

Abstract

Merchant Ship Recycling as a Strategy for Decarbonization Maritime Sector[†]

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Maritime transport supports 80% of global trade but contributes 2.9% of global greenhouse gas emissions. Despite its vital role, ship recycling remains limited, with only 8.9% of the fleet's gross tonnage recycled annually—contrasting with the ongoing construction of carbon-intensive new ships. The shipbuilding process generates between 5000 and 14,500 tCO_{2eq} per unit, with 70–85% of emissions stemming from material production (mainly steel), and 10–20% from industrial processes at shipyards. In this context, ship recycling emerges as a critical strategy for reducing carbon footprints and fostering circularity in the maritime sector. Depending on the technology used, recycling significantly mitigates environmental impact by recovering materials and reducing the demand for virgin resources and energy. In a global context, Europe leads in this domain, accounting for 23% of global ship recycling activity and hosting 38 of the 48 EU-authorized facilities (Commission Implementing Decision 2025/322). Particularly in merchant segments—bulk carriers, container ships, and tankers—recycling is becoming essential to decarbonization goals. These ship types, which have grown 35.4% globally from 2015 to 2024 (UNCTADstat, 2025), dominate the fleet's composition and thus offer significant potential for impact. This study assesses merchant ship recycling as a strategy to reduce carbon emissions. It employs a multidimensional methodology: first, a systematic literature review identifies key recycling technologies, regulatory frameworks, and challenges; secondly, an analysis of global trends is carried out regarding adoption, ship types, and geographical distribution; finally, the carbon footprint of building new ships versus recycling old ones is compared. Findings reveal that recycling can reduce greenhouse gas emissions by an average of 46.4% compared to new constructions, positioning it as a cornerstone of maritime sustainability and climate mitigation.



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