

Can cruise ship fuel cells save energy?

Some cruise ship owners are piloting on-board 1-5 MW fuel cells to further explore their potential to boost energy efficiency and reduce emissions. The future energy-saving potential of fuel cell technology in maritime applications, particularly for cruise ships, is significant.

How can a cruise ship save energy?

Summing up, it's evident that technologies like ship management system modeling and simulation, propulsion power and bulbous bow optimization, and fuel cells - whether utilized independently or in combination - can significantly contribute to energy savings for the cruise ship segment.

Can thermal energy storage be used on ships?

Implementation of thermal energy storage on ships Thermal energy storage technologies have been applied in many other fields, where balancing of mismatch between energy production and demand is required.

How does energy storage work?

Energy storage, both in its electric and thermal forms, can be used both to transfer energy from shore to the ship (thus working similarly to a fuel) or to allow a better management of the onboard machinery and energy flows. This chapter is made of two main parts.

How can a cruise ship improve fuel efficiency?

However, reducing the energy required for propulsion, the largest power consumer on a cruise ship, directly translates into less fuel use and reduced carbon emissions. Optimizing the newbuilding vessel design can have significant benefits for fuel efficiency.

Is the cruise industry pursuing energy-saving technologies?

Antonio Prestigiacomo, Business Development Manager North America at DNV, sheds light on some promising energy-saving technologies currently being explored. The cruise industry has made significant efforts to optimize operations for greater environmental and commercial sustainability.

Improving the technology of hybrid energy systems is an important development direction for the greening of ships, the configuration optimization and energy management of ship hybrid energy system is vital to enhance the marine electric power system reliability, economic efficiency, and sustainability. Focusing on this problem, this paper has carried out a study on ...

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1. Introduction Cruise Ship (CS) industry is ...

In this paper, a novel component sizing method is proposed for integrating reciprocating gas engines and energy storage systems (ESS) on ships, considering energy density and load response simultaneously. ... It can be found that implementing the proposed evaluation-based optimization can improve cruise ship energy efficiency while maintaining ...

Most energy system modelling at the international level and in the SIDS is done with closed black-box energy system models (ESMs). Typically, these are pre-set models and the source code is unavailable for third party review (Hilpert et al., 2018; Pfenninger & Staffell, 2016). This makes the analysis of the raw data and the methods used impossible for external ...

The massive scale of the greenhouse gas (GHG) emissions due to the operation of cruise ships creates an acute need to develop cruise ship energy management systems (EMSs) that explicitly assess and mitigate GHG emissions. Renewable resources (RRs)-albeit their ubiquity in recent years-pose key challenges that need to be addressed so as to be efficiently utilized by cruise ...

Table 1 reports the solid waste production onboard a cruise ship with gross tonnage of 141,000 tons, ... R.A. Optimal power management of electrical energy storage system, CHP, conventional and heat-only units ...

"Improving the energy efficiency of a cruise ship stateroom". Master thesis, Aalto University (2017) [4] Cotorcea Alexander, Visa Ioni. "Analysis of the opportunity to implement solar-thermal systems on ships. Case study: The voyage of a cruise ship in the Black Sea".

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A new energy storage scheme was used in order to reduce the effects of solar PV power fluctuations and the aging of the battery. The results of this study show that the proposed energy storage system can give a reduction of 25-35.0% on the battery replacement. ... This optimization depends on the cruise ship energy demand, the power system ...

If you're interested in cruise ship technology issues - read about cruise ship engines, propulsion systems, fuel consumption and pollution (11 photos) ... (Richmond BC) - ...

The CO₂ emissions can be also reduced by including carbon capture and storage systems, or using biofuels and hydrogen [11]. In this ... The aim of this study is to identify the cruise ship energy systems with the optimal performance under future carbon pricing scenarios by considering the minimisation of both the life cycle cost and the ...

The case study analyzed in the paper is a cruise ship operating in the Baltic Sea between Stockholm (in Swedish mainland) and Mariehamn (in the Åland islands). ... On the energy storage side, batteries, supercapacitors, and flywheels are presented and described. Three common hybrid propulsion configurations,

serial, parallel, and serial ...

A scientific paper on a novel cruise ship energy management system using LSTM for forecasting, optimizing costs, emissions, and travel time. ... fuel consumption energy management strategy for hybrid marine vessels with multiple diesel engine generators and energy storage," in 2018 IEEE Transportation Electrification Conference and Expo (ITEC ...

