E

SUB-COMMITTEE ON SHIP DESIGN AND CONSTRUCTION
12th session
Agenda item 8

SDC 12/INF.5
16 October 2025
ENGLISH ONLY
Pre-session public release: ☒

EXPERIENCE-BUILDING PHASE FOR THE REDUCTION OF UNDERWATER RADIATED NOISE FROM SHIPPING

An assessment of incentive schemes as a driver of URN reduction – A Stolt Tankers case study

Submitted by ICS, BIMCO and ASEF

SUMMARY

Executive summary:	The present document includes a case study on adoption of "quiet ship" class notations. The associated costs are compared with the potential financial gains attributable to a typical incentive scheme, i.e. a scheme that is intended to improve environmental performance. It is concluded that for the example ship there is a substantial imbalance between the cost of achieving a quiet ship class notation, and the potential reduction in port dues attributable to the typical incentive scheme. Ways to address this imbalance are presented, including the reconfiguration of incentive scheme rewards, and also encouraging the development of standards for autonomous underwater radiated noise (URN) measuring facilities or equivalent technologies.
Strategic direction, if applicable:	1
Output:	1.16
Action to be taken:	Paragraph 27
Related document:	MEPC.1/Circ.906/Rev.1

Introduction

1 This case study recounts the experience of Stolt Tankers with the adoption of quiet ship class notations. The associated costs are compared with the financial gains attributable to a typical incentive scheme, i.e. a scheme that is intended to improve environmental performance.

Background – Stolt Tankers

2 The roots of Stolt Tankers go back to 1959 when the Norwegian Jacob Stolt-Nielsen established his first shipping company. Throughout its history, the company has been innovative, designing the first parcel tanker in 1970, and being early adopters of new technologies and business lines. In 2020, Stolt Tankers signed the United Nations Global Compact, thereby committing the company to the UN's sustainable development goals. In 2022, Stolt Ventures was established, with the objective of exploring opportunities for sustainable technologies in maritime logistics and carbon reduction.

3 In 2023, Stolt Tankers became the first chemical tanker operator to apply a graphene-based marine coating to the propellers and hulls of their ships to reduce marine growth, improve propulsion and fuel efficiency and reduce underwater radiated noise (URN). In 2024 Stolt coated 26 propellers, bringing the total across their fleet to 55 units.

4 Stolt-Nielsen currently employs over 7,000 staff with Stolt Tankers employing over 4,700.

5 Stolt Tankers 2024 sustainability report states:

> "The Board and management believe that acting responsibly and protecting people and the environment is essential for the future success of our company and protects shareholder value. From our health and safety focus and environmental performance to our asset management, investment decisions and the way we recruit and develop our people, we aim to work in a way that is safe for both people and the environment."

Examples of recent Stolt Tankers actions to mitigate URN emissions

6 Earlier this year, Stolt Tankers undertook some further modifications on two close sister ships, each of about 9,000 gross tonnage (GT). The modifications were intended to improve energy efficiency (EE) and reduce URN.

7 Both ships were assessed by a classification society for a "quiet ship" class notation and the necessary URN measurements were conducted. The most recent measurements were intended to confirm the impact of the ship modifications on URN. The total cost, including workboat hire, hydrophone measurements and class survey fees was about US$100,000 for the two ships (i.e. a total cost for each ship of about US$50,000). For comparison, this is of similar magnitude to typical figures provided by another classification society for an equivalent URN class notation, again, inclusive of the workboat hire, class survey fees and measurement costs.

8 The measurements took in excess of six hours per ship. Though less tangible, additional costs were also accrued for diverting the ship from its normal trade, e.g. due to the manning cost, additional fuel, loss of charter time etc.

9 Stolt Tankers have not as yet adopted noise management plans for their ships, although this is an additional step they are currently considering.

Results

10 Presented in figures 1 and 2 are the URN measurements for one of the ships (hereafter referred to as the example ship), before and after the ship went into dry dock for hull and propeller cleaning, coating and installation of a propeller boss cap fin (PBCF).

