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SUMMARY

- 1 While the adoption of the Polar Code in 2014-2015 was a landmark in establishing legally binding international rules and standards for the protection of the Arctic marine environment from ships, there were some issues that the Code did not address.
- 2 In 2021, the International Maritime Organization (IMO) adopted a ban on the carriage and use of heavy fuel oil (HFO) as ship fuel in Arctic waters. A resolution urging the voluntary use of cleaner fuels to reduce black carbon emissions from ships in and near the Arctic was also adopted.
- 3 Issues such as air pollution, underwater noise, invasive alien species, and wastewater discharge from ships in the Arctic continue to be studied and considered by the IMO and the Arctic Council.



International regulation of Arctic shipping

The increasing trend in shipping traffic volume in the Arctic region (PAME, 2020) has led States to consider the impact of shipping activities on the unique marine environment and ecosystems of the Arctic, as well as the possible measures for their mitigation. In 2004, the Arctic Council commissioned a comprehensive Arctic marine shipping assessment, which was published as the *Arctic Marine Shipping Assessment 2009 Report* (AMSA Report). The report, which was conducted by the Protection of the Marine Environment (PAME) working group, assessed the current state of Arctic shipping and the challenges faced by the people of the Arctic and the marine environment (Arctic Council, 2009). The AMSA Report included several recommendations for Arctic States, including the decision “to cooperatively support efforts at the IMO to strengthen, harmonize and regularly update international standards for vessels operating in the Arctic”. In 2014-2015, the International Code for Ships Operating in Polar Waters (Polar Code) was subsequently negotiated and adopted by the IMO. It established legally binding international rules and standards for the safety of navigation and protection of the marine environment in Arctic and Antarctic waters.

The adoption of the Polar Code represents a significant step in the development of an international regime to protect the Arctic marine environment and ecosystem from shipping activities. While considerable

efforts are now being made for the effective implementation of and compliance with the Code in forums such as the Arctic Shipping Best Practice Information Forum established by PAME, the Code does not address all the environmental impacts of shipping activities in the Arctic. The IMO has held continuous discussions on the need for an international response for some of the issues that have not yet been regulated by the Polar Code, which, in some cases, resulted in additional regulatory measures. At the same time, the Arctic Council has conducted considerable work to better understand the problems and identify possible steps that may be taken in response.

The purpose of this document is to provide information on the development of additional international rules and standards for the environmental impact of shipping after the adoption of the Polar Code. Developments in the carriage and use of HFO, emission of pollutants into the air, including black carbon, underwater noise, invasive alien species, and wastewater discharge from ships will be addressed as the main issues on which discussions have been taking place in international forums. This document intends to describe the current state of discussions on these issues, but does not examine their priorities or engage in the substantive consideration of the necessary international rules or standards.



Recent developments in Arctic shipping regulation

(1) Heavy fuel oil (HFO)

HFO is a type of fuel oil that is produced at the end of the oil refining process. It has been widely used as a ship fuel because of its high energy density, wide availability, and relatively low price. The accidental release of oil into the marine environment is considered one of the most serious threats to Arctic ecosystems (Arctic Council, 2009). The consequences can be especially severe in the case of HFO, owing to its viscosity and chemical characteristics. Compared to distillate fuel, HFO produces higher levels of air pollutants, such as sulfur oxides (SOx), nitrous oxides (NOx), and particulate matter such as black carbon, when combusted as fuel.

Because of its hazards to the marine environment, the carriage and use of HFO as cargo (and also later as ballast) and as fuel were banned in the Antarctic area through an amendment of Annex I of the Protocol of 1978 relating to the International Convention for the Prevention of Pollution from Ships (MARPOL Convention) in 2010 (IMO, 2010, 2014b). In the Arctic Council, PAME commissioned a series of reports on the use and carriage of HFO by ships in the Arctic and possible mitigation strategies, starting with the Heavy Fuel in the Arctic Phase I Report in 2011 (Canada et al., 2018). Some proposals were made during the negotiation of the Polar Code to include a similar ban. However, in the face of opposition from some States, only a provision encouraging ships to apply regulation applicable in the Antarctic

area was included in the Polar Code.

