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AIR POLLUTION PREVENTION

Regulating Black Carbon emissions from international shipping impacting the Arctic

Submitted by FOEI, WWF, Pacific Environment and CSC

SUMMARY

Executive summary:	This submission develops the concept of "polar fuels" discussed at PPR 11. It seeks to set out the fuel characteristics that would distinguish polar fuels from residual fuels and thus lead to fuel-based reductions in ship Black Carbon (BC) emissions if mandated for use in an near the Arctic. It also proposes the drafting of a regulation for inclusion in MARPOL Annex VI. It supersedes the options set out by the co-sponsors in documents MEPC 81/5/5 and MEPC 81/5/8.
Strategic direction, if applicable:	3
Output:	3.3
Action to be taken:	Paragraph 19
Related documents:	MEPC 82/1/1; MEPC 81/5/5, MEPC 81/5/8; PPR 11/18, PPR 11/18, PPR 11/6/2 and PPR 10/10/1.

Introduction

1 In documents MEPC 81/5/5 and MEPC 81/5/8 (FOEI et al.) the co-sponsors outlined options for Member States to take mandatory action to address the impacts of Black Carbon (BC) emissions from international shipping on the Arctic by addressing fuel quality.

* This document was reissued on 23 August 2024 with the following corrections:

.1 the words "in or near to the Arctic" in the executive summary have been replaced by the words "in and near the Arctic";

.2 the words "in and near to the Arctic" in paragraphs 4 and 16 have been replaced by the words "in and near the Arctic";

.3 in paragraph 14, "document PPR 11/6/2 (United States)" has been replaced by "document PPR 11/6/2 (ISO)"; and

.4 the words "in or near Arctic waters" in paragraph 15 have been replaced by the words "in and near the Arctic".

These documents were submitted in January 2024 ahead of PPR 11 and have been held over for discussion at MEPC 82. This document builds on the substantive discussions held on these issues at PPR 11 and proposes further action through the introduction in MARPOL Annex VI of a fuel-based regulation which recognizes Distillate Marine Fuels (DMA) and DMZ as suitable "polar fuels" to effectively reduce the impact of shipping BC emissions on the Arctic for further consideration at MEPC 82.

2 In terms of possible action and feasible measures, this submission supersedes the options set out in MEPC 81/5/5 and MEPC 81/5/8. However, these documents contain considerable background information supporting this submission on the worsening climate crisis in the Arctic and how immediate action on shipping BC emissions is feasible.

Output 3.3 on Reduction of the impact on the Arctic of emissions of Black Carbon from international shipping

3 Output 3.3 is expected to result in a reduction of the impact on the Arctic of emissions of BC from international shipping and the work is due to be completed in 2025.

4 Document MEPC 82/1/1 proposes that under this agenda item, the Committee consider with a view to adoption the draft guidance on Arctic ship BC recommendatory goal-based best practice measures and BC emissions measurement, monitoring and reporting as well as the associated draft MEPC resolutions set out in PPR 11/18 paragraphs 6.27 and 6.29. The monitoring and reporting guidelines would apply to ships with marine diesel engines having a power output of more than 130 kw and include those fitted with exhaust gas treatment systems or operating on "other cleaner alternative fuels". These are calls for the voluntary implementation of operational guidelines and, as with the implementation of resolution MEPC.342(77) urging the voluntary use of distillate or other cleaner alternative fuels or methods of propulsion in and near the Arctic, it remains to be seen how many ships will implement them in the coming years.

5 International Council on Clean Transportation (ICCT) data demonstrates that 8,577 ships operated above 58.95°N in 2021 and emitted 1.5kt of BC. Almost half of these ships were over 5,000 gross tonnage (GT), and included oil and chemical tankers, ro-ro, ferry ro-pax and general cargo, offshore and service vessels, cruise ships, bulk and refrigerated bulk, and containerships. Usable conclusions from measurement results will inevitably take time to become widely available – ships need to develop an implementation plan based on an inventory of their onboard BC emissions sources, gather sufficient measurement data to be able to set individual targets, adopt measures to meet those targets, and report progress and any conclusions. IMO and Member States would then need to collate such information from various sources and draw conclusions as to the overall effectiveness of these proposals.

6 PPR 11/18 also requests the Committee to approve other outcomes on this issue including an invitation for ISO to consider the development of a polar fuel standard, which may include the hydrogen/carbon (H/C) ratio (paragraph 6.30), as well as for interested Member States and international organizations to conduct further research on fuel characteristics which might impact BC formation including the H/C ratio or other indicators and submit them to a future session (paragraph 6.31).

