Shipping industry needs an alternative to fossil fuels, but which one?

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Credit: University of Manchester

The shipping industry needs to move to renewable and alternative fuels to reduce the sector's impact on the environment.

But there is no widely available fuel to manage climate change and local pollutants according to a recent study by researchers at The University of Manchester.

How the shipping industry's need to radically reduce its CO2 emissions will a prominent discussion when the International Maritime Organisation's Marine Environment Protection Committee (MEPC) meets in London from 9-13 April.

The research team says there is a need for alternative fuels in shipping for two main reasons; to reduce local pollutants and comply with regulation and; to mitigate against climate change and cut greenhouse gas emissions.

Alternative fuels are defined as any other fuel than conventional fossil fuels that can be used for powering ships. The alternative fuels assessed in the study were liquefied natural gas (LNG), methanol, liquid hydrogen (LH2) (with and without carbon capture and storage), biodiesel, straight vegetable oil (SVO) and bio-LNG.

However, the analysis demonstrates that no widely available fuel exists currently to both reduce the environmental impact and comply with current environmental regulation. Some of the alternative fuel options analysed have the potential, but only if key barriers can be overcome.

Dr. Paul Gilbert, Senior Lecturer in Climate Change Mitigation, said: "There is, at present, no readily available fuel option to deliver significant savings on local pollutants and greenhouse gas emissions in tandem. In particular, LNG is a promising option for meeting existing regulation, but it is not a low greenhouse gas emissions fuel."

Researchers from the University's Tyndall Centre for Climate Change carried out a life cycle assessment of current and future fuels used by the

shipping companies to quantify their environmental impacts.

They measured the impacts by using six emissions types. These were local pollutants (sulphur oxides, nitrogen oxides, and particulate matter) and greenhouse gases (carbon dioxide, methane, and nitrous oxide).

However, to become a viable alternative for the industry to adopt, the fuel must meet a range of criteria. One of the fundamental requirements is that it can deliver emissions reductions over its full life-cycle.

Dr. Gilbert, from School of Mechanical, Aerospace & Civil Engineering, added: "To understand the full extent of the environmental implications it is important to consider the emissions released over the full life-cycle and not just during fuel combustion. Otherwise, there is a risk of misleading the industry and policy on the true emission penalties of any alternative fuels."

The study says effort needs to be directed at overcoming barriers to exploiting the identified low carbon potential of fuels, or finding alternatives.

Dr. Gilbert said: "As the urgent need to curtail greenhouse gas emissions is the more severe challenge, it is therefore important to ensure that any short-term measure doesn't diminish the potential roll-out of low carbon fuels, in particular when taking into account the long life times of ships and fuel supply infrastructure. To meet the objective of reducing greenhouse gas emissions, whole life-cycle emissions need to be accounted for."

The paper "Assessment of full life-cycle air emissions of alternative shipping fuels" was published in the *Journal of Cleaner Production*.

More information: Paul Gilbert et al. Assessment of full life-cycle air

emissions of alternative shipping fuels, *Journal of Cleaner Production* (2017). DOI: 10.1016/j.jclepro.2017.10.165