INTERNATIONAL MARITIME ORGANIZATION

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Agenda item 5

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REVIEW OF THE 2014 GUIDELINES FOR THE REDUCTION OF UNDERWATER NOISE FROM COMMERCIAL SHIPPING TO ADDRESS ADVERSE IMPACTS ON MARINE LIFE (MEPC.1/CIRC.833) (2014 GUIDELINES) AND IDENTIFICATION OF NEXT STEPS

The synergies between energy efficiency and underwater radiated noise (URN) and proposed actions

Submitted by ICS, BIMCO, INTERTANKO and IPTA

SUMMARY

Executive summary:	This document references a recently completed study into the interrelationship between ship energy efficiency measures and reduction of underwater radiated noise. Noting the strong synergies that are highlighted by the report, and further building on the recently approved IMO Guidelines on URN reduction, several action points are proposed. These actions align with the previously proposed targets by the Okeanos Foundation, to enable significant URN reduction through to 2050.
Strategic direction, if applicable:	1
Output:	1.16
Action to be taken:	Paragraph 7
Related documents:	SDC 9/16/Add.1 and SDC 10/5

Introduction

1 This document reports relevant information to the Sub-Committee ahead of the anticipated re-establishment of the URN Working Group at SDC 10.

Background

2 The *Revised guidelines for the reduction of underwater radiated noise from shipping to address adverse impacts on marine life* were approved by MEPC 80 and have now been published as MEPC.1/Circ.906. MEPC 80 also approved the *Guidelines for underwater radiated noise reduction in Inuit Nunaat and the Arctic* (MEPC.1/Circ.907).

3 MEPC 80 also:

.1 endorsed the updated URN work plan as set out in annex 2 to document SDC 9/16/Add.1;

.2 agreed to extend the target completion year for output 1.16 on "Review of the 2014 Guidelines for the reduction of underwater noise from commercial shipping to address adverse impacts on marine life (MEPC.1/Circ.833) and identification of next steps" to 2024;

.3 approved the convening of an expert workshop on the relationship between energy efficiency and underwater noise; and

.4 noted that the Sub-Committee had re-established the relevant Correspondence Group to continue the remaining work.

4 Intersessionally, the URN Correspondence Group has progressed the work plan and the Coordinator has submitted the Group's report as document SDC 10/5. This includes:

.1 a revised reference chart on the URN management planning process; and

.2 a list of suggested next steps, presented in the format of an action plan, to further prevent and reduce URN from ships (annex 2).

5 ICS has separately sponsored a study (the study) by the University of Southampton into the interrelationship between energy efficiency and URN reduction. The results of the study were published in early November and, although too late to be considered within the Correspondence Group, has relevance to the forthcoming discussions at SDC 10.

Discussion

6 The Southampton University report (the report) may be accessed here.* Sponsors would like to highlight the following aspects:

.1 Global trends in ambient URN
The study has carried out a comprehensive review of global URN trends based on long-term physical measurements. Generally ambient URN has been on an upward trend for decades and historically this has amounted to about a 3-decibel average increase per decade. The Arctic, in particular, is experiencing a relatively rapid increase in URN. Clearly this is of concern and shipping remains a major contributor to such increases.

.2 However, this upward trend is not universal and in some regions the levels are static or even falling. The study identifies long term natural oscillations in URN that could contribute to such inconsistent trends. The report also refers to the roll-out of ship energy efficiency measures as a possible abatement factor. Noting that about 28% of the world fleet is now fitted with energy saving devices (ESDs) or propulsion improving devices (PIDs), it does seem likely to the sponsors that this will have a discernible impact on ambient URN.

* https://www.ics-shipping.org/wp-content/uploads/2023/11/URN-Final-report-ver-4-02-11.pdf

.3 The Coastal Enhancement Effect
When considering coastal sources of URN, the report describes how the Coastal Enhancement Effect can give these a disproportionately large impact on deep ocean ambient URN. This is due to the reflection of the sound waves back into the deep ocean at a shallow angle, enabling them to travel much longer distances than if the same sound sources were in the deep ocean.

