidence and include lung cancer, cardiovascular disease, chronic obstructive pulmonary disease, asthma, and stroke, as outlined in MEPC 70/INF.34 (Finland).
6. The increase of CO₂ emissions linked to the use of scrubbers in ships is also worrying, given that the shipping industry is already a significant contributor to the climate crisis by being responsible for approximately 2.89% of global greenhouse gas emissions.³ The use of scrubbers can increase CO₂ emissions by enabling the continued use of the highest-emitting fuel, HFO, which appears to be contrary to the objectives of the 2023 IMO Strategy on Reduction of GHG Emissions from Ships which was adopted at MEPC 80, in July 2023.⁴
7. In addition, BC is the second largest contributor to shipping's climate impacts, representing 7% and 21% of CO₂-equivalent emissions on a 100-year and 20-year time frame, respectively.⁵ As well as being a significant driver of the climate crisis,⁶ BC also has significant adverse health impacts; it can penetrate deep into the lungs and is linked to cardiovascular diseases, strokes and cancer, and to acute respiratory infections in children.⁷
8. For water pollutants, PPR 9/INF.21 (Canada) found that while scrubber discharges usually comply with IMO guidelines, compliance does not guarantee that scrubber discharges are safe. The findings suggest that all scrubbers (open-loop, closed-loop, and hybrid) discharge water that is more acidic and turbid than the surrounding water. Additionally, scrubbers emit nitrates, polycyclic aromatic hydrocarbons, and heavy metals, all of which can negatively affect water quality and marine life. Amongst a multitude of submissions to the IMO detailing the serious impacts of scrubbers, MEPC 76/9/1 (ICES) outlined the risks to the marine environment posed by scrubber wastewater. PPR 11/7/3 (FOEI et al.) identified the impacts of scrubber wastewater on the health of coastal communities, and outlined concerning rates of non-compliance of scrubbers with fuel sulphur content requirements, resulting in higher levels of sulphur dioxide emissions.

² Tony R Walker and others, 'Environmental effects of marine transportation' in Charles Sheppard (ed), *World Seas: An Environmental Evaluation: Volume III – Ecological Issues and Environmental Impacts* (2nd edn, Academic Press 2019), 4.

³ Faber and others (n 1) 112.

⁴ Resolution MEPC.377(80).

⁵ Naya Olmer and others, *Greenhouse gas emissions from global shipping, 2013–2015* (International Clean Council on Transportation 2017), v.

⁶ TC Bond and others, 'Bounding the role of black carbon in the climate system: a scientific assessment' (2013) 118(11) *Journal of Geophysical Research: Atmospheres* 5380, 5413.

⁷ Xuping Song and others, 'Is short-term and long-term exposure to black carbon associated with cardiovascular and respiratory diseases? A systematic review and meta-analysis based on evidence reliability' (2022) 12(e049516) *BMJ Open* 1.

Legal Background

9. Regulation 14 of MARPOL Annex VI, *Sulphur oxides (SO_x) and particulate matter*, limits the sulphur content of fuel oil used or carried for use on board a ship at 0.50% m/m (paragraph 1) and at 0.10% m/m for fuel oil used on board while a ship is operating within an ECA (paragraph 4).
10. Given that the SO_x and PM emission controls under Regulation 14 of MARPOL Annex VI differentiate between those applicable inside ECAs, which are established to limit emissions of SO_x and PM, and those applicable outside such areas, it is useful to recall the definition of an ECA under Regulation 2 paragraph 1.13 (emphasis added):

Emission control area means an area where the adoption of special mandatory measures for emissions from ships is required to prevent, reduce and control air pollution from NO_x or SO_x and particulate matter or all three types of emissions and their attendant adverse impacts on human health and the environment. Emission control areas shall include those listed in, or designated under, regulations 13 and 14 of this Annex.

11. Regulation 14, paragraph 3 refers to Appendix III of MARPOL Annex VI for the criteria and procedures with respect to proposals for the designation of an ECA. Appendix III, paragraph 1.2 highlights the adverse health and environmental impacts from Nitrogen oxides ("NO_x"), SO_x and PM emissions as a rationale for an ECA, stating:

Emissions of NO_x, SO_x and particulate matter from ocean-going ships contribute to ambient concentrations of air pollution in cities and coastal areas around the world. Adverse public health and environmental effects associated with air pollution include premature mortality, cardiopulmonary disease, lung cancer, chronic respiratory ailments, acidification and eutrophication.

