H_2MARINE

HYDROGEN PEM FUEL CELL STACK FOR MARINE APPLICATIONS

Project ID	101137965
PRR 2024	Pillar 3 – H_2 end uses: transport
Call topic	HORIZON-JTI-CLEANH2-2023-03-02: Development of a large fuel cell stack for maritime applications
Project total costs	EUR 7 499 171.50
FCH JU max. contribution	EUR 7 499 171.50
Project start - end	11.1.2024–30.6.2027
Coordinator	Ethniko Kentro Erevnas kai Technologikis Anaptyxis, Greece
Beneficiaries	Albert-Ludwigs-Universität Freiburg, Beyond Gravity Schweiz AG, Cleos Idiotiki Kefalaiouchiki Etaireia, Cluster Viooikonomias kai Perivallontos Dytikis Makedonias, École polytechnique fédérale de Lausanne, EH Group Engineering SA, Greenerity GmbH, PowerCell Sweden AB, Reinz-Dichtungs GmbH, Teknologian Tutkimuskeskus VTT Oy, ThyssenKrupp Marine Systems GmbH, Zentrum für Sonnenenergie- und Wasserstoff-Forschung Baden-Württemberg

https://h2marineproject.eu

PROJECT AND GENERAL OBJECTIVES

The overarching objective of the H_2Marine project is to design, build, test and validate two proton-exchange membrane stacks generating 250–300 kW electrical power designed for marine applications. The H_2Marine project takes a top-down approach, building on a proof of concept of two proton-exchange stacks that are being developed in the EU and Switzerland. The H_2Marine project will:

- identify the requirements for the tests and conditions as well as load curves that the fuel cell stacks will have to be tested against, using the combined knowledge of a major ship-building company (ThyssenKrupp Marine Systems) and a shipowner (Cleos);
- enable both the PowerCell and the EH Group stack manufacturers to benefit from a great consortium surrounding their development, testing and upscaling with unique testing facilities (Beyond Gravity, Zentrum für Sonnenenergie- und Wasserstoff-Forschung Baden-Württemberg, Greenerity, University of Freiburg), industrial partners such as DANA, the upscaling of stacks by Ethniko Kentro Erevnas kai Technologikis Anaptyxis and École polytechnique fédérale de Lausanne, and novel diagnostics development by VTT, which will allow them to enhance the state of the art of proton-exchange membrane fuel cell stacks, and advance and scale up the system to reach ambitious targets set in the call that will be disseminated by CLUBE (a member of numerous fuel cell and hydrogen projects);
- test the proposed solutions in a relevant environment/ecosystem, designed to fully represent the actual implementation conditions;
- design the stack modules in an optimum manner for upscaling to 10 MW train systems;
- test several diagnostics for the integrity of the stack and overall system and for the prognosis of the health status of critical components;
- assess the technology and economic feasibility of the solution, in order to determine its valuable end use, which will allow the partners to research the potential market(s) and identify the best opportunities.

NON-QUANTITATIVE OBJECTIVES

- Test the proposed solutions in a relevant environment/ecosystem, representing actual marine conditions.
- Design the stack modules in an optimum manner for upscaling to 10 MW.
- Test several diagnostics for the integrity of the stack and overall system and for the prognosis of the health status of critical components.
- Assess the technology, and the economic and environmental feasibility of the solution, in order to determine its valuable end use.

PROJECT TARGETS

Target source	Parameter	Unit	Target	Target achieved?
Project's own objectives	Module rating	kW	250	
	Hours of testing for each FC	hours	2 000	
	PEMFC system CAPEX	€/kW	< 1 500	
	FC power rating	MW	10	
	Maritime FCS lifetime	hours	> 40 000	

Clean Hydrogen Partnership
Co-funded by the European Union