Polar fuels

7 During the discussion of fuel quality issues during the PPR 11 Working Group on Prevention of Air Pollution from Ships (see PPR 11/18) when considering the impact of BC emissions on the Arctic, it was observed that the distillate-grade marine fuels DMA and DMZ, which are covered by ISO standards, are already available. If used by ships operating in and near the Arctic these fuels will reduce ship BC emissions in the Arctic and thus could be referred to as "polar fuels". This reflected a widespread understanding of the fuel quality benefits of distillates as more refined and therefore "cleaner". They have long been mandated by States for use in road transport, both to enhance ignition and combustion performance and to enable additional abatement technology such as particle filters. Marine fuel characteristics are far more varied than those used in the road and aviation sectors, as indeed is the range of marine diesel engines in current use. Cleaner marine fuels such as "bright and clear" distillates (ISO 8217 terminology) are more paraffinic.

8 ISO 8217 lists seven marine distillate fuels – DMX, DMA, DMB, DMZ, DFA, DFB, DFZ (see ISO 8217, table 1). DMZ is basically the same fuel as DMA but with a slightly higher minimum viscosity requirement. It was developed in response to a special situation – the 2009 California Air Resources Board (CARB) requirement mandating 0.1% sulphur distillate fuel when entering the port of California. Operational problems were encountered when switching to the compliant fuel DMA as it proved to be too thin, fuel pumps started to leak. Hence DMZ was created but it is not in high demand. With respect to other marine distillate fuels, DMX is only sold in small quantities/drums for emergency use (e.g. for lifeboats and with a flashpoint of 43°C) and does not comply with SOLAS. Both DMB and DFB are classed as possibly having "trace" residual (i.e. line flushings) and are excluded because, unlike DMA and DMZ, they are not subject to the maximum 0.1% by mass ash and 0.3% micro-carbon residue limits in ISO 8217, table 1 which are deemed as acceptable limits on residual trace. DFA and DFZ could also be suitable to reduce BC emissions but being biodiesel blends belong to the category of future lower carbon fuels referenced below.

Definition of polar fuel oils

9 A move to require the use of DMA and DMZ as "polar fuels" in and near the Arctic, would mean that they would have to be defined in an IMO measure within MARPOL Annex VI, given that MARPOL does not currently define "distillate" or any other similar term such as "gas oil" or "diesel oil".

10 ISO 8217 sets out industry fuel quality specifications for both marine residual and distillate fuels. These are industry recommendations and not regulatory requirements. The sulphur monitoring guidelines (resolution MEPC.326(75)) distinguish between "distillate fuel" and "residual fuel" citing ISO 8217 provisions on viscosity. "Distillate fuel" being ≤ 11.00 cSt at 40°C and "residual fuel" > 11.00 cSt at 40°C (which equates to 8.3 cSt at 50°C – the temperature usually used to categorise such fuels). This was done because MEPC extended the sulphur monitoring to also include "distillate fuels" from 2011 onwards. The 11.00 cSt at 0°C maximum limit for distillates was first included in the updated sulphur monitoring resolution MEPC.192(61) in 2010 following publication of ISO 8217:2010 which had also recategorized DMC as residual fuel. It was previously listed as a distillate with some "residual" (up to 10 to 15%).

11 Since ISO 8217:2010, the highest viscosity for distillates has been set at 11.00 cSt at 40°C. ISO 8217, in all its versions, has also set the maximum density for distillates at 900 kg/m^3 at 15°C to distinguish distillate fuels from residual fuels. ISO 8217 sets a density limit for the various residual fuels at 15°C between 955 and 1,010 kg/m^3 (see ISO 8217, table 2). This leads to a suitable definition of DMA and DMZ as "polar fuels" as being "a marine

distillate fuel not exceeding a viscosity of 11.00 cSt at 40°C; a density of 900 kg/m^3 at 15°C"; and a maximum micro carbon residue of 0.3% mass". Perhaps with the addition of and reflecting the wording in IMO's sulphur testing guidelines, "as tested in accordance with standards acceptable to the Organization".

12 Norway and Iceland have identified fuels with high pour points developed in response to the 2020 global limit on marine fuel sulphur content, as potentially creating clean-up problems in the event of a spill in Arctic waters (see documents PPR 10/10/1 (Norway) and MEPC 78/14/1 (Iceland and Norway)). PPR 10/10/1 identifies that the problem posed by post-2020 high pour point fuels is due to their different composition resulting in a different behaviour as compared to heavy fuel oils and suggests that defining "polar fuel oils" that are acceptable to use or carry as fuels in Arctic waters could be an alternative to defining oils that are prohibited to use or carry as fuels.

