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REDUCTION OF THE IMPACT ON THE ARCTIC OF BLACK CARBON EMISSIONS FROM INTERNATIONAL SHIPPING

Polar fuels

Submitted by FOEI, WWF, Pacific Environment and CSC

SUMMARY

Executive summary:	This document sets out a proposal for advancing discussion at PPR 12 with the intention of leading to action to reduce the impact of Black Carbon (BC) emissions from ships on the Arctic. It builds on the "polar fuels" concept discussions at PPR 11 and MEPC 82 and recognizes that a first step to reduce BC emissions should be regulation leading to the use of polar fuels such as marine distillate fuel categories DMA and DMZ throughout the Arctic. It also clarifies what further discussion and work is needed to define "other polar fuels" and proposes that this discussion take place in a working group (WG) at PPR 12, before proceeding to consider the development of a polar fuel standard that addresses the sooting propensity of marine fuels for use in the Arctic.
Strategic direction, if applicable:	3
Output:	3.3
Action to be taken:	Paragraph 16
Related documents:	MEPC 82/5/2 and MEPC 82/17

Introduction

1 During MEPC 82, the Committee invited interested Member States and international organizations to submit comments and proposals to PPR 12 regarding the concept of "polar fuels" with the intention of reducing Black Carbon (BC) emissions from shipping in and near the Arctic, taking into account document MEPC 82/5/2 (FOEI et al.). This document clarifies elements of document MEPC 82/5/2 and sets out an approach that can advance the discussion at PPR 12 and lead to action to reduce the impact of BC emissions from ships on the Arctic in response to the rapidly worsening Arctic climate crisis.

2 BC emissions currently account for one fifth of international shipping's climate impact on a 20-year Global Warming Potential (20-year GWP)[1]. This places BC emissions second to only greenhouse gas (GHG) emissions in terms of the shipping sector's impacts on climate warming. For this reason, reducing the impacts of BC emissions from the shipping sector, particularly BC emissions that impact the Arctic, is an important complement to the Organization's efforts to develop GHG reduction measures. There are also common approaches to addressing both GHG and BC emissions, including operational improvements, engine maintenance and efficiency measures, and using "cleaner fuels". "Cleaner fuels" are immediately available and will make a significant fuel-based contribution to reducing BC emissions. Moreover, their immediate use enables the adoption of diesel particulate filters which will reduce emissions even further as seen in other sectors using oil-based fuels.

Background

3 The Arctic is a major climate regulator and the Intergovernmental Panel on Climate Change's (IPCC) Sixth Assessment Report (AR6) doubled the estimates of the warming potential of BC on snow and ice from 0.04 W m^{-2} in AR5 to 0.08 W m^{-2} in AR6[2]. This is due to a greater understanding of BC's warming on snow forcing, which is estimated to be two to four times that of equivalent CO_2 forcing. Unprecedented changes are already occurring at alarming rates, leading to a social and environmental crisis in the Arctic with consequences for Arctic communities, the Arctic ecosystem and the whole planet. The Arctic climate crisis is happening and accelerating.

4 The best and least costly opportunity to avoid runaway global heating and remain below 1.5ºC aligned with the Paris Agreement is to act immediately to reduce emissions of short-lived climate pollutants. Fast action to reduce short-lived climate forcers could avoid over 0.5ºC of warming by 2050[3]. As BC is a powerful short-lived climate pollutant with a very short atmospheric lifetime, urgent practical action now to reduce emissions impacting the Arctic will result in rapid results. Arctic shipping BC emissions have a greater impact than BC from sources further away due to the close proximity of snow and ice and emissions from Arctic shipping more than doubled between 2015 and 2021[4], but as of yet there is no mandatory requirement to reduce BC emissions from ships operating in and near the Arctic.

