MARANDA

MARINE APPLICATION OF A NEW FUEL CELL POWERTRAIN VALIDATED IN DEMANDING ARCTIC CONDITIONS

Project ID:	735717
PRD 2023:	Panel 3 – H2 end uses – transport
Call topic:	FCH-01-5-2016: Develop new complementary technologies for achieving competitive solutions for marine applications at an economic scale of implementation
Project total costs:	EUR 3 704 757.50
Clean H_2 JU max. contribution:	EUR 2 939 457.50
Project period:	3.1.2017–31.3.2022
Coordinator:	Teknologian tutkimuskeskus VTT Oy, Finland
Beneficiaries:	ABB OY, OMB Saleri SpA, Persee, PowerCell Sweden AB, Suomen ympäristökeskus, Swiss Hydrogen SA

https://projectsites.vtt.fi/sites/maranda/

PROJECT AND OBJECTIVES

In MARANDA, an emission-free hydrogen-fuelled proton-exchange-membrane-fuel-cell-based hybrid powertrain system (3 × 82.5 kW alternating current) was developed for marine applications. It was validated onshore, simulating offshore operation, and at a durability test site, as approval for testing the systems in the *Aranda* vessel was not granted. The project increased the market potential of hydrogen fuel cells in the marine sector. General business cases for different marine and harbour actors or fuel cell business actors were created.

NON-QUANTITATIVE OBJECTIVES

- The MARANDA project has already had a significant impact on the development of regulations, codes and standards.
- The fuel cell systems should be able to withstand the shocks, vibrations, saline environment and ship motions commonly encountered on the water, and other marine-application-relevant requirements.
- MARANDA aimed to evaluate the economic and environmental impacts for a prospective customer. A report on the business analysis of hydrogen fuel cells for marine applications has been prepared.
- The project aimed to formulate an initial go-to-market strategy. The report on the business analysis includes this strategy.
- MARANDA aimed to map opportunities for future demonstration actions. This mapping is included in the report on the business analysis.

PROGRESS AND MAIN ACHIEVEMENTS

- Three fuel cell systems from Swiss Hydrogen were assembled, delivered to Teknologian tutkimuskeskus VTT, integrated in containers and tested at the durability test site.
- A significant improvement in stack durability has been shown by PowerCell Sweden.
- Containers and equipment for the integration of fuel cell systems and hydrogen storage, including all safety systems, were designed, manufactured and tested.

FUTURE STEPS AND PLANS

All test runs were completed by the end of May 2022.

QUANTITATIVE TARGETS AND STATUS

Target source	Parameter	Unit	Target	Achieved to date by the project	Target achieved?
AWP 2016	Fuel cell system power	kW	75	75	✓
	Stack durability	mV/1 000 h	4.6	1.7	
	Fuel-to-electricity efficiency (alternating current)	%	48	42	

Clean Hydrogen Partnership
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