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Ammonia as an alternative fuel for large passenger ships: benefits and challenges

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The shipping industry is under increasing pressure to comply with new demanding requirements for exhaust gas emissions. Alternative fuels as well as new technologies need to be developed to meet these goals and reduce Green-House Gases (GHG). This paper investigates ammonia as an alternative fuel for the cruise ship market.
The paper focuses on the regulatory framework (e.g. EU, IMO and Classification Societies) that at present defines requirements for gaseous emissions and design principles of the fuel containment as well as supply systems. Ammonia allows for effective reduction of CO2, but is potentially toxic for human life and the environment. Due to the innovative nature of ammonia as a fuel, the regulatory approach is based mainly on alternative design instead of prescriptive rules.
An applied case – study, with ICE (Dual-Fuel) and electric motors (PEM) as selected standard propulsion system, has been carried out to investigate the impacts of ammonia as fuel on a large passenger ship. The purpose is to evaluate the variation of navigation autonomy, arrangement and weights/stability, considering also specific storage and handling requirements.

Primary authors: Mr SCAMARDELLA, Filippo (UNIGE - DITEN); Prof. ZAMBONI, Giorgio (UNIGE - DIME); Prof. CANEPA, Edward (UNIGE - DIME); Prof. GUALENI, Paola (UNIGE - DITEN); Mr MACOCCO, Angelo (Fincantieri S.p.A. - Merchant Ship Business Unit)

Presenter: Mr SCAMARDELLA, Filippo (UNIGE - DITEN)

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