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

Arctic climate crisis

Submitted by FOEI, WWF, Pacific Environment and CSC

SUMMARY

Executive summary:	This document provides further information on the Arctic climate crisis in support of the recommendations in document PPR 12/6 (FOEI et al.). It proposes that the Sub-Committee recognize that a first step to immediately reduce Black Carbon emissions should be the requirement to use polar fuels, such as DMA and DMZ, as well as other suitable fuels with comparable Black Carbon outcomes, throughout the Arctic.
Strategic direction, if applicable:	3
Output:	3.3
Action to be taken:	Paragraph 16
Related documents:	MEPC 80/7/11; MEPC 82/5/2, MEPC 82/17 and PPR 12/6

Introduction

1 This document comments on document PPR 12/6 (FOEI et al.) by providing additional information to what is contained in that document and is submitted in accordance with the provisions of paragraph 6.12.5 of the *Organization and method of work of the Maritime Safety Committee and the Marine Environment Protection Committee and their subsidiary bodies* (MSC-MEPC.1/Circ.5/Rev.5).

2 Document PPR 12/6 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 in response to the rapidly worsening Arctic climate crisis. This document provides further information on the Arctic climate crisis in support of the recommendations in document PPR 12/6 and proposes that the Sub-Committee recognize that a first step should be regulation in order to immediately reduce BC emissions and agree on the advisability of a requirement to use of polar fuels, such as DMA and DMZ, as well as other suitable fuels with comparable BC outcomes, throughout the Arctic.

IPCC Sixth Assessment Report

3 Previously, in document MEPC 80/7/11 (CSC et al.), the co-sponsors have drawn attention to the Intergovernmental Panel on Climate Change's (IPCC) Synthesis Report for the Sixth Assessment Report (AR6): Climate Change 2023 (SYR), released in March 2023. SYR recognizes the interdependence of climate, ecosystems and biodiversity, and human societies; the value of diverse forms of knowledge, including Indigenous Knowledge; and the close linkages between the recognition for the inherent rights of Indigenous Peoples, climate change adaptation, mitigation, ecosystem health, human well-being and sustainable development.

4 The IPCC's AR6 cycle recognizes that climate heating has already caused widespread adverse impacts and related losses and damage to nature and people, and that these losses and damage are unequally distributed across systems, regions and sectors. Cultural losses threaten adaptive capacity and may result in irrevocable losses of sense of belonging, valued cultural practices, identity and home, particularly for Indigenous Peoples and those more directly reliant on the environment for subsistence. For example, loss of snow cover, lake and river ice, and permafrost in many Arctic regions are harming the livelihoods and cultural identity of Arctic residents including Indigenous communities. Housing and infrastructure, including transportation, water, sanitation and energy systems have been compromised by extreme and slow-onset events, with resulting economic losses, disruptions of services, and impacts to well-being.

5 The latest AR6 report goes on to state that the likelihood and impacts of abrupt and/or irreversible changes in the climate system, including changes triggered when tipping points are reached, are increasing with further global heating. As warming levels increase, so do the risks of species extinction and irreversible loss of biodiversity in ecosystems in all regions of the world, including the Arctic. According to WWF's 2024 Living Planet Report, wildlife populations have declined by 73% in the past 50 years.[1] At sustained warming levels between 2°C and 3°C, the Greenland and West Antarctic ice sheets will be lost almost completely and irreversibly over centuries or millennia, causing several metres of sea level rise. The probability and rate of ice mass loss, and therefore related sea level rise, increase with higher global surface temperatures.

6 The Arctic is already at 2.5ºC heating.[2] International shipping is one of a number of sectors that are contributing to that heating through both greenhouse gases and emissions of short-lived climate forcers such as BC. The IPCC has identified BC as an unusually potent short-lived forcer in cryosphere (snow and ice) regions of the Arctic, primarily due to loss of albedo when it deposits on such reflective surfaces.

Arctic climate crisis

7 Document PPR 12/6 reminds the Sub-Committee that the Arctic is a major climate regulator and that the IPCC's AR6 report doubled the estimates of the warming potential of BC on snow and ice from 0.04 W m^{-2} in the Fifth Assessment Report (AR5) to 0.08 W $m^{-2,}$ due to improvements in the understanding of BC's warming on snow forcing which is estimated to be

[1] 2024 Living Planet Report

[2] Rantanen, M., Karpechko, A.Y., Lipponen, A. et al. The Arctic has warmed nearly four times faster than the globe since 1979. *Communications Earth and Environment* 3, 168 (2022). https://doi.org/10.1038/s43247-022-00498-3. Accessed through: https://www.nature.com/articles/s43247-022-00498-3

two to four times that of equivalent CO_2 forcing.[3] Unprecedented changes including Arctic sea ice loss, Greenland ice sheet melting, permafrost thaw, increasing ocean temperature and acidification are already occurring at alarming rates. Declines in sea ice extent and thickness are leading to a social and environmental crisis in the Arctic and the AR6 report concludes that there is high confidence that increased weather and climate extreme events are exposing Arctic communities to acute food insecurity.