.4 Other anthropogenic sound sources
The ambient URN is also influenced by other man-made sources. These sounds are utilized for a multitude of valuable purposes, such as communication, navigation, defence, research and fishing. Furthermore, there are a high variety of sounds generated as a by-product of another activity, e.g. offshore industrial activities, including oil drilling and production, or seismic airgun signals which are employed for exploration purposes, used to examine the seafloor's layers and locate subsea oil and gas deposits. Although these activities fall outside the purview of IMO, it underscores that IMO alone cannot fully manage the levels of ambient deep ocean URN, particularly when we consider the coastal enhancement effect that can project such coastal URN great distances, back into the deep ocean. Consequently, the role of coastal States also remains very important, not only in the control of coastal ambient URN but also in the reduction of deep ocean ambient URN.

.5 The contribution of energy efficiency to net zero by 2050
The study forecasts that energy efficiency measures will remain an important component of decarbonization in the coming decades and by 2050 will contribute about 32% of the total decarbonization effort. Due to the progressive nature of the GHG regulations, the expected high price of the alternative fuels and the need for the gradual replacement or retrofit of the entire world fleet, it is anticipated that the energy efficiency gains will increase steadily through to 2050.

.6 Synergies between energy efficiency and URN
Table 2 within the report estimates the approximate energy efficiency gains and URN reductions that are attributable to the various measures currently being considered or installed by ship owners. As may be seen, for the vast majority there is a clear co-benefit and synergy, with many of the measures yielding around 5-decibel URN reduction. For some, e.g. air lubrication, wind assisted propulsion and hybrid battery power, around 10-decibel reductions are possible.

.7 It should be noted that decibels work on a logarithmic scale, and a 3-decibel reduction in noise equates to a halving of the sound energy and a 10 decibel reduction results in one tenth of the sound energy. Hence, reductions of 5 to 10 decibels attributable to single measures are substantial.

.8 One of the most effective ways to reduce both fuel consumption and URN is speed reduction, and the study also estimates that on average, a 20% reduction in speed can amount to about a 6-decibel reduction in URN.

.9 Measures to be carefully managed
Fortunately, there are very few energy efficiency measures that can increase URN and in this respect the study identifies optimization of the propeller blade area and slow running of controllable pitch propellers as having this potential conflict. These aspects should be carefully managed by designers, suppliers and shipowners to ensure the best compromises between energy efficiency and URN management.

.10 Nevertheless, there are many other aspects of propeller design and operation that do produce co-benefit, and these include the adoption of a contracted loaded tip propeller, a Kappel propeller or utilizing a propeller boss cap fin.

.11 Global targets for URN reduction and the feasibility of achieving them as a co-benefit of decarbonization
The study carried out an extensive literature review, and the only global targets for reduction of ambient URN that have yet been proposed and received a degree of recognition are the below targets advocated for by the Okeanos Foundation:

"We call for initial global action that will reduce the contributions of shipping to ambient noise energy in the 10-300 Hz band by 3 dB in 10 years and by 10 dB in 30 years".

.12 These were previously endorsed by the International Whaling Commission, and also appear in the conclusions of a report of a 2019 URN workshop held at IMO.

.13 A comprehensive assessment of the impact of the GHG regulations on global levels of URN is a very complex task, not least due to difficulties in forecasting levels of trade, the impact of coastal variations, water depth and attenuation, and seasonal and long-term undulations in URN due to natural causes, etc. Nevertheless, the study identifies an approximate technique by Ross which correlates the key parameters influencing deep ocean ambient URN, i.e average source level, density of shipping traffic, water depth and attenuation factor. Using this methodology, the study was able to consider a worst-case trade growth scenario through to 2050 and assess the feasibility of energy efficiency measures producing the magnitude of URN reductions called for by Okeanos. The report concludes:

"When this study considers the synergies between energy efficiency and URN reduction, and even after taking account of worst-case projections for growth in transport work, it becomes evident that accomplishing a 3 dB reduction in shipping's contribution to ambient noise within a decade is a feasible goal."