Developing the "polar fuel" concept to reduce Arctic ships' BC emissions

5 While BC emissions from marine engines, including internal combustion engines, will vary depending on the engine type, operating conditions, and load conditions; it is widely recognized that controlling for these factors as well as improving the quality of marine fuel effectively cuts BC emissions. The concept of "polar fuels" is designed to identify a category of fuels that would contribute to a significant reduction of BC emissions compared with the residual fuels that are currently being used by many ships operating in and near the Arctic. This concept is based on a recognition of the clear statement made during the Working Group on Prevention of Air Pollution from Ships at PPR 11 that the readily available distillate fuels DMA and DMZ would do this, and does not preclude further work on "polar fuel" characteristics or other factors impacting BC emissions.

1 Fourth IMO GHG Study 2020 - Full report and annexes.pdf

2 Annex III: Tables of Historical and Projected Well-mixed Greenhouse Gas Mixing Ratios and Effective Radiative Forcing of All Climate Forcers

3 Keeping warming to 1.5˚C impossible without reducing Short-lived Climate Pollutants

4 Webinar: The Arctic Footprint of EU-Related Shipping Emissions - Clean Arctic Alliance

6 One approach to defining "polar fuels" could begin by stating that residual fuels do not deliver this outcome so should be excluded from any definition. An alternative could start by saying that DMA and DMZ and other suitable fuels with comparable BC outcomes could fall under the definition of "polar fuels" as they would deliver immediate reductions in BC emissions compared to residual fuels. However, such an approach would also need to reflect the wording in resolution MEPC 342(77) on *Protecting the Arctic from shipping Black Carbon emissions* and make clear that any definition should include other fuels (apart from residuals) as well as future zero-GHG fuels being developed to reduce shipping's GHG emissions. At a later point the impacts of these other fuels on BC emissions should be confirmed.

7 The co-sponsors believe that the use of "polar fuels" in the Arctic should be mandatory, in which case MARPOL Annex VI would need to be amended to require ships to use "polar fuels". This would then require a definition. Two potential approaches to the initial definition are proposed here for discussion, both with the objective of ensuring that ships operating in or near the Arctic will reduce their BC emissions relative to the residual fuels whose use is currently prevalent there:

.1 "Polar fuels" are the marine distillate polar fuels DMA and DMZ or other yet-to-be-defined "polar fuels" (e.g. cleaner, alternative fuels or methods of propulsion that would be expected to deliver comparable reductions in BC emissions than distillates); or

.2 "Polar fuels" do not include residual fuels. "Black Carbon" has already been defined by the Committee, while the requisite characteristics of DMA and DMZ in ISO 8217 (2024 edition) that would need to identify them as suitable polar fuels to reduce Arctic BC have been set out in document MEPC 82/5/2. Agreement on an appropriate definition of "Arctic" will also be essential to the effective delivery of IMO's output to address the impact of BC emissions on the Arctic.

From a polar fuel concept to a polar fuel standard

8 Future work could involve the progressive analysis and determination of current and future marine fuels as to their potential to reduce BC emissions from ships in and near to the Arctic, i.e. the sooting propensity. This would involve a fuel quality testing regime for sooting propensity that could be commonly applied to any fuels in use today as well as to all future fuels. There has been considerable discussion on an appropriate fuel test. The hydrogen/carbon (H/C) weight ratio ASTM 5291 test based on the elemental analysis of C, H, and N has been proposed with MEPC 82 noting that PPR11 had invited ISO to consider the development of a polar fuel standard which may include the H/C ratio. ISO has implemented the Viscosity Gravity Constant (VGC) as Annex K to ISO 8217 (2024), however the VGC only works for residual fuels.

9 Whether just one common fuel test to assess sooting propensity could be universally applied needs to be considered, along with agreement on what measure of sooting propensity should define "polar fuels" – for example paraffinic/aromatic content, H/C weight ratio, or other possible alternatives. PPR 11 called for Member States and international organizations to investigate these issues and undertake further discussion of the options during PPR 12.

10 A polar fuel standard would mandate threshold limits (i.e. on BC emissions or sooting propensity or an appropriate proxy) that would have the effect of determining which marine fuels should – or should not – be used in the Arctic in order to reduce ship-based BC emissions. A threshold limit would be agreed based on fuel quality properties and determined during fuel testing. The standard would be set via an amendment to MARPOL Annex VI and would rule out the use of marine fuels in the Arctic which would not comply with the limit values set in the standard.

