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DEVELOPMENT OF A MANDATORY CODE FOR SHIPS OPERATING IN POLAR WATERS

Reducing black carbon emissions from vessels in the Polar Regions

Submitted by FOEI, CSC, IFAW, WWF and Pacific Environment

SUMMARY

Executive summary:	This document summarizes recent IMO submissions that refer to black carbon (BC) emissions from vessels and presents existing, cost-effective methods to reduce them in polar waters
Strategic direction:	5.2
High-level action:	5.2.1
Planned output:	5.2.1.19
Action to be taken:	Paragraph 11
Related documents:	DE 53/18/3; DE 54/13/7, DE 54/13/8, DE 54/INF.5; DE 55/12/1, DE 55/12/3, DE 55/12/5; MEPC 60/4/24, MEPC 60/21/1, MEPC 60/INF.20; MEPC 61/5/10; BLG 15/INF.5 and BLG 15/INF.8

Introduction

1 This document[1] is a response to New Zealand's submission DE 55/12/3, specifically its section on "MARPOL Annex VI: Prevention of Pollution from Ships", and is submitted in accordance with the provisions of paragraph 4.10.5 of the Committee's Guidelines (MSC-MEPC.1/Circ.2).

2 In this document, co-sponsors summarize recent IMO submissions that refer to black carbon (BC) emissions from vessels, provide detailed information on current and projected BC emissions from vessels operating in the Arctic, and present existing, cost-effective methods to reduce BC vessel emissions in polar waters. Co-sponsors recommend to the DE Sub-Committee that measures to reduce black carbon emissions from vessels be considered as part of the Polar Code, in order to abate warming in the Polar Regions and protect the human health of its inhabitants. Alternatively, co-sponsors invite DE 55 to request that MEPC 62 evaluate black carbon emission-reducing measures for the Code.

[1] The preparation of this document for the IMO's DE Sub-Committee was assisted by Earthjustice and the Antarctic and Southern Ocean Coalition (ASOC), an umbrella NGO (whose members include FOEI, IFAW and WWF) with expert observer status at the Antarctic Treaty Consultative meetings (ATCM) and meetings of the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR). The Whale and Dolphin Conservation Society (WCDS) also supports this document.

Recent IMO submissions regarding black carbon emissions from vessels

3 There have been a multitude of recent submissions that refer to black carbon emissions from vessels and their impacts on the environment and public health (e.g., listed in related documents in summary). Of particular note, document MEPC 60/4/24 from Norway, Sweden, and the United States discusses the impacts of BC emissions from shipping on the Arctic climate, its significance, and several approaches to reduce those emissions. The document maintains that BC emissions can be reduced by lowering fuel consumption and through specific pollution control measures. Fuel consumption strategies include slow steaming, modifications to vessel and propeller design, maximum use of alternative power technologies, and measures to improve ship routeing and logistics. Examples of specific pollution control measures are in-engine adjustments, diesel particulate filters, water-in-fuel emulsification on demand, and slide valves. The document emphasizes that BC emissions have serious impacts on the Arctic, that shipping contributes to BC production, and that greater BC emission contributions from vessels are expected in the Arctic as sea ice diminishes and sea lanes open up. Importantly, the document concludes that "reductions of black carbon now, can provide short-term climate responses that are absolutely necessary to forestall a climate "tipping point", thereby providing the climate "breathing time" for the needed reductions in CO_2 to take hold over the longer term[.]"

4 Documents from Norway (DE 55/12/5) and New Zealand (DE 55/12/3) address the topic as well. Norway's document recognizes that the deposition of black carbon, or soot, on ice is an environmental problem. Although no particular requirements for black carbon emissions have so far been put forward by Norway, the document recommends that mitigation efforts continue as much as feasible through operational or other measures.