.14 It should be emphasised that the efficiency measures nominated by the study team represents their view of the most likely combination that shipowners will choose as a result of the GHG regulatory compliance obligations, and the expected high price of the alternative fuels. There are many other efficiency measures that could produce significant noise reduction while also ensuring compliance with the GHG regulations. To maintain efficient and safe operation, it is important that shipowners must retain the discretion to select the efficiency measures they judge to be the most appropriate to meet their

GHG regulatory obligations. It is important for IMO to maintain a non-prescriptive approach and not to mandate specific measures such as speed limitation.

Opportunities to achieve significant reductions in URN as a co-benefit of decarbonization

7 Shipping's endeavour to fully decarbonize by 2050 should continue to be prioritised through the mandatory GHG regulations. Nevertheless, it is apparent that the aforementioned synergies present an opportunity and, with limited additional effort and guidance, can be leveraged to give a very beneficial outcome in terms of noise reduction and improved ocean health. Hence the sponsors propose the following approach going forward:

.1 Application of the *Revised guidelines for the reduction of underwater radiated noise from shipping to address adverse impacts on marine life* (MEPC.1/CIRC.906) by the shipping industry and other stakeholders should be further encouraged and the uptake of the guidelines increased. This should be achieved through raised awareness (e.g. with best practice industry publications) and incentive schemes (e.g. discounting of port dues).

.2 The conflicts arising from optimization of the propeller blade area ratio and slow running of controllable pitch propellers need to be carefully explained, and shipowners, designers and suppliers dissuaded from these practices. For instances where these cannot be avoided detailed explanation of how they can be managed to produce the best compromise between energy efficiency and noise reduction should be provided. This could be achieved through a further IMO guidance document or circular. Industry best practice publications should also disseminate this information.

.3 Through this pragmatic approach, a co-benefit of the IMO GHG regulations and deep ocean ambient URN reductions can be expected, of the magnitude called for by the Okeanos Foundation. The progress towards these targets should be confirmed by long term recording of deep ocean URN levels. This will allow the industry to maintain its vital focus on decarbonization, whilst simultaneously achieving substantial reductions in deep ocean URN.

.4 For limited areas that need more focused measures, the application of Particularly Sensitive Sea Area (PSSA) status should be considered.

Action requested of the Sub-Committee

8 The Sub-Committee is invited to note the information, including the annex, and to consider the proposal in paragraph 7 and take action, as appropriate.

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ANNEX

SOUTHAMPTON UNIVERSITY REPORT

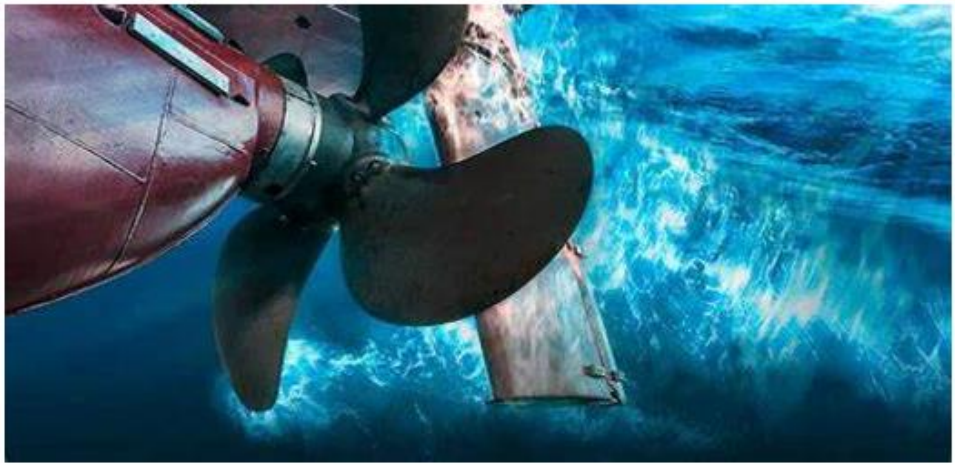
The report may be accessed here.

Southampton Marine & Maritime Institute

University of Southampton

The impact of shipping's energy efficiency measures on reduction of underwater radiated noise, and opportunities for co-benefit

Version 4- 02.11.2023



Authors

Vakili, S., White, P., Turnock, S.R.