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AIR POLLUTION PREVENTION

Regulating Black Carbon emissions from international shipping impacting the Arctic

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SUMMARY

Executive summary: This document sets out suggestions for regulation to deliver "fast and immediate" action on Black Carbon (BC) emissions via a fuel switch, followed by stricter emission cuts via a polar fuel standard and designation of BC emission control areas (ECAs) as a stepped approach.

Strategic direction, if applicable: 3

Output: 3.3

Action to be taken: Paragraph 11

Related documents: A 33/8(a)/Add.1; MEPC 64/5/22; MEPC 80/9/1, MEPC 80/9/2; PPR 10/18; PPR 11/INF.7 and PPR 11/INF.10

Background

1 In strategic direction 3 of the *Strategic Plan for the Organization for the six-year period 2024 to 2029* on responding to climate change and reducing greenhouse gas emissions from international shipping, IMO commits to taking concrete actions that ensure that the sector bears its fair share of responsibility. Output 3.3 on reducing the impact on the Arctic of emissions of Black Carbon (BC) from international shipping is now scheduled for completion in 2025. In July 2011, MEPC 62 established a work plan to "investigate appropriate control measures to reduce the impact of BC emissions from international shipping and submit a final report to MEPC 65, where the Committee should agree on the appropriate action(s)" (MEPC 62/24, paragraph 4.20). In the intervening years, emissions of BC from ships operating in and near to the Arctic have more than doubled¹. At the same

¹ Osipova, L, Black carbon emissions from Arctic shipping: A Review of Main Emitters and Time Trends, International Council on Clean Transportation (2023) (https://cleanarctic.org/wp-content/uploads/2023/04/BC_in_Arctic_prePPR10.pdf).

time, other sectors responsible for BC emissions impacting the Arctic have actively introduced measures to reduce BC emissions and are on track to achieve reductions of 25 to 33% by 2025² based on 2013 baselines.

2 Following the release of the Intergovernmental Panel on Climate Change (IPCC) Special Report on Global Warming of 1.5°C in 2018, the UN Environment Programme reiterated that "fast and immediate action on short-lived climate pollutants can avoid a half a degree of warming by 2050" and such action "will also avoid over 50% of the predicted warming in the Arctic by 2050, thereby significantly decreasing the chances of triggering dangerous climate tipping points..."³. The urgent need to reduce highly potent short-lived pollutants including BC was considered the best chance to avoid runaway warming and must go "hand-in-hand with deep and persistent cuts in long-lived greenhouse gases".⁴

3 To support efforts towards completion of this output by 2025, this document proposes the text of a regulation in MARPOL Annex VI to deliver "fast and immediate" action on BC emissions via a fuel switch, followed by stricter stepped emission cuts through a polar fuel standard and BC emission control areas (ECAs) (see paragraphs 6 to 8 and the annex).

Need for immediate action

4 The UN now recognizes that globally we are on course for nearly 3°C of warming by the end of the century⁵. There is a clear and present climate crisis in the Arctic, which is warming at four times faster than the global average⁶. Despite 13 years of debate on Arctic ship BC issues, the shipping sector not only continues to emit a potent, short-lived climate forcer in an unregulated manner in and near to the very region where the most damage occurs, but emissions are increasing. This is in direct contradiction to the rapid, deep and sustained mitigation measures that the IPCC stresses are needed this decade⁷.

A stepped approach to regulating BC emissions impacting the Arctic

5 In 2022, the PPR Correspondence Group reduced a long list of potential BC control measures to those that could be applied to existing ships immediately, including a switch to distillate fuels and emission control areas, and longer-term measures such as a fuel standard or engine certification. PPR 10 invited Member States and international organizations to work intersessionally on proposals and submit them to PPR 11 (PPR 10/18, paragraph 6.33).

² Arctic Council (2019). Expert Group on Black Carbon and Methane - Summary of Progress and Recommendations 2019. 88 pp (<https://oaarchive.arctic-council.org/server/api/core/bitstreams/50c0522a-5755-469b-9154-ccbfc88d5de/content>)

³ United Nations Environment Programme, *Keeping warming to 1.5°C impossible without reducing Short-lived Climate Pollutants* (2018) (<https://www.unep.org/news-and-stories/press-release/keeping-warming-15c-impossible-without-reducing-short-lived-climate>).

⁴ United Nations Environment Programme, *Broken Record, Temperatures hit new highs, yet world fails to cut emissions (again)* (<https://www.unep.org/resources/emissions-gap-report-2023>).

⁵ United Nations Environment Programme, *Emissions Gap Report 2023* (2023) (<https://www.unep.org/resources/emissions-gap-report-2023>).

