A cost-benefit analysis of fuel-switching vs. hybrid scrubber installation: A container route through the Chinese SECA case

Abstract

The shipping industry has been subjected to significant pressure with the increasingly stringent environmental regulations. All vessels must comply with the IMO 2020 Sulfur cap—using fuel with less than 0.5% of sulfur content in international navigation, and 0.1% within Sulfur Emission Control Areas (SECAs). Ship operators must select the most cost-effective compliance option for their vessels, especially in the current sluggish market. This research uses a cost–benefit framework to analyze ship operators' compliance options of fuel-switching versus hybrid scrubbers, and applies these to a specific liner route through the Chinese SECA. The study considers the impacts of the proportion of the entire round trip that is a designated SECA; price differences between low- and high-sulfur fuels; loading factors; freight rates and discount rates on compliance options; and possible impacts of investment cost or government subsidies on scrubber installation. Based on the current conditions, fuel-switching is found to be the best compliance option on the specific route. However, the SECA proportion, a high price difference between low- and high-sulfur fuel, or a low scrubber cost can make scrubbers a better option. In addition, from the perspective of reducing sulfur oxide and carbon dioxide emissions,

the scrubber option is always preferable. This highlights the importance of providing government subsidies for scrubbers in order to reduce environmental impacts.