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BESS-Based Hybrid Propulsion: an Application to a Front Line Naval Vessel Preliminary Design

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The paper conceives a flexible new generation Destroyer (DDX, Destroyer, Experimental) with primary focus on low environmental footprint, high efficiency and high reliability. The ship implements an innovative propulsion power generation and storage system based on a CODOGOL (COMbined Diesel Or Gas Or eLectric) architecture and a Battery Energy Storage System (BESS).

The proposed modular solution is suitable for retrofitting applications and is an innovation in the state of the art of hybrid propulsion systems for big, front-line naval ships. The shipboard BESS is used as a backup power source in order to ensure reliability requirements in Minimum Generator Operation (MGO) mode. The benefits of the proposed solution are discussed in detail, highlighting a reduction of the operating costs and fuel consumption, as well as low pollutant emissions and Life Cycle Cost. Moreover, dynamical simulation is used to assess the effectiveness of the proposed solution in critical conditions.

Primary authors: Dr BELVISI, Daniele (Marina Militare Italiana); Dr ZACCONE, Raphael (Università degli Studi di Genova); Prof. FIGARI, Massimo (Università degli Studi di Genova); Dr SIMONE, Sergio (Marina Militare Italiana); Dr SPANGHERO, Bruno (Università degli Studi di Genova)

Presenters: Dr BELVISI, Daniele (Marina Militare Italiana); Dr ZACCONE, Raphael (Università degli Studi di Genova)

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