5 Document DE 55/12/3 cites the environmental and health concerns associated with black carbon emissions from ships, and "supports the introduction of controls for this type of pollutant for vessels entering the polar regions." The document goes on to cite operational and technical measures to further this goal that can be cost effective, and specifically references the use of emulsified fuels, which it asserts reduce particulate emissions by up to 60% without the need for engine modifications. Lastly, the document points out that measures to reduce black carbon and particulate matter may also offer co-benefits by reducing nitrogen and sulfur oxides as well.

Convention on long-range transport of air pollution report on black carbon

6 The Executive Body (EB) for the Convention on Long-range Transboundary Air Pollution (CLRTAP) recently formed an Ad Hoc Expert Group on Black Carbon and commissioned the group to prepare a report to assess available information on black carbon to, *inter alia*, articulate the rationale for addressing near-term and regional/Arctic climate change impacts of air pollution along with impacts on human health and ecosystems under the Convention. On 30 September 2010, the Co-Chairs of the Expert Group released their report, which assesses available information on black carbon and outlines reasons for addressing the impacts of black carbon pollution. The report has been submitted to BLG 15 (BLG 15/INF.8). In response to the report, the EB adopted at its December 2010 meeting the following resolution in which it: "Decided to request the Chairman of the EB to inform the IMO of its concern about the climate and health impacts of BC emissions and to urge the IMO to adopt requirements to reduce emissions of BC from international shipping, especially emissions in areas that impact the Arctic climate."[2]

[2] Executive Body for the Convention on the Long-range Transboundary Air Pollution, Draft Decision on the Implications of the Reports of the TFHTAP for the Convention and Ad Hoc Expert Group on Black Carbon, 16 December 2010 (Final).

European Parliament resolution on black carbon emissions from polar shipping

7 In addition, the European Parliament passed a resolution on 20 January 2011 stating "that the rapid warming of the Arctic makes it necessary … to work on possible further short-term measures to limit Arctic warming." In part to achieve that objective, the resolution "requests the EU and its Member States to propose, as part of the ongoing IMO work on a mandatory Polar Code for shipping, that soot emissions and heavy fuel oil be regulated specifically; in the event that such negotiations do not bear fruits, requests the [European] Commission to put forward proposals on rules for vessels calling at EU ports subsequent to, or prior to, journeys through Arctic waters, with a view to imposing a strict regime limiting soot emissions and the use and carriage of heavy fuel oil."[3]

New research on present and future black carbon emissions from vessels in the Arctic and existing, cost-effective technologies to reduce those emissions

8 Two recently published reports provide further data pertinent to the Sub-Committee's consideration of measures to reduce black carbon emissions from vessels in the Polar Regions.

9 In "Arctic shipping emissions inventories and future scenarios", Corbett *et al*. (2010) (BLG 15/INF.5, annex 1)[4], the authors analyse Arctic emissions inventories of black carbon, greenhouse gases and other pollutants from shipping under existing and future scenarios. The inventories take into account the predicted growth of regional shipping due to the decline of sea ice coverage, potential diversion of global shipping traffic to the Arctic using emerging routes, and available emissions reductions though implementation of emissions control measures. The report concludes that without control measures, black carbon will increase in all future scenarios. Black carbon emissions in the Arctic are predicted to increase from 0.88 kilo tonnes (kt) per year in 2004 to between 2.7 kt per year (under a business as usual scenario) to 4.7 kt per year (under a high-growth scenario) by 2050.

.1 The inventories were created using empirical data of shipping activity reported by Arctic Council member states using current estimates of particulate emission factors, and an activity-based approach used in the Arctic Marine Shipping Assessment 2009 report of the Arctic Council. Future seasonal emissions projections were created using high growth and business as usual assumptions, with a projected 1%, 2% and 5% diversion of global shipping for 2020, 2030 and 2050 due to the decline of Arctic sea ice and accessibility of new trade routes.