13 During the PPR 11 Working Group on Prevention of Air Pollution from Ships, there was also mention that a move to "define" polar fuels as DMA/DMZ to address BC emissions could also be a solution to concerns around the pour point of post-2020 low sulphur fuels and that "a holistic approach also considering the cold water properties of the fuel should be further explored" (PPR 11/18).

Polar fuel standard

14 Document PPR 11/6/2 (ISO) argued that the Viscosity Gravity Constant (VGC) is a good indicator of aromaticity in residual fuels. The document discounted the use of H/C ratio as there is very little H/C ratio test data on which to justify setting a reference value to indicate whether any marine fuel was more aromatic or paraffinic, while also noting that there was no operational or regulatory need to measure the carbon and hydrogen content of marine fuels. In the absence of any regulatory, operational, or safety requirements, it was suggested that including the H/C ratio in ISO 8217 would not necessarily result in tests being carried out. An advantage of Member States agreeing on the concept of "polar fuels" and recognizing DMA and DMZ distillate marine fuels as "polar fuels" (and the exclusion of marine residual fuels) is that it would obviate the need for any such testing regime at the current time.

Reducing the impact on the Arctic of BC emissions from international shipping

15 This Committee has now spent over a decade considering a definition of BC, deciding how best to measure BC, adopting a resolution calling for Member States and ship operators to voluntarily use distillate or other cleaner alternative fuels or methods of propulsion. It is now set to agree to guidelines on recommendatory BC emission measurement, monitoring and reporting protocols, and provide guidance on best practice on recommendatory goal-based control measures to reduce the impact of BC emissions on the Arctic. During this time, emissions of BC from international shipping in and near the Arctic have more than doubled (MEPC 81/5/8). A mandatory fuel-based reduction in the impact of BC emissions from international shipping on the Arctic could be simply achieved via the introduction in MARPOL Annex VI of a regulation which recognises DMA and DMZ as suitable fuels for use in the polar regions and defines "polar fuels" by their conformity with provisions in ISO 8217, table 1. It would exclude any use of residual fuels and should specify that the fuel to be used in and near the Arctic be recorded in the Bunker Delivery Note (BDN). The introduction of such a new regulation in MARPOL Annex VI should not rule out the future use of biofuels or alternative low carbon fuels.

16 Future fuel testing work using H/C ratio or any other test approaches could then focus on any incremental benefits of further tightening of provisions affecting either fuels in use or potential new fuels. To proceed in this way, the Committee could request PPR 12 to consider

the inclusion of a regulation in MARPOL Annex VI requiring polar fuels be used in and near the Arctic and could invite ISO to confirm to PPR 12 how to define polar fuels such as DMA/DMZ, in a manner which did not include residual fuels.

Black Carbon Emission Control Area (ECA)

17 Consensus on a polar fuel regulation could be complemented by the development of a BC or polar fuel emission control area (ECA) provision. Such a provision could also require the use of polar fuels in areas beyond the Arctic but where emissions of BC from international shipping have the potential to reach the Arctic.

Next steps

18 The co-sponsors propose that Member States consider the development of a new regulation for inclusion in MARPOL Annex VI identifying suitable polar fuels, based on DMA/DMZ, to deliver an immediate fuel-based reduction in BC emissions from international shipping impacting the Arctic under Output 3.3. Furthermore, the co-sponsors propose that further consideration be given to an amendment having a wide geographic scope (e.g. Arctic waters above 60ºN excluding the Baltic Sea) to include the BC emissions from shipping in this area (see document MEPC 80/9/2 (FOEI et al.)).

Action required of the Committee

19 The Committee is invited to consider information contained in this document, especially:

.1 note the information provided in paragraphs 3 to 17;

.2 endorse the concept of "polar fuels" which would reduce the impact of ship BC on the Arctic and agree that distillate-grade marine fuels such as DMA and DMZ, which are appropriately covered by ISO standards, would be suitable fuels for ships operating in and near the Arctic;

.3 consider inviting ISO to provide advice to PPR 12 on how to define the characteristics of DMA and DMZ which could be considered suitable as polar fuels;

.4 request PPR 12 to draw on the above and any further submissions in developing a regulation for inclusion in MARPOL Annex VI which reduces the impact on the Arctic of BC emissions from international shipping; and

.5 take action as appropriate.