

# ALTERNATIVE FUELS FOR SHIPPING: OPTIMISING FLEET COMPOSITION UNDER ENVIRONMENTAL CONSTRAINTS



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***This research aims analyzes the alternative fuel options available for shipping and assesses the emission reductions obtainable through a fuel shift while also providing insights on the costs associated with such fuel transition.***

## **APPROACH:**

While research has previously been conducted on operational and technological measures aimed at reducing emissions for shipping, this focus aims to fill informational gaps concerning the economic and environmental impacts of fuel shift in the industry. This paper builds on previous research by both expanding the range of fuels looked into as well as addressing the issue of identifying an optimal future fleet transition pathway aimed at minimising retrofit costs while accounting for feedstock availability and biofuel volumes in order to create a model for potential fuel shifts.

## **MAIN FINDINGS:**

- Notwithstanding the potential of alternative fuels in achieving minimal-cost GHG emission reduction, a strong set of policy options need to be developed if shipping is to transition to a lower GHG emission industry and strategies to increase fuel availability need to be considered.
- Methanol is found to be the most carbon efficient fuel for shipping followed by LBG and Ethanol.
- While an LNG powered fleet generates more emissions than a fleet powered by biofuels, it is also the most carbon efficient fossil-based fuel for shipping in a tank-to-propeller analysis and excluding capital outlays,
- The authors of this paper stress LNG as an ideal alternative fuel for shipping from the perspective of ship-owners looking for a profitable investment as well as policymakers striving for CO<sub>2</sub> emissions reduction.