12. To this end, Appendix III, paragraph 1.3 states:

An emission control area should be considered for adoption by the Organization if supported by a demonstrated need to prevent, reduce and control emissions of NO_x or SO_x and particulate matter or all three types of emissions (hereinafter emissions) from ships.

13. There are other means by which equivalent levels of SO_x and PM emission controls under Regulation 14 of MARPOL Annex VI can be achieved. Regulation 4 of MARPOL Annex VI, *Equivalents*, allows ships to continue to use high sulphur content fuel oil, provided that the ship is fitted with or uses alternative compliance mechanisms that are at least as effective in terms of emission reductions as those required by MARPOL Annex VI, stating (emphasis added):

1. The Administration of a Party may allow any fitting, material, appliance or apparatus to be fitted in a ship or other procedures, alternative fuel oils, or compliance methods used as an alternative to those required by this Annex if such fitting, material, appliance or apparatus or other procedures, alternative fuel oils, or compliance methods are at least as effective in terms of emissions reductions as those required by this Annex, including any of the standards set forth in regulations 13 and 14.

2. The Administration of a Party that allows a fitting, material, appliance or apparatus or other procedures, alternative fuel oils, or compliance methods used as an alternative to those required by this Annex shall communicate to the Organization for circulation to the Parties particulars thereof, for their information and appropriate action, if any.

3. The Administration of a Party should take into account any relevant guidelines developed by the Organization pertaining to the equivalents provided for in this regulation.

4. The Administration of a Party that allows the use of an equivalent as set forth in paragraph 1 of this regulation shall endeavour not to impair or damage its environment, human health, property or resources or those of other States.

14. Despite not being expressly mentioned in Regulation 4 of MARPOL Annex VI, the fitting of scrubbers onboard ships has been understood by Administrations to be an alternative method for complying with the fuel sulphur content limits to control SO_x emissions. To assist with the implementation of MARPOL Annex VI, MEPC has adopted a number of guidelines for the use of scrubbers, the most relevant one in the present context being Resolution MEPC.340(77) on *2021 Guidelines for exhaust gas cleaning systems* ("**2021 EGCS Guidelines**").

Analysis

15. Article 31 of the Vienna Convention on the Law of Treaties ("**VCLT**") sets out the general principles of interpretation applicable to treaties. It sets out that treaties must be interpreted 'in good faith in accordance with the ordinary meaning to be given to the terms of the treaty in their context and in the light of its object and purpose'. The context for the purpose of the interpretation of a treaty shall comprise, in addition to the text, including its preamble and annexes, 'any agreement relating to the treaty which was made between all the parties in connection with the conclusion of the treaty', as well as:

(a) any subsequent agreement between the parties regarding the interpretation of the treaty or the application of its provisions;

(b) any subsequent practice in the application of the treaty which establishes the agreement of the parties regarding its interpretation;

(c) any relevant rules of international law applicable in the relations between the parties.

Ordinary meaning of the terms

16. As is apparent from the wording of the title, Regulation 14 of MARPOL Annex VI is intended to impose SO_x and PM emission controls. This is also apparent in the way that Regulation 2, paragraph 1.13 of MARPOL Annex VI defines an ECA, which is designated with the aim to prevent, reduce and control air pollution from NO_x (through Regulation 13) or from SO_x and PM (through Regulation 14) or all three types of emissions as well as associated adverse human health and environmental impacts.

17. Alternative compliance mechanisms in Regulation 4 of MARPOL Annex VI have to be 'at least as effective in terms of emission reductions' (emphasis added) as those required by MARPOL Annex VI including the standards set forth in Regulations 13 and 14 of MARPOL Annex VI. This wording in connection with the terms used in Regulation 14 make it apparent that the limitations of the fuel sulphur content of 0.50% m/m outside an ECA and 0.10% m/m within an ECA are set in place to impose controls on both emissions of SO_x and PM emissions.

18. However, as outlined in paragraph 4, scrubbers may not be equivalent to using lower sulphur fuels (such as MGO), when considering the total air pollution, including the emission of PM.