⁶ Rantanen, M. et al. The Arctic has warmed nearly four times faster than the globe since 1979. *Commun Earth Environ* 3, 168 (2022) (<https://doi.org/10.1038/s43247-022-00498-3>).

⁷ Intergovernmental Panel on Climate Change, *Sixth Assessment Report* (2021) (<https://www.ipcc.ch/assessment-report/ar6/>).

First step - a mandatory switch to distillate fuels

6 A fuel switch, first proposed in 2013 in an IMO study sponsored by Transport Canada (BLG 17/INF.7) has featured throughout subsequent discussions. Resolution MEPC.342(77) makes clear that it is the simplest and quickest way to reduce BC emissions in or near the Arctic. While confirming that BC emissions vary considerably according to engine power, document PPR 11/INF.10 (EUROMOT) cites test results that show a fuel switch would on average cut BC by 41% for two stroke engines and about 31% for four stroke engines. Installing diesel particulate filters (DPFs) would see ship BC cut by as much as 99%. Document PPR 11/INF.6/Rev.1 (RINA) suggests a fuel switch would cut annual BC emissions by 65% over a 2022 baseline.

Second step - a polar fuel standard

7 A polar fuel standard established to reduce BC emissions via an amendment to MARPOL Annex VI would require all ships to only use fuels complying with an aromatic fuel standard. This would preferably be based on the hydrogen/carbon (H/C) ratio, which could be required to be stated on the Bunker Delivery Note (BDN) when operating in a defined Arctic region. Establishing a polar fuel standard would require fuel testing to ascertain the H/C ratio of marine fuels. Over time the H/C ratio minimum could be tightened.

Third step - BC emission control areas

8 A BC emission control area (BC ECA) would also require compliance with a fuel H/C ratio, potentially more stringent than a polar fuel standard if preferred by coastal States, or complementary to it in order to cut BC emissions further south. Such a regulation could also combine both the required 0.10% m/m (1,000 ppm) sulphur limits and the H/C threshold.

Geographic scope of Arctic ship BC measures.

9 Steps 1 (mandatory fuel switch) and 2 (polar fuel standard) require a geographic scope to be defined. In document MEPC 65/4/22 (Norway), the Arctic Council's Arctic Monitoring and Assessment Programme (AMAP) highlighted the significance of close-to and within Arctic sources of BC, concluding that BC emissions above 60°North were more significant than those at lower latitudes and mitigating measures should recognize this. AMAP defined the Arctic as all regions north of 60°North. Document MEPC 80/9/2 (FOEI et al.) proposed that at a minimum the geographic scope of measures should cover the maritime waters of the Arctic Human Development Report (AHDR) area or those defined by AMAP. Alternatively, all waters above 60°North (excluding the Baltic Sea) could be simpler for navigational purposes.

Comprehensive test for a fuel standard

10 The polar fuel standard and BC ECA proposals – but not the fuel switch – are based on setting a fuel standard that will lead to reductions in emitted BC, albeit varying according to ship and engine type, age and operating conditions. The standard, which all fuels will need to comply with, will limit the aromaticity of the regulated fuel by setting a minimum H/C ratio as measured by an H/C fuel test undertaken by fuel suppliers and incorporated in the BDN. Whether the H/C minimum would be the same for both the fuel standard and BC ECAs would be a point for discussion and would be dependent on whether BC ECAs would set stricter requirements for BC emissions in or near to the Arctic or aim to reduce BC emissions from further afield. The appropriate fuel test to measure the H/C content of marine fuels would need to be agreed upon and a testing regime undertaken to ascertain the paraffinic/aromatic levels of different fuel samples. Data on trends and variances could then be generated to enable agreement on appropriate limits.

Action requested of the Committee

11 The Committee is invited to urgently agree on the need for mandatory measures to achieve the fast and immediate action to reduce BC emissions called for by the IPCC and to consider the approach set out in the annex.

ANNEX

OVERVIEW OF PROPOSED AMENDMENTS TO MARPOL ANNEX VI

Amend MARPOL Annex VI to require ships to use marine distillate fuel or other cleaner, alternative fuels or methods of propulsion, require ships to comply with an aromatic fuel standard, and designate a Black Carbon emission control standard. The language of a mandatory measure should include:

- .1 definitions of "Arctic", "Black Carbon", and "Marine Distillate Fuel", in MARPOL Annex VI, chapter 1 (General), regulation 2 (Definitions);
- .2 a new paragraph in MARPOL Annex VI, chapter 3 (Requirements for Control of Emissions from Ships) addressing special requirements for ships operating in the Arctic to contain the substance of the requirement for ships to use marine distillate fuel or other cleaner alternative fuels or methods of propulsion that are safe for ships and contribute to the reduction of Black Carbon emissions when operating in or near the Arctic;
- .3 a new section in MARPOL Annex VI, chapter 3 (Requirements for Control of Emissions from Ships) related to Black Carbon, which sets forth an aromatic fuel standard for ships operating in or near the Arctic;
- .4 a new regulation in MARPOL Annex VI, chapter 3 (Requirements for Control of Emissions from Ships) setting forth the criteria and procedures for Member States and the Organization to designate Black Carbon Emission Control Areas based on the aromatic content or H/C ratio of fuel; and
- .5 renumeration of the regulations in MARPOL Annex VI to account for the amendments outlined.

