

Fuel Production from Cruise and Passenger Ship Waste

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Increasingly demanding environmental regulations and onboard waste production require immediate action from cruise companies. Firstly, the International Maritime Organization has established very strict emissions reduction goals, leading companies to use cleaner (and more expensive) fuels, and/or shifting to dual-fuel engines or gas turbines. Furthermore the size of the average vessel continues to increase, leading to larger amounts of waste that must be disposed of properly. Thus, the cruise ship industry faces several environmental challenges requiring novel solutions.

This project examines the feasibility of using the waste generated on cruise ships for producing fuels *onboard*, thereby attending two environmental problems of cruise ships. Five thermochemical processes for producing biofuel are reviewed: pyrolysis, hydrothermal liquefaction, gasification, hydrothermal gasification and arc-plasma gasification. These alternatives have been used for producing second generation biofuels but, to the best of our knowledge, they have not been considered for waste treatment or fuel production on ships. Our initial estimations indicate that all processes would reduce fuel costs, thus suggesting that initial investments would be recovered. Furthermore, public image of cruise companies will greatly benefit from inclusion of green technologies in their ships and additional savings could arise from reduced fines for pollution and reduced onshore discharge fees.

From an environmental point of view, onboard biofuel production would decrease consumption of fossil fuels and provide a proper treatment method for wastes. Also, secondary emissions (such as those deriving from oil and wastes transportation onshore) would diminish by including the proposed technology. Finally, by employing the considered waste streams as feedstock for providing energy in the ship, the industry would be one step closer to sustainable cruising.