In light of the object and purpose

19. The object and purpose of MARPOL Annex VI is to prevent air pollution from ships, including NO_x, SO_x and PM. The limits imposed by Regulation 14 of MARPOL Annex VI are intended to realise positive effects for human health and the environment. This is because limiting fuel sulphur content ultimately reduces a ship's SO_x and PM emissions.
20. This rationale is reinforced by Appendix III, paragraph 1.2 which outlines that NO_x, SO_x and PM emissions from ships contribute to air pollution in cities and coastal areas, which causes adverse public health and environmental effects. These include premature mortality, cardiopulmonary disease, lung cancer, chronic respiratory ailments, acidification and eutrophication.
21. It is for that reason that the approval of equivalent compliance mechanisms is balanced by Regulation 4, paragraph 4 of MARPOL Annex VI, which states that 'the Administration of a Party that allows the use of an equivalent as set forth in paragraph 1 of this regulation shall endeavour not to impair or damage its environment, human health, property, or resources, or those of other States.'
22. However, the use of scrubbers with HFO increases the emissions of PM compared to the use of MGO. This means that while one type of air pollution (SO_x emissions) is addressed by the use of scrubbers (although noting the concerning levels of non-compliance, see paragraph 8), other types of air pollution (PM, including BC, and CO₂ emissions) are increased. This outcome goes against the very objective of MARPOL Annex VI.

Subsequent agreement regarding interpretation

23. The 2021 EGCS Guidelines are non-binding and recommendatory in nature. Thus, they cannot be considered a subsequent agreement as to the interpretation or application of MARPOL Annex VI, as they are intended to operationalise MARPOL Annex VI.

Subsequent practice of the Parties

24. MEPC 81/INF.36 (FOEI et al.) has identified 93 measures that have been implemented in 45 countries, with 86% of these measures being bans (prohibition on any washwater discharges or bleed-off water from scrubbers) rather than more limited restrictions (scrubber use and discharge are allowed as certain criteria are met).
25. While there is no uniform State practice with regard to scrubber use, these findings suggest that States increasingly recognise the harmful effects of scrubbers and are taking steps to address this issue.

Relevant rules of international law

26. There is a strong general preference in international law for norms to be interpreted in a way which renders them compatible with one another. In other words, when several norms bear on a single issue, they should, to the extent possible, be interpreted so as to give rise to a single set of compatible obligations.⁸ This concept, known as systemic integration, is codified in Article 31(3)(c) VCLT (see paragraph 34).
27. In a similar vein, MEPC 81/5/4 (FOEI et al.) reflects on the importance of not interpreting Regulation 4 of MARPOL Annex VI in isolation of other regulations and obligations. MEPC 81/5/4 (FOEI et al.) recalls the duty of State Parties to MARPOL Annex VI to not impair or damage the environment, human health,

⁸ Study Group of the International Law Commission, 'Report on Fragmentation of International Law: Difficulties Arising from the Diversification and Expansion of International Law' (13 April 2006) A/CN.4/L.682, paragraph 4.

property or resources, and argues that scrubber discharge appears to be inconsistent with the obligations under the following treaties:

- i. The United Nations Convention on the Law of the Sea, citing MEPC 79/5/3 (FOEI et al.);
- ii. The Convention on Biological Diversity;
- iii. The United Nations Framework Convention on Climate Change; and
- iv. The United Nations Declaration on the Rights of Indigenous Peoples.

28. MEPC 81/5/4 (FOEI et al.) also refers to the precautionary principle in support for calls to ban or restrict scrubbers. The precautionary principle provides that the absence of adequate scientific information should not be used as a reason for postponing measures to prevent environmental degradation. The IMO has integrated the precautionary principle in its decision-making processes, for example through the adoption of:

- i. Resolution MEPC.67(37) on *Guidelines on incorporation of the precautionary approach*; and
- ii. Resolution MEPC.377(80) on *2023 IMO Strategy on Reduction of GHG Emissions from Ships*.

29. Further, the Special Rapporteur on the implications for human rights of the environmentally sound management and disposal of hazardous substances and wastes, Marcos Orellana, has highlighted the close connection between shipping and the environment and human beings. For example, air emissions from vessels adversely affect port cities and contribute to climate change. He outlined that shipping implicates a range of human rights and called on the IMO to embrace an explicit human rights-based approach to its work, with particular attention to persons and groups in vulnerable situations, such as workers and coastal communities.⁹ Crucially, this includes interpreting and implementing shipping-related legal instruments in accordance with international human rights law.¹⁰

30. Thus, in addition to the likely inconsistencies of scrubber approval with the obligations of States under international treaties (see paragraph 27) and the precautionary principle (see paragraph 28), this submission specifically recalls States' obligations to prevent exposures to toxics (including air pollution) under international human rights law (A/74/480), derived from (without limitation):

- i. The human right to life under Article 6 of the International Covenant on Civil and Political Rights;
- ii. The human right to the highest attainable standard of health under Article 12 of the International Covenant on Economic, Social and Cultural Rights; and
- iii. The human right to a clean, healthy and sustainable environment as enshrined in resolutions from the Human Rights Council in 2021 (A/HRC/RES/48/13) and the General Assembly in 2022 (A/RES/76/300).