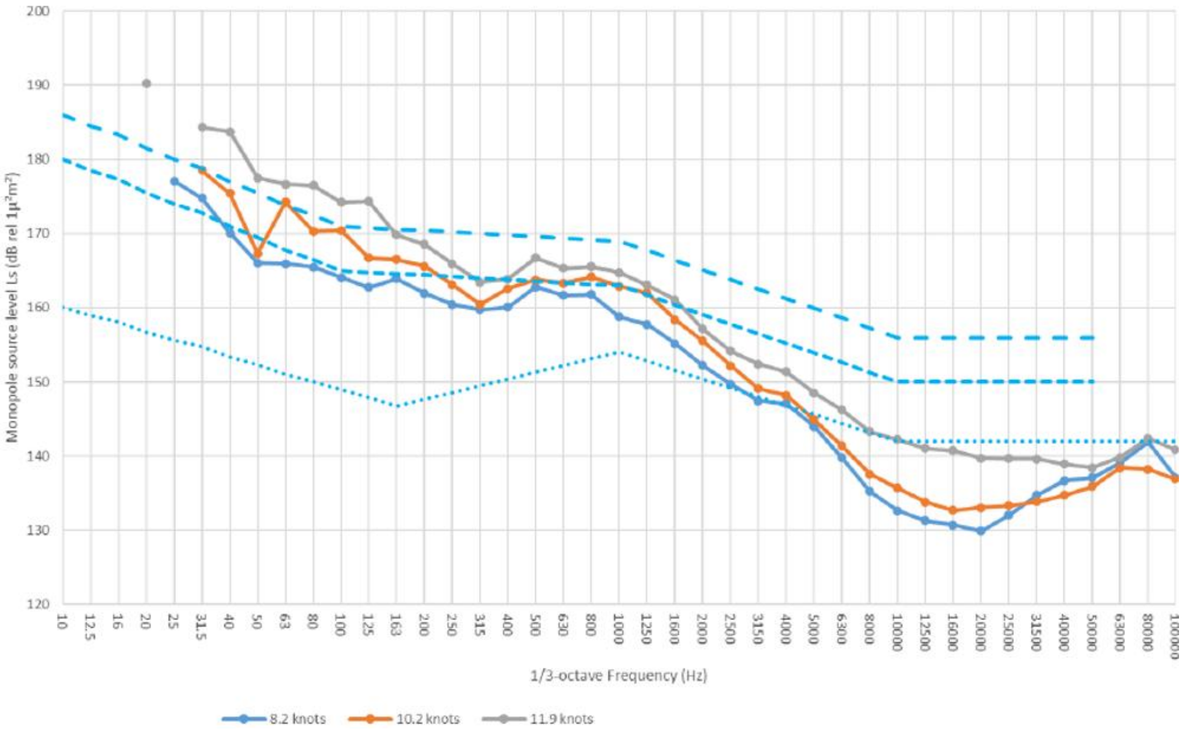

Figure 1 - URN results prior to hull and propeller cleaning, coating and installation of a PBCF – conducted 19th April 2024 off Bulgaria