Feasibility of using DMA and DMZ as polar fuels

11 Thousands of ships around the world are required to switch to cleaner fuels every day to cut air pollution and protect human health. While residual fuel consumption in the geographic Arctic (north of 60ºN, excluding the Baltic Sea) has significant climate impacts, its volume is minimal compared to the 171 million tonnes per annum of global residual fuel use in 2023 (document MEPC 82/6/38 by the Secretariat). Over 26 million tonnes of marine distillate was also used globally that year. Estimates by the International Council on Clean Transportation (ICCT) assess residual fuel use in the Arctic at 1.26 million tonnes of the 3.8 million tonnes of total fuel consumed in the Arctic in 2021 (the fishing sector used around 2 million tonnes of distillates)[5].

12 This 1.26 million tonnes of residual fuel use in the geographic Arctic in 2021 includes residual fuel use that will need to be switched (unless scrubbers are used) in the forthcoming Norwegian and Canadian Arctic emission control areas (ECAs). It compares with around 16 million tonnes of current residual fuel use in the Mediterranean as detailed in document MEPC 78/11 (Albania et al.). The incremental cost of switching all the 1.26 million tonnes of residual use to distillates in the wider Arctic is about US$115 million per annum using the average fuel switch cost of US$95/metric tonne cited in the proposal to designate the Mediterranean as an Emission Control Area for Sulphur Oxides (MEPC 78/11). The bulk of this cost would fall on large ships over 5,000 GT – cargo ships, tankers, bulkers, container ships many of which are engaged in world trade. Many of them must already comply with fuel switch ECA regulations on other parts of the same Arctic voyage.

13 Some delegations at MEPC 82 suggested that ISO be invited to provide advice to PPR 12 on how to define the characteristics of "polar fuels" such as DMA and DMZ and "other suitable fuels" with a view to subsequently including ISO advice in the recently adopted *Guidance on best practice on recommendatory goal-based control measures to reduce the impact on the Arctic of Black Carbon emissions from international shipping* (resolution MEPC.393(82)). The co-sponsors would welcome the provision of advice on polar fuels by ISO and other marine fuel experts to facilitate further discussion in a working group on prevention of air pollution from ships at PPR 12. The Guidance recalls the adoption of resolution MEPC.342(77) on *Protecting the Arctic from shipping Black Carbon emissions*, urging Member States and ship operators to voluntarily use distillate or other cleaner alternative fuels or methods of propulsion and provides advice to assist ship operators and companies in efforts to reduce BC emissions by setting individual ship reduction targets. While the Guidelines on BC emissions measurement, monitoring and reporting stipulate that when measuring ship BC emissions in the Arctic the fuel in use should also be recorded, it would also be valuable if it was noted when ships had carried out a fuel switch consistent with resolution MEPC.342(77).

Proposals

14 The co-sponsors propose that sufficient time be allocated during a working group on prevention of air pollution from ships at PPR 12, to discuss the issues raised above on developing the "polar fuels" concept and on how immediate action on regulatory measures can be achieved.

[5] https://cleanarctic.org/2024/05/14/webinar-the-arctic-footprint-of-eu-related-shipping-emissions/

15 Consequently, the co-sponsors propose the inclusion of the following in the terms of reference for a working group on prevention of air pollution from ships at PPR 12:

.1 discussion of, with the aim of agreement, a definition of "polar fuels" i.e. those fuels that are suitable for use in the Arctic starting with DMA and DMZ and other suitable fuels with comparable BC emissions;

.2 discussion of how the "polar fuels" concept can be utilized to reduce emissions of BC; and

.3 consideration of how the Organization can deliver on the long-standing output to reduce the impact on the Arctic of emissions of BC from international shipping via the Organization's regulatory framework.

Action requested of the Sub-Committee

16 The Sub-Committee is invited to consider the information contained in this document, in particular the proposals in paragraphs 14 and 15, and take action as appropriate.