8 Cascading changes are impacting not only the global climate but also ocean circulation. These processes are nearing points beyond which rapid and irreversible changes, on the scale of multiple human generations, are possible. It is widely recognized that global climate tipping points – when change becomes self-sustaining and even if the triggers are halted or reversed significant and irreversible changes to the planetary system will occur – are within reach and in some cases have already been crossed. Arctic sea ice has undergone a dramatic transformation over the last four decades and is rapidly heading towards an eventual ice-free Arctic Ocean at least once by 2050.[4] A newly published study estimated that the first ice-free period might even occur prior to 2030 given warming to-date. However, such ice-free periods during the summer months will increase and potentially become normal should temperatures exceed around 1.7ºC globally. This could have knock-on effects on increased permafrost thaw and melting of the Greenland ice sheet. There is concern among researchers of an abrupt shutdown of the Atlantic Meridional Overturning Circulation (AMOC) amidst signs that it has slowed over the past decades, also a knock-on effect of both Greenland melt and sea ice loss. The Arctic climate crisis is underway.

9 The best and least costly opportunity to avert runaway global heating and remain below 1.5ºC while respecting the human right to health, 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.[5] BC is a powerful climate pollutant, and urgent practical action is needed now to reduce emissions impacting the Arctic. While the Arctic Council discusses setting even more ambitious targets for BC reduction from a wide range of sectors (having nearly achieved the initial reductions envisaged by 2025), BC emissions from Arctic shipping more than doubled between 2015 and 2021.[6]

The role of BC

10 BC is a short-lived climate pollutant produced by the incomplete burning of fossil fuels. It has a climate impact over 3,000 times that of CO_2 on a 20-year global warming potential (GWP) basis and accounts for one-fifth of international shipping's CO_2 equivalent emissions. When released near the Arctic, it has a disproportionately high impact.

11 The need to reduce emissions of BC because of both the climate and health impacts has been long recognized. On land, considerable effort has been made to ban dirtier fuels in power stations, to install diesel particulate filters on land-based transport, and to improve the burning of dry wood – all to reduce emissions of BC and air pollution. Measures to reduce BC emissions from shipping have been under consideration now for well over a decade, but so far there has been no regulation agreed.

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

4 Heuzé, C., Jahn, A. The first ice-free day in the Arctic Ocean could occur before 2030. *Nature Communications* 15, 10101 (2024). https://doi.org/10.1038/s41467-024-54508-3. Accessed through: https://www.nature.com/articles/s41467-024-54508-3

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

6 BC_in_Arctic_prePPR10.pdf

Reducing BC emissions from sources in and near to the Arctic is essential

12 It is anticipated that a Seventh IPCC Assessment Special Report on Short-lived Climate Forcers, to be released in 2027, may help better define global BC impacts; however, the most important aspects of evaluating sources of BC, and not simply "emissions", for the Arctic remain the same as those outlined in multiple Arctic-focused reports over many years. To reduce BC effects in the Arctic, we must focus on sources in or close to the Arctic (or other seasonal/permanent ice and snow, or cryosphere) and focus on sources with a higher ratio of BC, such as flaring.

13 This combination of location and ratio of BC is the most effective means to determine the most beneficial and cost-effective efforts to slow Arctic warming when addressing BC sources. The conclusions on the most "effect per unit" or low-hanging fruit for Arctic and other cryosphere climate benefits have proven remarkably consistent since the first studies by AMAP from 2009, CLRTAP from 2011, UNEP/WMO from 2012 and the World Bank/ICCI from 2013, through to the latest AMAP reports on BC as well as the EU-funded ABC-iCAP study (both from 2023). For sources of BC in and near the Arctic, this includes oil and gas flaring, marine shipping, diesel generators and vehicles, fires and wood and coal heating stoves.

What action is possible now?

14 Action to reduce BC emissions by ships operating in and near to the Arctic does not require the development of new fuels or new technology and can be done with immediate effect. Suitable "polar fuels" are already in widespread use. Switching to readily available and widely used distillate fuels, such as DMA and DMZ, and installing diesel particulate filters on ships operating in and near to the Arctic, will deliver a greater than 90% reduction in BC emissions.

15 The co-sponsors reiterate the action proposed in document PPR 12/6 and urge the Sub-Committee to recognize that a first step to immediately reduce BC emissions throughout the Arctic should be a requirement to use polar fuels, such as DMA and DMZ, as well as other suitable fuels with comparable BC outcomes.

Action requested of the Sub-Committee

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