On the other hand, due to the alternating nature of power provided by the RESs, a backup source of energy like an energy storage system is usually needed to save the surplus energy during sunny or windy weather conditions and supply the demand during gloomy or windless times [13]. An effective optimization approach is presented in Ref. [14] for optimal ...

A scientific paper on a novel cruise ship energy management system using LSTM for forecasting, optimizing costs, emissions, and travel time. ... fuel consumption energy management strategy for hybrid marine vessels with multiple diesel ...

Energy use and energy efficiency in cruise ship hotel systems in a Nordic climate. Author links open overlay panel August Brækken a, Cecilia Gabrieli a ... improved ventilation system (8-24%), and heating setback in port and during the night (5%). A hot water storage tank, charged with the engines' waste heat during sea operation, could ...

In this paper, the structure of the cruise ship's energy system with multiple facilities such as an internal combustion engine, gas turbine, dual fuel engine, ... The role of energy storage and demand response has recently received an increasing interest in CCHP systems. This paper addresses the long-term economic planning of a renewable CCHP ...

Energy storage units are added to store excess energy, so that when the output of wind power and photovoltaic power cannot meet the demand of the load, the power shortage will be compensated by the storage units. ... Best Operative strategy for energy management of a cruise ship employing different distributed generation technologies. Int J ...

This small mismatch could be solved in those periods by managing the schedule of some of the thermal loads to meet the instantaneous heat availability and/or by providing the cruise ship with a small thermal energy storage system storing excess energy in the form of hot water (see e.g. [76], [77]), which could be then used to partially fulfil ...

A case study is proposed, taking an old-fashioned cruise ship, and introducing energy storage systems and frequency converters for chillers' high power induction motors. The results ...

The Corvus Blue Whale energy storage system is designed for use in cruise ships and other vessels where the operational profile calls for low C-Rate, slow battery system charge and discharge rates, and emissions-free

sailing over long ...

Fincantieri says it is building the world's first hydrogen-powered cruise ship for delivery in late 2026, while Coca-Cola Bottlers Japan says it will debut the world's first ...

To satisfy those great power demands and improve the energy efficiency, heterogeneous energy storage (HES), including both the battery and the thermal storage tank, ...

Thermal energy storage (TES) technologies are focused on mismatching the gap between the energy production and consumption by recovering surplus energy during the generation to be used on periods of high demand. ... This becomes especially critical in hoteling periods, when the cruise ship is in port: due to the reduced number of active engines ...

Baldi et al. [19] studied the design and operation optimisation of a cruise ship power plant configuration consisting of diesel-generator sets, a waste heat recovery system and an electric energy storage system. The results indicated that the use of a waste heat recovery systems can offer almost 5% savings, whereas the use of batteries only 1.6%.

Hybrid solar PV/PEM fuel Cell/Diesel Generator power system for cruise ship: A case study in Stockholm, Sweden. Case Stud. Therm. Eng. (2019) S Zereschkian et al. ... Latent heat thermal energy storage (LHETS) has been widely used in solar thermal utilization and waste heat recovery on account of advantages of high-energy storage density and ...

Download scientific diagram | 16 Topology of a multi-energy cruise ship, reprinted from [77], with permission from IEEE from publication: Optimization-Based Energy Management for Multi-energy ...

Cruise lines are heavily investing in flexible propulsion systems and alternative energy sources, such as green methanol, biofuels, hydrogen, solar, and batteries, to enable the widespread adoption of low- and zero-emission fuels in the ...

Cruise ship; electric propulsion: PV(1200kW); PEM fuel Cell (1000kW); Diesel Generator(2 × 2760kW) A theoretical model of a cruise ship hybrid renewable energy system is established, a simulation study is carried out on it, and an optimal control strategy for the hybrid energy system is proposed. WannengYu [100] Experimental test rig; Diesel ...

To satisfy those great power demands and improve the energy efficiency, heterogeneous energy storage (HES), including both the battery and the thermal storage tank, is integrated and makes the future cruise ship as a "moving multienergy microgrid."

Energy storage, both in its electric and thermal forms, can be used both to transfer energy from shore to the ship (thus working similarly to a fuel) or to allow a better ...

Fuel cells, a clean power-generation technology when produced from renewable energy sources, are already used on land for applications like data centres. Some cruise ship owners are piloting on-board 1-5 MW fuel ...

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