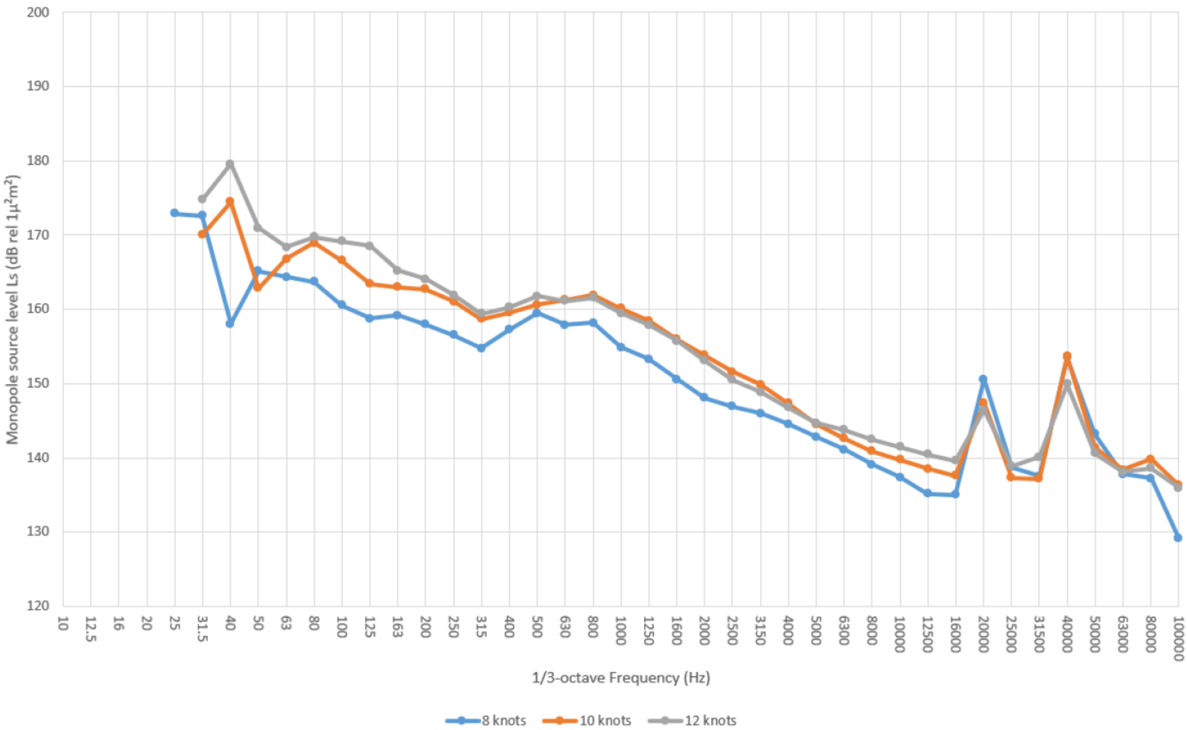

Figure 2 - URN results after hull and propeller cleaning, coating and installation of a PBCF – conducted 11th May 2025 off Galveston, USA

11 Figure 3 below is an overlay of the two sets of measurements. The classification society confirmed the accuracy of the measurements as +/- 3 to 6 dB. Therefore, it is inappropriate to quantify exact URN reductions. However, it is encouraging that at 12 knots the low frequency URN has reduced by about 4 to 8 decibels and between 2 and 4 dB at 8 knots. High frequency URN, increased at 20 kHz and 40 kHz, and this is attributed to the fitting of an ultrasonic anti-fouling system within the box coolers. These frequencies fall within the documented communication and hearing ranges of baleen whales[1] (e.g. blue, humpback, and right whales), which NOAA identifies as low-frequency cetaceans with hearing extending from approximately 7 Hz to 35 kHz, with peak sensitivity below 1 kHz (NMFS, 2024). This overlap highlights the potential for increased risk of acoustic masking in biologically important frequency bands, despite the reductions observed at lower frequencies.