The use of HFO as fuel in the Arctic has continued to be studied in projects undertaken by PAME after the adoption of the Polar Code. In the IMO, environmental NGOs raised the issue again during the 69th session of the Marine Environment Protection Committee (MEPC) in 2016 (FOEI et al., 2016). In the ensuing discussions, some Arctic States initially opposed the regulation of HFO use as fuel in Arctic waters, expressing concerns about the socioeconomic impact of the measures on communities in the Arctic, especially on Indigenous Peoples in remote areas (Canada & United States, 2016; Russian Federation, 2016). However, an agreement was reached at the 76th session of the MEPC in 2021, resulting in the adoption of an amendment to MARPOL Annex I in the form of the addition of a new Regulation 43A on the carriage and use of HFO as fuel in Arctic waters (IMO, 2021b).

The new regulation prohibits the use of HFO as fuel by ships in Arctic waters, to which the Polar Code applies. Unlike the Antarctic area, the ban does not apply to the carriage of HFOs for cargo. The ban will come into effect on 1 July 2029 for ships meeting structural requirements concerning the protection of fuel tanks and on 1 July 2024 for other ships. The prohibition does not apply to ships engaged in securing the safety of ships or in search and rescue operations and ships dedicated to oil spill preparedness

and response. In addition, the authorities of Arctic coastal States are entitled to waive the application of the prohibition for ships flying their flag while operating in waters subject to their sovereignty or jurisdiction (i.e., internal waters, territorial sea and exclusive economic zone) until 1 July 2029. The temporary waivers, introduced to accommodate the concerns of Arctic coastal States, have come under criticism by environmental NGOs, who pointed out that the ban will not contribute to the reduction of HFO use in Arctic waters until it fully comes into effect in 2029 (Comer et al., 2020).

(2) Emissions of pollutants to the air

Ships powered by engines emit air pollutants produced by fuel combustion, including carbon dioxide (CO₂), nitrogen oxides (NO_x), sulfur oxides (SO_x), and particulate matter such as black carbon. Of particular concern in the Arctic is the environmental and climate effects of black carbon particles, which may accelerate the retreat of sea ice by reducing the albedo of snow and ice in the Arctic (Arctic Council, 2009). International rules and standards for the prevention of the emission of main air pollutants from ships are contained in Annex VI of the MARPOL Convention. The limits for NO_x, SO_x, and particulate matter emissions were progressively tightened through the revision of Annex VI. MARPOL Annex VI also allows for the designation of emission control areas (ECAs) subject to more stringent controls compared to globally applicable standards.

The impact of ship emissions to the air, including the release of black carbon, on the Arctic marine environment was considered in detail in the AMSA Report (Arctic Council, 2009). While the option to implement a higher level of protection in the Arctic

through the designation of an ECA under MARPOL Annex VI was referred to in the report, it has not yet been acted upon. The Arctic Council has subsequently conducted work to assess and understand the effect of black carbon emissions, including those from shipping activities (Arctic Council Task Force on Short-Lived Climate Forcers, 2011, 2013). However, the issue of atmospheric pollution was not included in the scope of the negotiations in the process leading to the adoption of the Polar Code. As a result, the Polar Code, as initially adopted, did not include regulations directly relevant to the issue. The 2021 amendment to MARPOL Annex I on the use and carriage of HFO, discussed in the previous section, is intended to reduce black carbon emissions. Otherwise, the applicable regulatory standards for shipping in the Arctic are the basic rules contained in Annex VI, such as the global sulfur limit of 0.50% effective from 1 January 2020.

