

# Fuel emissions from marine vessels remain a global concern

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The forecast for clear skies and smooth sailing for oceanic vessels has been impeded by worldwide concerns of their significant contributions to air pollution and greenhouse gas emissions that impact the Earth's climate.

A new study by professors James Winebrake and James Corbett examines "Emission Tradeoffs among Alternative Marine Fuels: Total Fuel Cycle Analysis of Residual Oil, Marine Gas Oil, and Marine Diesel Oil," in a recent issue of *Journal of the Air & Waste Management Association*.

According to Winebrake, professor and chair of the Department of Science, Technology and Society/Public Policy at Rochester Institute of Technology, and Corbett, associate professor in the College of Marine and Earth Studies at the University of Delaware, reducing fuel sulfur content is an essential component of any strategy aimed at reducing sulfur oxide emissions from marine vessels—especially since global concerns have caused policy makers to accelerate the introduction of emission control technologies and cleaner fuels into the international marine sector. These tactics aim to improve air quality and human health and mitigate climate change.

"Cleaner fuels are expected to reduce sulfur and particulate emissions, however, greenhouse gas (GHG) emissions may increase because of the additional refining energy required to produce these fuels—residual oil, marine gas oil and marine diesel oil," Winebrake explains. "Our study provides a total fuel cycle emissions analysis to help quantify these emissions tradeoffs."

In the study, Winebrake and Corbett applied a jointly developed model called the Total Energy and Emissions Analysis for Marine Systems (TEAMS) model, which was developed to explore what are called "upstream" emissions associated with fuel production and distribution. Using the model, the authors demonstrated that although

cleaner fuels increase GHG emissions during their production, they reduce GHG emissions during vessel operation, creating almost a net zero GHG impact.

This result was counter to claims by the petroleum industry—which suggested that the use of cleaner fuels in the marine sector would exacerbate greenhouse GHG problems.

"Given that the GHG impacts associated with cleaner fuels are almost nil, and given the tremendous advantages of these fuels with respect to other pollutants, policies that encourage cleaner fuels seem warranted," explains Winebrake, who also published a paper last year with Corbett demonstrating significant premature human mortality across the globe due to emissions from ships.

"The global shipping sector is one of the last unregulated emissions sources, and our study will provide useful information to the ongoing international debate surrounding cleaner marine fuels."

Source: Rochester Institute of Technology

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