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Biofouling in shipping

A study of the impacts and industry management practices

Abbreviated version

CLEAN SHIPPING COMMITMENT

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Abbreviated version

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Introduction

Biofouling management refers to the strategies and technologies used to control and prevent the accumulation of marine organisms such as algae, barnacles, molluscs, and bacteria on submerged surfaces like ship hulls.

This accumulation begins rapidly once a vessel enters the water and can significantly reduce vessel efficiency by increasing fuel consumption and maintenance costs.

Beyond operational impacts, unmanaged biofouling also poses environmental risks by facilitating the global spread of invasive aquatic species, which can disrupt marine ecosystems and threaten biodiversity. The International Maritime Organization (IMO) updated its Biofouling Guidelines in 2023, emphasising a globally consistent approach that integrates best practices for hull cleaning, antifouling system selection, and ship design, to minimise both the emissions that result from increased fuel consumption and the transfer of invasive species. This was supplemented with guidance on in-water cleaning of ships in April 2025.

In April 2025, the IMO's Marine Environment Protection Committee (MEPC) member states also agreed to develop a legally binding global framework for biofouling management. While this won't become an international requirement for a number of years, the industry must begin its preparations in earnest. This regulatory momentum is reinforced by parallel developments in emissions control. The full application of the FuelEU Maritime Regulation from January 2025 and the phased inclusion of shipping in the EU Emissions Trading System (EU ETS) are tightening requirements on greenhouse gas intensity and emissions reporting for ships operating in European waters. Amendments to European regulations on air pollution from ships are on the horizon, with further revisions expected in October 2025 to address fuel standards and emissions data collection.

Effective biofouling management is therefore essential not only for maintaining vessel performance and reducing greenhouse gas emissions, but also for protecting marine environments and ensuring compliance with evolving international regulations. Its effectiveness on these matters should not be understated. DNV Maritime Advisory verified that vessels coated by Jotun, a global marine coatings manufacturer, avoided 11.1 million tons CO_2 emissions in 2024 as a result of the antifouling used. This is equivalent to nearly 30% of the country of Norway's total CO_2 emissions for one year.

Despite these international efforts, there remains a significant gap in national-level preparedness. The 2023 IPBES report revealed that only a minority of countries have enacted laws or invested in measures to address biofouling's role in the spread of invasive species, underscoring the need for harmonised global action and industry readiness to meet forthcoming requirements.

As the IMO moves toward a legally binding global framework for biofouling management, the industry faces a pivotal transition. Proactive adoption of best practices will be essential not only for regulatory compliance but also for operational efficiency and environmental leadership. The following report presents new research commissioned to inform how the industry can best prepare for this new era of biofouling management.

Methodology

To develop a global picture of biofouling management, Jotun carried out research exploring the attitudes of ship owners and operators to different strategies.

The research was conducted by Censuswide, among a sample of 1,000 ship owners and operators within the shipping industry across 11 countries between 3rd April 2025 and 10th April 2025. Censuswide abides by and employs members of the Market Research Society and follows the MRS code of conduct and ESOMAR principles. Censuswide is also a member of the British Polling Council.

Survey respondents operate in the following regions:

Global	25%
Africa	9%
Asia Pacific	21%
China	12%
Europe	33%
Middle East	15%
North America/ Central America & Caribbean	18%
South America	12%
South Asia	15%

Executive summary

The survey results reveal that biofouling management has a broad level of awareness already, as over three-quarters of ship owners and operators (79%) consider hull performance a top priority for their company. However, only 31% think their company has adequate knowledge of available hull performance solutions, uncovering a knowledge gap between what is considered important and understanding of strategies and solutions. The research also revealed that 1 in 10 ship owners and operators (12%) are not confident in their own knowledge of biofouling. Despite this, 54.2% said that they do plan routes to minimise biofouling risk, demonstrating that biofouling is a key consideration in daily operations for the shipping industry.

