**Revised draft Project Plan**

**Black carbon mitigation measures from shipping in the Arctic**

**Fuel and Exhaust Gas Treatment for Marine Diesel Engines – Summary Report**

**Submitted by Iceland (draft version 7 January 2019)**

# Project Title: Black carbon mitigation measures from shipping in the Arctic: Fuel and Exhaust Gas Treatment for Marine Diesel Engines – Summary Report

# Summary

Iceland has conducted research on exhaust gas cleaning and water-in-fuel emulsification and now seeks to expand this work within PAME. This project will compile information from the Arctic States on various fuel and exhaust gas treatment methods, with the goal to provide a literature review summary report with recommendations to the Arctic Council. The summary report will be supplemented with an online resource containing an overview of different research projects, preferably with information related to methodology, feasibility technical execution, necessary equipment and key measurements. This project will identify common challenges and highlight the need for further Arctic-specific research.

The project and its result serve as shipping-specific input from PAME on mitigation measures for shipping in the Arctic, which may contribute to the ongoing work within the Arctic Council’s Expert Group on Black Carbon and Methane (EGBMC) and the International Maritime Organization’s (IMO) sub-committee, the Pollution Prevention and Response (PPR) Committee, and serve as a basis for future projects within PAME. Full consideration for this project proposal has been given, and will continue to be given, to the ongoing work within IMO, particularly the results of the Correspondence Group on Investigation of Appropriate Control Measures to Reduce the Impact on the Arctic of Black Carbon Emissions from International Shipping, to ensure that this project does not duplicate its work.

While this project will mainly focus on mitigation measures for black carbon, project leads propose that the key findings of this review also take into account the effect of these mitigation measures on the emissions of co-pollutants.

Iceland is willing to host a workshop for the project going forward to advance and further streamline its work.

# Background

A great majority of engines used for vessel propulsion are driven by fossil diesel oil. Smaller vessels and smaller engines are generally powered by Marine Diesel Oil (MDO). For larger engines, Heavy Fuel Oil (HFO) is used, as it has greater viscosity than the former. HFO is less refined and cheaper than MDO and is therefore the favored choice among owners of larger vessels. The combustion of any type of fossil diesel creates numerous exhaust gases which are harmful to the environment and human health.

The 2017 Summary of Progress and Recommendations Report by the EGBCM identified emission abatement technologies as one of the possible ways of achieving the goal of reducing emissions in the Arctic. The EGBCM also concluded that Arctic shipping currently accounts for about 5 percent of black carbon emissions within the Arctic and that, absent emission controls, shipping emissions within the Arctic could double by 2030 under some projections of Arctic vessel traffic.

To date, PAME has undertaken a number of projects that relate to Heavy Fuel Oil (HFO) use and carriage by ships in the Arctic. One aspect of concern in using HFO is the release of air pollutants such as black carbon, which has been cited as the second largest contributor, after CO2, to human induced climate change from all sources (Bond et al., 2013). Studies have found that Black Carbon emitted in the Arctic warms Arctic surface temperatures nearly five times more than Black Carbon emitted in mid latitudes (Bond et al., 2013). It is therefore of specific interest and importance to the Arctic region to examine emission control measures.

Efforts have been undertaken to respond to pollution from the use of fossil diesel oil in the greater context, such as IMO’s 2020 global sulphur limit regulation, and the current discussion within the IMO to ban the use and carriage for use on-board of HFO in the Arctic. The subject of black carbon specifically is also being discussed within the Marine Environment Protection Committee (MEPC) and the PPR sub-committee Furthermore, the PPR established the *Correspondence Group on Investigation of Appropriate Control Measures to Reduce the Impact on the Arctic of Black Carbon Emissions from International Shipping*, which, under the coordination of Canada, has submitted a report for the consideration of the PPR at its forthcoming sixth session in February 2019.

The report, which is already available but has not been discussed and adopted by the PPR, identifies several fuel and exhaust gas treatment methods as having the possibility of being implemented within the next five years (short-term availability). Furthermore, the comments provided by Canada in the consultation process on feasibility, which have been made available in Document PPR 6/INF.6, identify the need for further research with regard to Arctic specific conditions for some of these methods. In addition to compiling existing research, this PAME project would identify and highlight key findings, as well as gaps, in existing research and provide a basis for further research and therefore supplement PPR’s work. PPR will be kept updated on the project as it proceeds.

Additionally, a workshop summary on the fifth ICCT technical workshop on marine black carbon emissions, hosted by the International Council on Clean Transportation (ICCT), identified 13 control measures for international shipping. Among those measures were some exhaust gas treatment measures. However, certain fuel and exhaust gas treatment measures were not included in the list of 13 control measures, as evidence was considered insufficient and no consensus was reached.

These measures, in particular the water-in-fuel emulsification, are also included in the report by the *Correspondence Group on Investigation of Appropriate Control Measures to Reduce the Impact on the Arctic of Black Carbon Emissions from International Shipping* and some of the comments from participating states suggest that there is potential for these methods to reduce black carbon but further research and data is necessary.

Please note that as previously stated, full consideration will be given to the ongoing work within IMO, particularly the results of the *Correspondence Group on Investigation of Appropriate Control Measures to Reduce the Impact on the Arctic of Black Carbon Emissions from International Shipping* and this project will be revised in relation to any forthcoming decisions by PPR/6 and/or MEPC/74 on appropriate control measures. All IMO standards will be used for the purposes of the project.