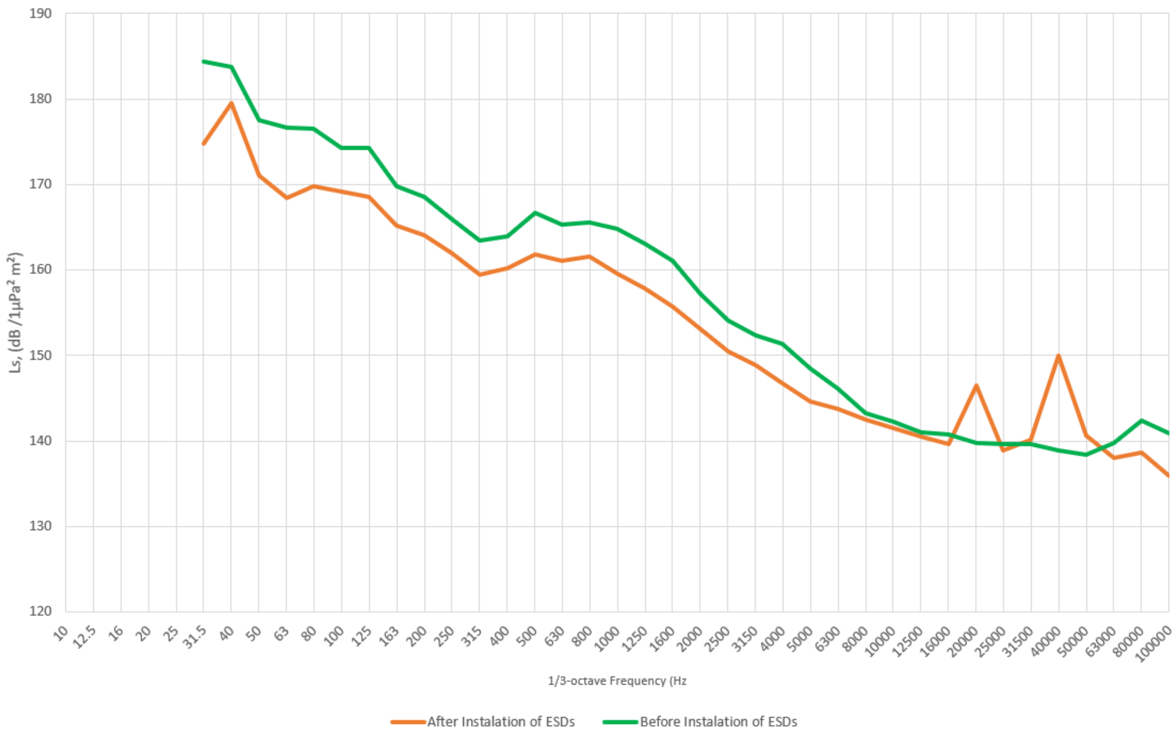

Figure 3 - Overlay of the two sets of measurements

12 Following the measurements, the classification society awarded their quiet ship class notation for a ship speed of ten knots. With respect to the ultrasonic anti-fouling system, this is subject to further verification by the classification society, but potentially could be mitigated by temporarily turning off the antifouling system when entering sensitive sea areas.

Environmental incentive schemes

13 The two ships principally operate between Mexico, central America, Jamaica, Houston, New Orleans, and Texas City. As yet, there are no environmental incentive schemes within this locality that Stolt Tankers participate in, and that reward URN reduction measures.

---

1 Reference: National Marine Fisheries Service. (2024). *Update to: Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 3.0): Underwater and In-Air Criteria for Onset of Auditory Injury and Temporary Threshold Shifts* (NOAA Technical Memorandum NMFS-OPR-71). U.S. Department of Commerce. https://www.fisheries.noaa.gov/s3/2024-11/Tech_Memo-Guidance_-3.0-_OCT-2024-508_OPR1.pdf

14 Stolt Tankers confirms that their motivation for achieving the URN notations and doing further research is rooted in their corporate culture, which has consistently driven the organization to be an early adopter of new technologies and innovative practices. By taking this approach, they aim to set a strong example and create a foundation for industry peers to adopt similar measures in addressing environmental impacts.

15 However, for illustrative purposes, we can use the Port of Vancouver's incentive scheme to compare against. Under this scheme, a ship receiving a quiet ship class notation would benefit from the platinum level of reduction in port dues. If a similar scheme were introduced on a regular port call for the example ship, then for 9,000 GT, such a reward scheme would yield a reduction in port dues of CAD$0.087 per GT, per visit. Assuming 5 port calls per year, such a scheme could yield an overall reduction in port dues of about CAD$3,915 per annum, i.e. equivalent to about US$2,836 per annum.

Comparison of the cost of a quiet ship class notation with the potential benefit from an environmental incentive scheme

16 For the example ship, the notation was achieved after the first set of URN measurements in 2024. Although a second set of measurements was carried out in 2025, this was not required as part of the normal 5 yearly renewal of class certification. Therefore, the cost of achieving the notation was principally the class fees and the cost of the URN measurements, workboat hire and hydrophones, i.e. about US$50,000. Although, as previously noted, there may also be costs attributable to the redeployment of the ship to the locality of the recording equipment, and also the time for the measurements, during which the ship is off-hire.

17 There exists a strong synergy between EE and URN measures, and, therefore, it is assumed that the cost of the physical modifications is attributed to GHG regulatory compliance and savings in fuel cost, i.e. there is no capital cost attributable to URN reduction.

18 For comparison, over the same 5 yearly survey cycle, a served port introducing an environmental incentive scheme similar to the port of Vancouver, would yield about a US$14,180 saving in port dues, i.e. substantially less than the cost of +US$50,000 of achieving the quiet ship class notation.