With regard to the emission of black carbon from ships, a notable recent development is the adoption of a resolution on this issue at the 77th session of MEPC in November 2021. The resolution urges States and ship operators to “voluntarily use distillate or other cleaner alternative fuels or methods of propulsion that are safe for ships and could contribute to the reduction of Black Carbon emissions from ships when operating in or near the Arctic” (IMO, 2021c). The issue of black carbon in the Arctic was first raised in 2010 (Norway et al., 2010), after which the Sub-Committee on Bulk Liquids and Gases (BLG) (and subsequently the Sub-Committee on Pollution Prevention and Response (PPR)) was mandated, *inter alia*, to consider control measures to reduce the impact of black carbon emissions from international shipping. Although not legally binding in nature, the

resolution represents the first concrete step taken by the IMO to reduce black carbon emission from ships in the Arctic after more than ten years of work on the issue.

However, discussions leading to the adoption of the resolution indicate a disagreement between States on the required measures. The adoption of voluntary measures as the first step reflects a compromise between delegations calling for the accelerated development of measures to reduce black carbon emissions and delegations taking the view that further studies and trials would be required as the available data are insufficient for the consideration of possible control measures (IMO, 2021a; Russian Federation, 2022). While adopting the recommendation, MEPC agreed to extend the work of the PPR on Arctic black carbon until the target completion year in 2023, with the mandate, *inter alia*, to “develop, as a starting point, guidelines on recommendatory goal-based control measures to reduce the impact on the Arctic of Black Carbon” and to “further consider regulating or otherwise directly control Black Carbon emissions from marine diesel engines” (IMO, 2022).

(3) Underwater noise

The introduction of underwater noise generated by ships and other anthropogenic sources into the marine environment is known to affect the behavior of marine life, especially in marine mammals. In recent years, anthropogenic underwater noise has increasingly been identified as an issue that requires an international response. Although underwater noise may be regarded as “pollution of the marine environment” as defined in Art. 1(1)(4) of the United Nations Convention on the Law of the Sea, to which

general obligations concerning the protection of the marine environment apply, there are no specific legally binding rules at the global level. The IMO's MEPC adopted guidelines to address this issue in 2014 (IMO, 2014a), and further work is currently underway to review and update these guidelines.

While underwater noise is an emerging issue of global concern, the Arctic is a unique case because of factors such as the low level of ambient sound and the existence of species largely unexposed to anthropogenic noise. The AMSA Report identified “sound and noise disturbance” as one of the potential disturbances from ships and shipping activities in the Arctic (Arctic Council, 2009). In 2019, PAME published a report providing an overview of current scientific knowledge and its gaps concerning underwater noise in the Arctic (PAME, 2019). Following the 2019 Report, PAME further conducted work on modeling and mapping underwater noise from ships in the Arctic and published the results in a report in 2021 (PAME, 2021). The 2021 Report identified a significant increase in underwater noise levels in some regions of the Arctic, with ship traffic at a level that can result in the masking of communication in marine mammals. Based on these two reports, PAME is currently undertaking a project “to further characterise the Arctic ocean soundscape, investigate scenarios for noise level predictions to 2030, and model operational and technological scenarios to mitigate underwater noise impacts” (Underwater Noise in the Arctic: Understanding Impacts and Defining Management Solutions - Phase II).

(4) Invasive alien species

Invasive alien species are those whose introduction and/or spread outside their natural past or present

distribution threatens biodiversity. The movement of ships can result in the introduction of invasive aquatic species into new areas by carrying them in ships' ballast water or on their hulls (biofouling). At the global level, the problem of invasive species in ships' ballast water is addressed by the Ballast Water Management Convention, which requires ships to implement ballast water management plans (IMO, 2004). The problem of biofouling is addressed by the Biofouling Guidelines adopted by the MEPC of the IMO, which provide guidance to minimize the transfer of aquatic invasive species through biofouling (IMO, 2011).