# Rationale

In support of this project, reference is made to:

* The Arctic Council Task Force on Short-Lived Climate Forcers “Recommendations to Reduce Black Carbon and Methane Emissions to Slow Arctic Climate Change.” (2013).
* The Summary of Progress and Recommendations Report submitted by the Expert Group on Black Carbon and Methane (EGBCM) and adopted by the Ministerial Meeting in Fairbanks. (2017).
* Report to the MEPC from the sub-committee on Pollution Prevention and Response. (2018).
* Greenhouse Gas Emissions from Global Shipping, 2013-2015. (ICCT, 2017).
* Black Carbon Emissions and Fuel Use in Global Shipping. (ICCT, 2017).
* PPR 5/INF.7 – Update to the investigation of appropriate control measures (abatement technologies) to reduce Black Carbon emissions from international shipping, submitted to PPR 5. (2017)
* PPR 6/7 – Report of the Correspondence Group on Investigation of Appropriate Control Measures to Reduce the Impact on the Arctic of Black Carbon Emissions from International Shipping, submitted to PPR 6. (2018).
* PPR 6/INF.6 – Comments received, disposition and working documents of the Correspondence Group on Investigation of Appropriate Control Measures to Reduce the Impact on the Arctic of Black Carbon Emissions from International Shipping, submitted to PPR 6. (2018).
* PPR 6/INF.11 – Appropriate Black Carbon control measures for international shipping: summary of an international technical workshop, submitted to PPR 6. (2018).
* Communication between PAME and ACAP, AMAP and EGBCM on black carbon, sent July 2018. In their reply to PAME, EGBCM stated that no efforts have yet been made to *“dig deeply into shipping as this could potentially lead to a duplication of work.”* Furthermore, the EGBCM stated that they were *“interested to hear of the progress in PAME and […] happy to continue with a dialogue.”*

# Key Objective

The objective of this project is to strengthen harmonization and foster dialogue and cooperation between the Arctic Council member states, Permanent Participants and Arctic Council Observers on research on various fuel and exhaust gas treatment methods as possible means by which to reduce the amount of harmful gases emitted by vessel engines.

# Scope

* The project falls under AMSA recommendation II(H) which states: “*That the Arctic states decide to support the development of improved practices and innovative technologies for ships in port and at sea to help reduce current and future emissions of greenhouse gases (GHGs), Nitrogen Oxides (NOx) Sulfur Oxides (SOx) and Particulate Matter (PM) taking into account the relevant IMO regulations."*
* The project will seek to gather information from all available sources, including governmental authorities, the maritime industry and indigenous and local communities throughout the Arctic.
* The project can utilize data from the ASTD database on emissions from ships.
* Synergies with the work of IMO will be ensured.
* The project will have relevance to PAME’s shipping work, including HFO.
* The project will feed into discussions by experts from the member states and observers to work together on the best ways to reduce harmful emissions by ships.

# Main Components and Implementation

This project will require a nomination of an expert from each of the member states, Permanent Participants and observers of the Arctic Council. A workshop is scheduled for September 2019, back-to-back with PAME-II 2019. One of the background documents for this project is a study conducted by the Icelandic Transport Authority on this topic: [here](https://www.samgongustofa.is/media/siglingar/skyrslur/GasCleaning-Bernodusson-2018.pdf).

Any local research, data or knowledge will be valuable to the final outcome, as the project will seek to collect a varied and extensive overview.

***Timeline and Major Milestones***

* February 2019: PAME-I 2019 meeting. Approval and confirmation of project leads for inclusion into the 2019-2021 Work Plan.
* May 2019 – September 2019: Undertake information gathering from publicly available sources and Arctic Council member states.
* September 2019: Half or whole day workshop, back-to-back with PAME-II 2019.
* September 2019-February 2020: Continue information gathering and compilation.
* February 2020: Provide update to PAME-I 2020 on project status, including an outline of the report and a list of information sources.
* February 2020 – September 2020: Continue information gathering, compile and synthesize information received by 1 June and begin drafting report.
* September 2020: Submit a draft report to PAME-II 2020 and invite review and comment by 15 November 2020.
* November 2020 – February 2021: Revise draft report in light of comments received.
* February 2021: Final draft submitted to PAME-I 2021 for approval and submission to SAOs and Ministerial.
* March 2021: Present any revisions to SAOs.
* May 2021: Finalize report for Ministerial.

# Indicative Budget

Consistent with the overall Arctic Council approach, the development of this project will be financed through voluntary contributions and in-kind support from member governments. Financial contributions may be sought from other sources as well, such as the Nordic Council of Ministers.

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| **Item/activity** | **Budget (USD/in-kind)**  |
| Project management, coordination, consultation, desk research, project analysis and outreach | 50.000 |
| External expert(s)  | 15.000 |
| Workshop | 30.000 |
| Editing, final layout and printing  | 10.000 |
| **Estimated Total:** | **105.000** |

# Main outcomes

The final product will be a written summary report and an online resource containing an overview of different ongoing research projects, preferably with information related to methodology, feasibility, technical execution, necessary equipment and key measurements. It will serve as shipping-specific input from PAME on fuel and exhaust gas treatment methods as possible mitigation measures for shipping in the Arctic, which may contribute to the ongoing work within the EGBMC, IMO’s PPR Committee, and serve as a basis for future related projects within PAME.

# Project Team Structure/Lead Countries

* Leads: Iceland (Jon Bernodusson, Icelandic Transport Authority; Anna Margret Bjornsdottir, Icelandic Transport Authority); Others?
* Each Arctic Council member government and Permanent Participants’ organization to appoint a project team member.
* Collaboration, inputs and synergies will be important, in particular with the EGBCM, IMO and the industry, as relevant.
* The PAME Secretariat will provide administrative and project assistance.
* Other Arctic Council working groups will be consulted accordingly.