19 In essence, this case study highlights two factors contributing to this financial imbalance, i.e.:

.1 Whereas the rewards attributable to incentive schemes are usually determined by GT, the dominant cost for achieving a quiet ship class notation is the URN measurements, which are the same, regardless of the size of the ship. Hence, the reward systems tend to benefit larger ships.

.2 Although measurement of URN by an autonomous buoy[2] is usually far cheaper than dedicated sea trials, autonomous buoys are regarded as insufficiently accurate by the class societies for the award of a quiet ship class notation. Therefore, the measurement techniques specified by the class societies make the achievement of a quiet ship notation relatively expensive as compared to alternative approaches, e.g. by adoption of a noise management plan, where generally the accuracy of the autonomous measuring facilities is considered sufficiently accurate.

[2] It is acknowledged that alternative measurement technologies are also under development that could, in due course, fulfil the same objectives as an autonomous buoy, i.e. increased availability and reduced measurement cost. For example, onboard methods of URN measurement, and measurement of URN by drones.

Conclusions

20 For the example ship, the cost of achieving the quiet ship class notation, including workboat hire, hydrophone measurements and class survey fees was about US$50,000. This is of similar magnitude to typical figures provided by another classification society for an equivalent URN class notation. Less tangible costs may also be accrued for diverting the vessel from its normal trade, e.g. due to the manning cost, additional fuel, loss of charter time etc.

21 On the basis of the 2024 URN measurements, the example ship was awarded a quiet ship class notation for a speed of 10 knots. In 2025 the following further URN/EE improvements were undertaken, and the URN measurements were repeated by the classification society:

.1 hull and propeller cleaning and coating; and

.2 installation of a PBCF.

22 Measurements taken before and after the ship modifications indicated approximate reductions in URN of:

.1 4 to 8 dB (at 12 knots); and

.2 2 to 4 dB (at 8 knots).

However, assigning precise levels of reduction is inappropriate due to inherent inaccuracies in the measurement technique. The class society noted that the observed URN changes fall within the expected margin of error, and they could not determine whether the reductions were attributable to the vessel itself or the surrounding environment.

23 As yet, there are no environmental incentive schemes within the locality of operation that reward URN reduction measures. However, for comparison, a scheme similar to Vancouver's would yield 5 yearly reductions in port dues of about US$14,180, versus the 5 yearly cost of maintaining the quiet ship class notation of about US$50,000.

24 Within this case study there is a substantial imbalance in the cost of achieving a quiet ship class notation, versus the potential reductions in port dues. Contributory factors include:

.1 The rewards attributable to incentive schemes are usually determined by GT, whereas the dominant cost for achieving a quiet ship class notation is the URN measurements, which are the same, regardless of the size of the ship. Hence, the reward systems tend to benefit larger ships.

.2 The measurement techniques specified by the class societies make the achievement of a quiet ship notation relatively expensive as compared to alternative approaches, e.g. the adoption of a noise management plan, where generally the accuracy of the autonomous measuring facilities is considered sufficiently accurate. Although at an early stage, it is understood that ISO has begun to consider a standard for such autonomous measurement facilities.

25 Common practices, such as operational speed reductions and route avoidance in critical habitats, play a vital role in reducing URN and the risk of whale strikes. Continued research and adoption of energy-efficient and low-noise technologies further supports the mitigation of acoustic disturbances to marine mammals.

26 The co-sponsors extend their sincere thanks to Stolt Tankers for their support in the development of this document.

Action requested of the Sub-Committee

27 The Sub-Committee is invited to take note of the conclusions within paragraphs 20 to 26 notably in respect of ways of further incentivising the uptake of quiet ship class notations, particularly by smaller ships, such as:

.1 encouraging the reward scheme managers and the ports and harbour authorities to consider the impact of their reward scales on smaller ships, i.e. the cost of achieving a quiet ship class notation is largely independent of ship size, but the reward is usually dependent on the GT, making the existing systems less effective for smaller ships, and

.2 support development of standards for autonomous buoys or equivalent technologies[3], as a more cost-effective means of URN measurement that could see their wider acceptance. Although at an early stage, it is understood that ISO has begun to consider such a standard.

---

3 It is acknowledged that alternative measurement technologies are also under development that could in due course fulfil the same objectives as an autonomous buoy, i.e. increased availability and reduced measurement cost. For example, onboard methods of URN measurement, and measurement of URN by drones.