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REDUCTION OF GHG EMISSIONS FROM SHIPS

Work to support uptake of true zero emission nuclear-powered ships

Submitted by WNTI

SUMMARY

Executive summary:	Nuclear power will enable ships to achieve true zero GHG emissions on a well-to-wake basis (WtW), as well as zero emissions of other harmful pollutants to air or water. Nuclear-powered ships can operate for years without refuelling, alleviating concerns about low and zero carbon fuel availability and supply infrastructure. The Code of Safety for Nuclear Merchant Ships, adopted in 1981, has been identified as a barrier to the timely deployment of nuclear-electric ships using advanced reactor technologies. This document outlines major work already done by WNTI to provide a framework for revising the Code to be fit for purpose and support a new generation of nuclear-powered ships.
Strategic direction, if applicable:	3
Output:	3.8
Action to be taken:	Paragraph 11
Related documents:	MSC 108/INF.21 and MSC 108/WP.8

Introduction

1 There is growing realisation that nuclear power has a vital role to play in meeting the goals of the *2023 IMO Strategy on Reduction of GHG Emissions from Ships* (2023 IMO GHG Strategy). This has been recognized by the Maritime Safety Committee (MSC) in work undertaken so far under a new continuous output on "Development of a safety regulatory framework to support the reduction of GHG emissions from ships using new technologies and alternative fuels" approved by MSC 107. This output, henceforth referred to as "GHG Safety" is considered crucial and urgent work to support the 2023 IMO GHG Strategy.

2 A Correspondence Group (CG) established at MSC 107 and a Working Group (WG) established at MSC 108 on the Development of a Safety Regulatory Framework to Support the Reduction of GHG Emissions from Ships Using New Technologies and Alternative Fuels,

have developed a list of alternative fuels and new technologies to support the reduction of GHG emissions from ships, which includes nuclear power. The CG and the WG at MSC 108 also identified barriers and gaps in current IMO instruments that may impede the use of the alternative fuels or new technologies.

3 During the CG on the Development of a Safety Regulatory Framework to Support the Reduction of GHG Emissions from Ships Using New Technologies and Alternative Fuels, and during MSC 108, several delegations identified that the Code of Safety for Nuclear Merchant Ships (the Code), adopted by Assembly as resolution A.491(XII) in 1981 as a supplement to SOLAS chapter VIII, is out of date and in need of review, and that the Code presents a barrier to deployment of nuclear-electric ships using advanced reactor technologies.

Background

4 A new generation of marine-appropriate nuclear reactors are under development and are expected to become available to the market from around 2030. Significant investments have already been made in their development by maritime stakeholders, including shipowners who recognise the need for true zero-emission ships. The appropriate regulatory framework needs to be in place to allow ships to use these advanced new nuclear technologies as they become available. For reasons explained below, the Code in its current form is a barrier to the introduction of commercially owned and operated nuclear-powered ships to the global fleet.

5 The Code has not been reviewed or amended since it was adopted in 1981, and now needs to be comprehensively revised and updated to reflect and accommodate more than four decades of progress in both maritime and nuclear safety and security standards, as well as relevant technology developments.

6 The Code is currently limited to prescribing requirements for ships using early designs of pressurised water reactor (PWR) technology that use a direct steam cycle propulsion system. Although this technology is well proven and has an exemplary safety record at sea, it does not lend itself to application on merchant ships operating internationally, primarily owing to licencing stipulations for a large emergency planning zone (EPZ) required for highly pressurized nuclear reactors. This prevents commercial insurance and, as a result, port calls from ships that are not commercially insured. While there are over 160 nuclear-powered ships in operation today, these are mostly naval ships, and some state-owned icebreakers which are all underwritten by the country of origin.

7 Progress in the design of a new generation of advanced reactor technologies and the development of all-electric-ship concepts have created the potential for successful application of different nuclear technologies to ships, incorporating features that could make them more suitable for commercial marine applications. For example, reactors are being developed that incorporate inherent passive safety features and low operating pressure which would require a small EPZ, allowing nuclear-powered ships to be commercially insured. Some designs also benefit from longer fuel cycles that will reduce, or even eliminate the need for refuelling and handling of nuclear material in ports, for the lifetime of the ship.

8 A group of experts on nuclear reactor technology and safety standards at WNTI has undertaken a detailed and thorough gap analysis of resolution A.491(XII) to demonstrate how the Code may be revised and updated to be fit for purpose and support a new generation of nuclear-powered merchant ships, while meeting current international practice relating to nuclear safety standards set by the International Atomic Energy Agency (IAEA). It provides a framework for creating a revised Code that is consistent with the current goal-based approach and follows a technology-inclusive, risk-informed, performance-based approach. The gap analysis has been made available to the IMO in document MSC 108/INF.21 (WNTI).

9 MSC 108 recognized that the Code is out of date and in need of review, and that the Code presents a barrier to the deployment of new types of reactors and power conversion systems in merchant ships (MSC 108/WP.8, annexes 1 and 2). Given the significant investments required to develop and deploy new marine-appropriate nuclear propulsion technologies meeting the highest safety standards, this barrier needs to be addressed to underpin and encourage market efforts to unlock the potential of nuclear power to decarbonise shipping. Nuclear-powered ships offer zero GHG emissions on a well-to-wake (WtW) basis and emit no other harmful pollutants to air or water during operation.

10 MSC is currently mapping out regulatory gaps and barriers related to GHG Safety and has not yet formally agreed to undertake a revision of the Code. Revising the Code is a major undertaking and will take time, however the comprehensive gap analysis provided in document MSC 108/INF.21 has already laid the groundwork by identifying the sections of the Code that require updates, providing a solid basis for starting the review and revision of the Code.

Action requested of the Committee

11 The Committee is invited to note the information in this document and the gap analysis provided in document MSC 108/INF.21 and its annex.