The introduction and spread of invasive species through ballast water and biofouling were discussed in the AMSA Report as a risk that will increase in proportion to the volume of Arctic shipping. It was identified as an issue requiring further study (Arctic Council, 2009). In 2017, the work of the Conservation of Arctic Flora and Fauna Working Group (CAFF) and PAME of the Arctic Council on the broader issue of invasive alien species in the Arctic resulted in the publication of the Arctic Invasive Alien Species Strategy and Action Plan (CAFF & PAME, 2017). The Strategy and Action Plan outlines the steps required to prevent the spread and impact of invasive alien species in the Arctic, where the problem is currently limited. With regard to shipping activities, the Strategy and Action Plan lists among the priority actions encouraging the implementation of effective programs through domestic actions and/or international agreements, collecting information on best practices, and assessing whether there is a need for the IMO to develop Arctic-specific guidance to minimize the threat posed by ballast water and biofouling. For the 2021-2023 biennium,

PAME and CAFF are undertaking a project on Marine Invasive Alien Species in Arctic Waters, which will specifically focus on the potential transfer of invasive aquatic species into and within Arctic waters by ships (Arctic Council, 2021).

(5) Wastewater discharge

Various forms of waste and wastewater are produced during the normal operation of ships. The discharge of these substances into the marine environment is regulated at the global level by the MARPOL Convention, including its Annex on oil (Annex I), sewage (Annex IV), and garbage (Annex V). In Arctic waters, the management of discharges to avoid environmental damage is an issue that requires serious consideration (Arctic Council, 2009). Compared to the regulations that generally apply under MARPOL, the Polar Code contains stricter requirements such as the complete prohibition of discharge of oil or oily mixtures and the restriction of sewage discharge except under limited circumstances (IMO, 2015).

However, the current regulatory framework does not prohibit the discharge of certain types of wastewater into the Arctic marine environment. First, subject to certain requirements, the Polar Code allows treated sewage, and untreated sewage in some circumstances, to be discharged (IMO, 2015). Second, grey water, which refers to drainage from dishwater, shower, laundry, bath, and washbasin drains, is neither regulated in the Polar Code nor under the provisions of MARPOL that apply globally. Some studies suggest that grey water contains harmful substances such as bacteria and chemicals that require regulation at a global level. Grey water is also a source of marine plastic pollution. Third, ships with exhaust gas cleaning systems (scrubbers) may discharge

wastewater produced during their operation. While scrubbers reduce air emissions such as SOx, CO₂, and black carbon, scrubber effluents have low pH levels and contain polycyclic aromatic hydrocarbons (PAHs) and particulate matter such as heavy metals and ash that may adversely impact the marine environment. The Polar Code does not address the issue of scrubber effluents. While guidelines exist at the global level, they only include discharge standards for certain properties of effluents.

The issue of unregulated wastewater discharge from Arctic shipping has been raised, especially by environmental NGO groups calling for additional regulation in the global and Arctic contexts (Pew Charitable

Trusts, 2018; WWF Arctic Programme, 2018). Related work in the Arctic Council is at the stage of collecting information to better understand this problem. For the 2021-2023 biennium, PAME is undertaking a "Survey of Select Wastewater Discharges", with the goal of developing a better understanding of vessel practices related to wastewater discharges in the Arctic. In the Arctic region, this problem is intertwined with the lack of infrastructure to adequately dispose of waste and wastewater, which is an important issue for the implementation of strict discharge regulations already in place under the Polar Code. PAME has continued to conduct work related to this issue (PAME, 2017, 2022).





Ensuring the sustainability of Arctic shipping

To ensure the sustainability of Arctic shipping, it is important to understand its environmental impacts and the available mitigation measures, as well as to establish international rules and standards where required. As highlighted in this document, various issues related to the environmental impacts of shipping in the Arctic continue to be addressed and discussed after the adoption of the Polar Code. There are

also further issues identified by the AMSA Report that are not subsequently addressed by the Polar Code, such as vessel strikes, disturbance of ice by icebreakers, and light disturbance. While considerable work has already been done concerning the protection of the Arctic environment and ecosystem from shipping, further work will continue in the IMO and Arctic Council.

■Relevant Information

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