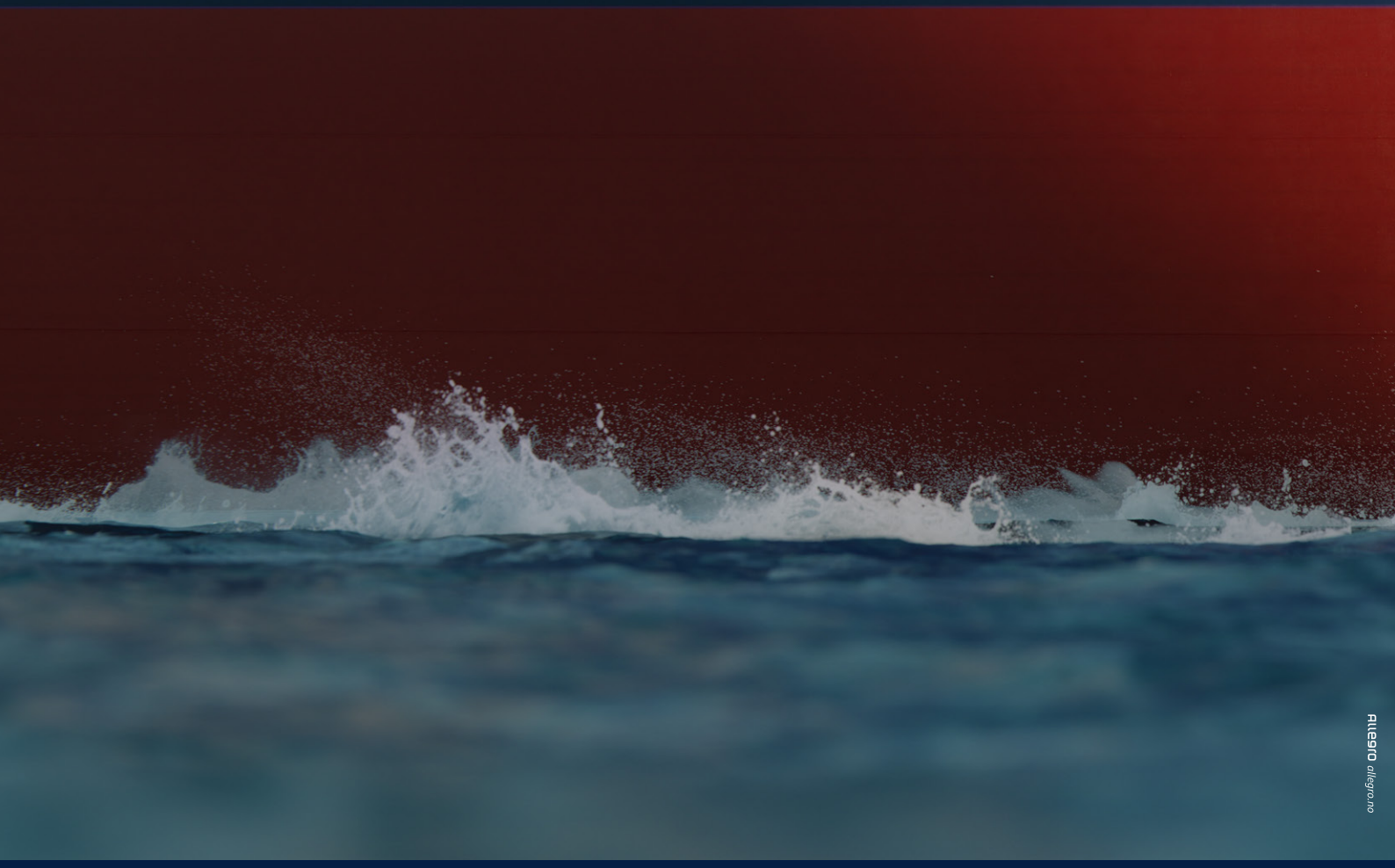
This report will set out the hidden costs of existing knowledge gaps on ship owners and operators across regulatory penalties, fuel inefficiencies and environmental risk. For example:

- **2 in 5 (41%)** of ship owners and operators have faced regulatory penalties because of biofouling related issues.
- **2 in 5 (38%)** of ship owners and operators have been refused access to ports as a result of biofouling related issues.
- **Almost half (49%)** of ship owners and operators said they avoid ports with stringent biofouling regulations.
- **50.4%** of ship owners and operators have experienced increased fuel inefficiencies as a result of poor biofouling management.
- **1 in 5 (21%)** are not using the most effective antifouling paint for each vessel in their fleet based on its biofouling management needs.

Overall, this research has uncovered several industry trends in biofouling management, from identifying where knowledge gaps exist to exposing the hidden risks of poor strategies.

The sector stands to see huge benefits from closing knowledge gaps on biofouling management. Taking into consideration the proposed changes to regulation and upcoming milestones, this report sets out a roadmap for rethinking biofouling as a strategic maritime priority.

Biofouling in shipping



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