While "Black Carbon" has already been defined by the Committee, and "Marine Distillate Fuel" is described in ISO 8217:2017, the development of an appropriate definition of "Arctic" for MARPOL Annex VI will be essential to the effective delivery of IMO's output to address the impact of Black Carbon emissions from ships in the Arctic.

Example A: Draft amendment to MARPOL ANNEX VI for an Arctic mandatory switch to distillate (Arctic Fuel Standard)

1 Chapter 1 and 3 of MARPOL Annex VI are amended as follows:

"Chapter 1 – General

Regulation 2 – Definitions

1 For the purpose of this Annex:

- .4 *Arctic* means the geographical area including all of Alaska, Canada North of 60°N, together with northern Quebec and Labrador, all of Greenland, the Faroe Islands, and Iceland, and the northernmost counties of Norway, Sweden and Finland, and in Russia the Murmansk Oblast, the Nenets, Yamalo-Nenets, Taimyr, and Chukotka autonomus okrugs, Vorkuta City in the Komi Republic, Norilsk and Igrska in Krasnoyarsky Kray, and those parts of the Sakha Republic whose boundaries lie closest to the Arctic Circle.

- .9 *Black Carbon*, means Black Carbon as defined by Bond et. al., Bounding the role of black carbon in the climate system: A scientific assessment (2013)
- .24 *Marine Distillate Fuel* means fuel as described in ISO 8217:2017, or any other comparable ISO standard that sets forth specifications for marine distillate fuel.

Chapter 3 – Requirements for Control of Emissions from Ships

Regulation 15bis (new Regulation 16) – Black Carbon

Special Requirements for Ships Operating in the Arctic

1 Marine distillate fuel or other alternative fuels or methods of propulsion that are safe for ships and contribute to the reduction of Black Carbon emissions shall be used by all ships operating in the Arctic on or after _____."

Example B: Draft amendment to MARPOL ANNEX VI for an Arctic Aromatic Fuel Standard

1 Chapter 1 and 3 of MARPOL Annex VI are amended as follows:

"Chapter 1 – General

Regulation 2 - Definitions

1 For the purpose of this Annex see definition of Arctic and Black Carbon from Example A.

Chapter 3 – Requirements for Control of Emissions from Ships

Regulation 15bis (new Regulation 16) – Black Carbon

1 All ships operating in the Arctic on or after _____ shall use fuel with an aromatic content that does not exceed _____ [or shall use fuel with an H/C ratio not less than _____]. "

Example C: Draft amendments to MARPOL ANNEX VI for a Black Carbon Emission Control Area based on aromatic content or H/C ratio

1 Chapter 1 and 3 of MARPOL Annex VI are amended as follows:

"Chapter 1 – General

Regulation 2 – Definitions

1 For the purpose of this Annex see definition of Black Carbon from Example A.

Chapter 3 – Requirements for Control of Emissions from Ships

Regulation 15bis (new Regulation 16) – Black Carbon

Requirements within Emission Control Areas

1 For the purpose of this regulation, emission control areas shall include any other sea area, including any port area, designated by the Organization in accordance with the criteria and procedures set forth in appendix X to this Annex.

2 While a ship is operating within an emission control area, the aromatic content of the fuel shall not exceed _____ [or the H/C ratio of the fuel] shall not be less than _____.

3 The aromatic content [or H/C ratio] of fuel referred to in paragraph 2 of this regulation shall be documented by its supplier as required by regulation 18 (new regulation 19) of this Annex.

4 Those ships using separate fuel oils to comply with paragraph 2 of this regulation and entering or leaving an emission control area set forth in paragraph 1 of this regulation shall carry a written procedure showing how the fuel oil changeover is to be done, allowing sufficient time for the fuel oil service system to be fully flushed of all fuel oils exceeding the applicable aromatic fuel standard [or H/C ratio] specified in paragraph 2 of this regulation prior to entry into an emission control area. The volume of non-compliant fuel in each tank as well as the date, time, and position of the ship when any fuel changeover operation is completed prior to the entry into an emission control area or commenced after exit from such an area shall be recorded in such logbook or electronic record book as prescribed by the Administration."

Appendix X

Criteria and procedures for the designation of emission control areas

[To be elaborated]
