

Holistic Energy Optimization on Ships: Crew Influence, Training, and Energy Efficiency Awareness



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Background

In recent years, the maritime sector has seen an increased focus on the green transformation. This focus is reflected in the efforts to reduce greenhouse gas (GHG) emissions such as the comprehensive strategy to reach net-zero GHG emissions in 2050, adopted by The International Maritime Organisation (IMO). To reach the end goal and the 2030 and 2040 milestones all aspects of shipping must be considered and both research and action must be comprehensive.

According to both the IMO and Det Norske Veritas (DNV), a considerable part of the required reductions in GHG emissions must come from operational initiatives on board vessels.



Objectives

This project is investigating the aspects of on-board actions by the crew in relation to the tank-to-wave efficiency of vessels. By “aspects,” is meant an examination of which actions are possible, how these actions affect efficiency, what data and resources are required to perform them, and what competencies are needed for their implementation.



- RQ1: How can the on-board crew affect the energy efficient operation of the ship and what competencies and data input is necessary for this realise this influence.
- RQ2: How can the necessary prerequisites to conducting energy efficient ship operations be integrated in the theoretic part of maritime education and training (MET), both across professional borders and maritime educations.
- RQ3: How can the use of maritime simulators support the understanding of what factors affect energy efficiency and transform this knowledge into practice.

Methodology

Phase 1 - Knowledge building: the role of the crew in energy-efficient operation

To explore the current role of the crew, an analysis of their actual decision-making space within operations will be conducted using interviews with experts in performance, crew members, and shipping companies. In addition, a comprehensive literature review will be part of this phase

Phase 2 - Development of education and training

In the second phase, the curricula of existing MET institutions will be mapped and analysed to identify where topics relevant to energy efficiency are taught and to assess the interdisciplinary elements between deck and engine education. This analysis will form the foundation for the development of teaching designs that promote the key theoretical prerequisites for conducting energy-efficient operations in practice.



Phase 3 - Simulator based training and learning.

Lastly simulator-based observation studies will be conducted to see how crew of varying experience practice energy efficient operation. Explicit training for energy efficient operation will be developed and tested. A comparison of energy efficiency awareness (EEA) and situational awareness as well as the implementation of EEA in a training programme will be attempted. Particular attention will be paid to the potential integration of EEA into the existing STCW simulator training.



Company, Collaboration and Funding

The Private PhD student will be employed at SIMAC, a leading maritime education centre offering bachelor programmes and simulator training for future officers and engineers. This PhD project is a collaboration between SIMAC and the University of Southern Denmark. The project has received funding from Orient's Fund



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