Should ships in India switch to shore power?

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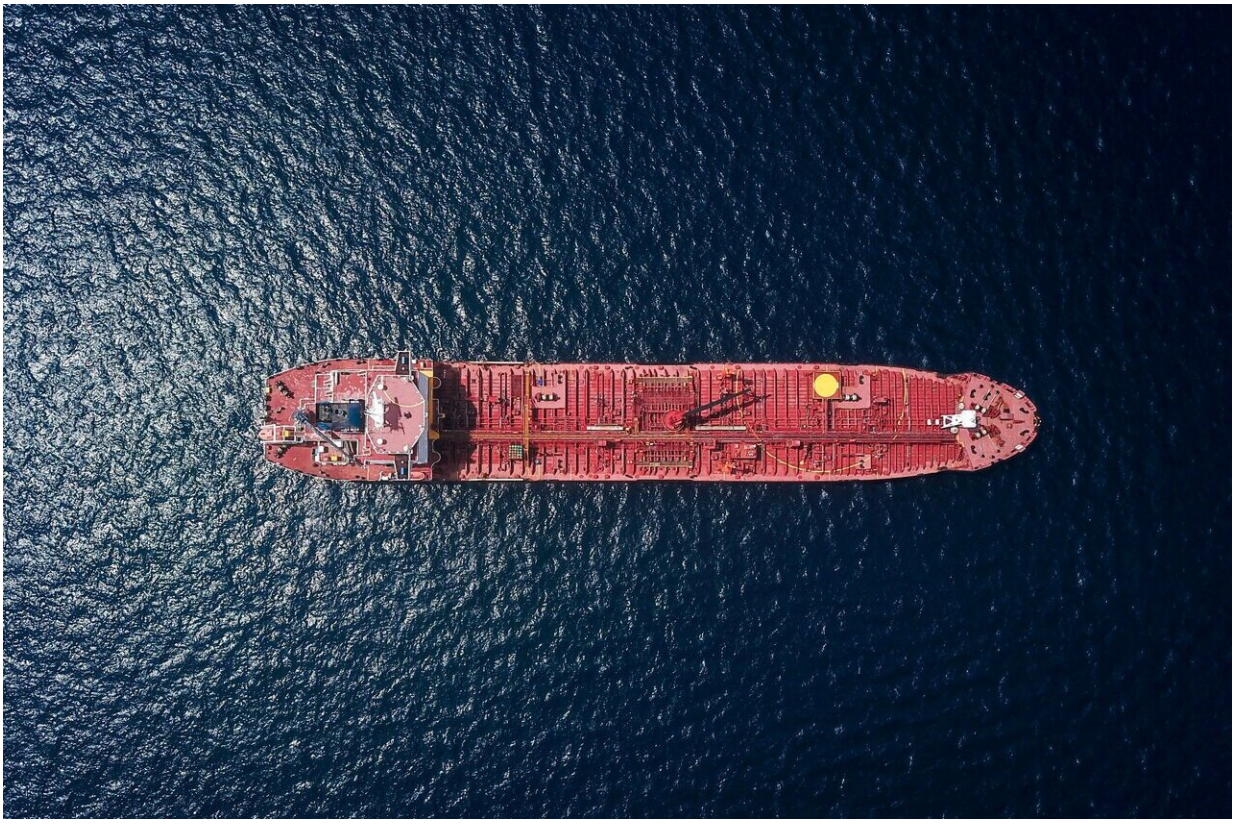

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Countries throughout Europe and North America require ships, when in port, to be attached to the shore-based power grid to prevent them from running their own engines and generating harmful emissions right on the city's doorstep. How effective could measures like these be for a developing nation like India, with a history of poor air quality and the

public health problems associated with it?

This question was the impetus for a new study by Carnegie Mellon University Engineering and Public Policy's (EPP) Ph.D. candidate Priyank Lathwal and his advisors, Parth Vaishnav, formerly of EPP and now at the University of Michigan, and Granger Morgan, professor of EPP. As international regulation around the emissions created by shipping continues to tighten, India itself is also making a significant push for electrification and modernization in a host of technology fields. The possible inclusion of shore power infrastructure in this initiative makes this question especially vital for determining the best path forward for a rapidly changing India.

Leading the effort for data collection, Lathwal spent a year braving the notoriously murky waters of data-sourcing in India. After collecting information on shipping from every major port in India, they were able to calculate individual ship outputs of pollutants and greenhouse gasses like $PM_{2.5}$, SO_2, NO_x, and CO_2. From there they could determine the net effect on pollution and greenhouse gas outputs for ships running on their own power versus connecting to shore power.

Lathwal, Vaishnav and Morgan were surprised by what they found. While one might assume a country with noted air quality concerns could benefit from a pollution mitigation technology like shore power, the authors found that there is actually little benefit for implementing shore power technology in India.

The primary reason is because power generation in India is still so centered on fossil fuels. The differences in emissions and greenhouse gasses created by a cargo ship operating in harbor and those created by the grid infrastructure required to power a ship connected to the shore are negligible. While countries with cleaner grids like the U.S. do benefit from shore power regulation, those still reliant on coal-power may be

better served investing in a cleaner grid than switching ships to shore power.

The team's study did not take into account cruise ships, which are not as prevalent in Indian ports as elsewhere in the world. This is important to note when considering the utility of shore power in other developing nations, where cruise ships may be more frequent, as a cruise ship in port usually has a significantly higher energy demand than a cargo vessel.

As emerging economies like India continue to push ahead, research like this can help generate the greatest impact from the finite resources available. While shore power may not be the answer for India's air quality woes, another area the team is interested in investigating is emissions created by cargo-handling and the short-haul truckers working within and around the port. Since these trucks only need to travel a short distance, they're often the dirtiest and least efficient trucks within a vehicle fleet. Studying key links like these in the supply chain presents new opportunities for improving efficiency and public health as nations like India chart the path ahead.

Provided by Carnegie Mellon University