.2 Maximum feasible reductions (MFR) in emissions were calculated using technologies employed individually or in combinations, including seawater scrubbing, slide valves, water-in-fuel emulsions, diesel particulate filters and emissions scrubbing technologies. The percentage of emissions due to transit vessels (as compared to fishing vessels) is predicted to rise in all future scenarios, from a 2004 level of 71%, to a 2050 level as high as 93%.

.3 Though quantitative data on Arctic shipping's contributions to global climate change remain uncertain, Corbett *et al*. estimate that in a high-growth shipping scenario, by 2030 the short-term climate forcing of black carbon could range from 17% to 78% of the global warming potential of CO_2 depending on growth, diversion of global ship traffic to the Arctic, and use of

[3] The resolution also states that a bunker fuel use and carriage ban "might be appropriate in Arctic waters to reduce risks to the environment in case of accidents." European Union: European Parliament, *European Parliament resolution on a sustainable EU policy for the High North*, 20 July 2011, A7-0377/2010.

[4] J.J. Corbett, D.A. Lack, J.J. Winebrake, S. Harder, J.A. Silberman and M. Gold, *Arctic shipping emissions inventories and future scenarios*, 10 Atmos. Chem. and Phys. 9689 (2010).

emissions reducing technologies. The MFR for black carbon, using a combination of technologies, was assessed at 70%. In a high-growth scenario the use of control measures to achieve MFR would reduce black carbon in the Arctic from 17 kt per year to 5 kt per year. In the business as usual scenario, MFR would reduce emissions to less than 2 kt per year. Without emission control technologies, black carbon emissions are predicted to increase by 2.44% to 3.69% per year by 2050.

.4 Growth in global shipping (2.1% per year) and diversion of vessel traffic to the Arctic (ranging from 1% to 5%) may result in increased black carbon emissions despite implementation of MFR. Diversion traffic is predicted to add between 2.4 and 12 kt of black carbon per year by 2050. However, with MFR, Arctic black carbon emission from global shipping can be reduced in the near term and held nearly constant through 2050.

10 In "An assessment of technologies for reducing regional short-lived climate forcers emitted by ships with implications for Arctic shipping", Corbett *et al*. (2010),[5] the authors develop a cost-effectiveness decision framework to evaluate five black carbon abatement technologies for marine engines. The report concludes that emissions control targets for black carbon are most cost-effective (i.e. least US$/mt CO_2eq reduced) at 60% reductions in emissions levels achieved using a combination of control technologies.

.1 The technologies analysed are slide valves, water-in-fuel emulsion, diesel particulate filters, emulsified fuel, and sea water scrubbing. The framework considers the effect of the technologies, implemented alone or in combination, on a set of short-lived climate forcers emitted by marine diesel combustion.

.2 All technologies produced benefits for global warming potential with the exception of sea water scrubbers, which selectively control particles that contribute to regional cooling. Combination technologies performed better than single technologies in the analysis, even the combination of the lowest-cost technologies.

.3 The total annual cost to achieve such a 60% reduction in black carbon emissions in the Arctic is estimated at US$8 to 50 million, avoiding roughly 9 to 70 million metric tons of CO_2eq per year at an average annual cost of US$1,200 to US$8,400 per vessel.

.4 Furthermore, a 70% reduction in black carbon emissions can be realized at about US$15 to 30 per mt$CO_2$eq (20 year), under conditions where the vessel spends 25-100% of the time in a sensitive region.

.5 The document also suggests that operational measures (such as slow steaming) to reduce BC emissions should be evaluated for their cost-effectiveness.

Action requested of the Sub-Committee

11 The Sub-Committee is invited to note the information provided and consider developing certain Polar Code provisions that reduce black carbon emissions from vessels operating in polar waters; or, in the alternative, request that MEPC 62 evaluate black carbon emission-reducing measures for the Code.

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[5] J.J. Corbett, J.J. Winebrake and E.H. Green, *An assessment of technologies for reducing regional short-lived climate forcers emitted by ships with implications for Arctic shipping*, 1 Carbon Management 207 (2010) at 223.