

Using Polymer Electrolyte Membrane Fuel Cells in a Hybrid  
Surface Ship Propulsion Plant to Increase Fuel Efficiency

by  
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## **Abstract**

An increasingly mobile US Navy surface fleet and oil price uncertainty contrast with the Navy's desire to lower the amount of money spent purchasing fuel. Operational restrictions limiting fuel use are temporary and cannot be dependably relied upon. Long term technical research toward improving fuel efficiency is ongoing and includes advanced gas turbines and integrated electric propulsion plants, but these will not be implemented fleet wide in the near future.

The focus of this research is to determine if a hybrid fuel cell and gas turbine propulsion plant outweigh the potential ship design disadvantages of physically implementing the system. Based on the potential fuel savings available, the impact on surface ship architecture will be determined by modeling the hybrid fuel cell powered ship and conducting a side by side comparison to one traditionally powered. Another concern that this solution addresses is the trend in the commercial shipping industry of designing more cleanly running propulsion plants.

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