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D4.1 – Design, development and implementation of advanced strategies for battery temperature regulation

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Project Abstract

The goal of the SEABAT project is to develop a full-electric maritime hybrid battery concept that is based on:

1 Modularly combining high-energy batteries and high-power batteries,
2 Novel converter concepts and
3 Production technology solutions derived from the automotive sector.

The modular approach will reduce component costs (battery cells, convertors) so that unique ship designs can profit from economies of scale by using standardized low-cost components. The concept will be suitable for ships requiring up to 1 MWh of storage or more.

Public summary

The SEABAT project aims to create a Hybrid Energy Storage System (HESS) for marine applications. To ensure the new product meets the performance requirements, it's essential to understand the performance of existing marine battery systems in terms of design and functional requirements, system safety. Here, the HESS will combine two different battery technologies to optimize performance for specific vessel requirements. The main objective of the SEABAT project is to develop a flexible, scalable, energy-efficient, and cost-effective HESS architecture for marine applications. This system architecture will balance ship energy and power requirements by using a mix of high-energy and high-power batteries. The HESS architecture will be scalable to at least 1 MWh and validated at a level of 300 kWh, while taking into account virtual upscaling.

Task 4.4 of WP4 is dedicated to consolidating the scalable system architecture and design of the cooling circuit proposed under the battery thermal management system, as outlined in D3.2 and D3.3 of the SEABAT project. Deliverable 4.1 provides an in-depth analysis of the advanced strategies used for battery temperature regulation, from the module level to the HESS level. The deliverable outlines the functional and safety requirements necessary for selecting thermal components and designing the overall battery thermal management system, based on international marine application standards. Additionally, the document provides detailed analysis of the heat transfer and energy losses in the batteries and DCDC converter, along with the coolant distribution through the piping system using theoretical, 1D /3D CFD and FEM simulations.

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Project partners:

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1	FM	FLANDERS MAKE
2	DAMEN	SCHEEPSWERF DAMEN GORINCHEM BV
3	FCSI	FINCANTIERI SI SPA
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