31. The human right to life concerns the entitlement of individuals to be free from acts and omissions that are intended or may be expected to cause their unnatural or premature death, as well as to enjoy a life with dignity.¹¹ The Human Rights Committee has recognised that environmental pollution threatens the right to life, and in particular, the right to a life with dignity.¹²

32. The rights to life and a life with dignity are inseparable from the right to the highest attainable standard of health, which imposes on States the obligation to prevent exposure. The right to the prevention of

⁹ Marcos Orellana, 'Visit to the International Maritime Organization' (14 July 2023) A/HRC/54/25/Add.2.

¹⁰ *ibid* paragraph 102(b); see also Marcos Orellana, 'Shipping, toxics and human rights' (13 July 2023) A/78/169, paragraph 107.

¹¹ Human Rights Committee, 'General comment No. 36 on article 6: right to life' (3 September 2019) CCPR/C/GC/36, paragraph 3.

¹² *ibid* paragraph 62; Human Rights Committee, *Cáceres et al. v. Paraguay* (20 September 2019) CCPR/C/126/D/2751/2016, paragraphs 7.3 and 7.5.

diseases is a cornerstone of the right to health.¹³ Accordingly, the right to health requires the prevention and reduction of exposure to hazardous substances.¹⁴

33. Ultimately, the rights to life, health, and a life with dignity, among others, require that States prevent exposure to toxic and otherwise hazardous substances and wastes. This requires every State to have in place comprehensive laws and effective enforcement mechanisms to prevent exposure to all forms of pollution, toxic chemicals and other hazardous substances that can be a reasonably foreseeable threat to the health, life, and dignity of the individual, including exposure caused by private actors.¹⁵
34. According to the principle of systemic integration under article 31(3)(c) VCLT and bolstered by the call of the Special Rapporteur to interpret shipping-related legal instruments in the light of international human rights treaties, these provisions are of particular importance for the interpretation of Regulation 4 paragraph 4 of MARPOL Annex VI, which puts the use of equivalence mechanisms under the condition to 'not impair or damage [the] environment, human health, property or resources [...]'.¹⁶
35. This means that the approval of scrubbers as an equivalent compliance method is likely to raise inconsistencies with international human rights law (amongst other sources of international law, as outlined in paragraphs 27–28). Moreover, the co-sponsors conclude from this that scrubbers cannot be considered equivalent compliance mechanisms as they likely do not appear to meet the requirements of Regulation 4 paragraph 4 of MARPOL Annex VI.

Recommendations

36. On the basis of the information presented, the co-sponsors are of the view that the use of scrubbers should not be considered an equivalent compliance mechanism for Regulation 14 of MARPOL Annex VI, and urge the Committee to:
 1. Consider whether the use of scrubbers as an equivalent to low sulphur fuels is aligned with requirements outlined in Regulation 4 of MARPOL Annex VI;
 2. Amend MARPOL Annex VI Regulation 4 to explicitly prohibit the use of scrubbers as a means of alternative compliance, thereby removing practices under MARPOL which are inconsistent with the obligations of IMO Member States under international treaty law, including human rights law; and
 3. Until a global ban is introduced, encourage national maritime administrations to ban the discharge of scrubber waste within their jurisdictional waters and to stop approving scrubbers as an alternative compliance method for ships registered under their flags.

Action requested of the Committee

37. The Committee is invited to take note of the information provided in paragraphs 1 to 35, to consider the recommendations contained in paragraph 36, and to take action as appropriate.

¹³ Committee on Economic, Social and Cultural Rights, 'General Comment No. 14 (2000): The right to the highest attainable standard of health (article 12 of the International Covenant on Economic, Social and Cultural Rights)' (11 August 2000) E/C.12/2000/4, paragraph 16.

¹⁴ *ibid* paragraph 15.

¹⁵ Baskut Tuncak, 'Report on States' duty to prevent exposure' (7 October 2019) A/74/480, paragraph 17.

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www.opportunitygreen.org

Further information

Isabela Keuschnigg

Legal Officer

Opportunity Green

isabela@opportunitygreen.org

Kirsty Mitchell

Legal Manager

Opportunity Green

kirsty@opportunitygreen.org

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