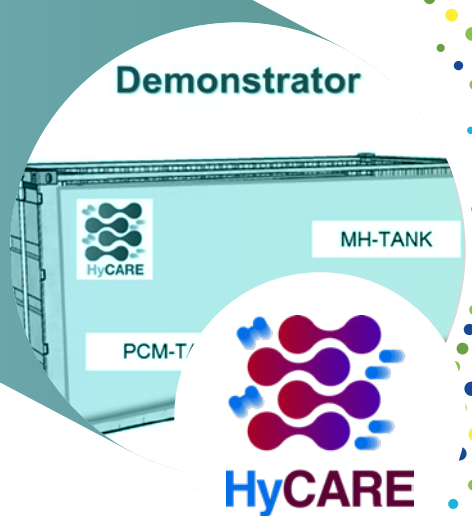

HYCARE

ANINNOVATIVEAPPROACHFORRENEWABLEENERGY STORAGEBYACOMBINATIONOFHYDROGENCARRIERS AND HEAT STORAGE

Project ID:	826352
PRD 2023:	Panel 2 – H2 storage and distribution
Call topic:	FCH-02-5-2018: Hydrogen carriers for stationary storage of excess renewable energy
Project total costs:	EUR 2 039 230.00
Clean H_2 JU max. contribution:	EUR 1 999 230.00
Project period:	1.1.2019–31.7.2023
Coordinator:	Università degli Studi di Torino, Italy
Beneficiaries:	Stühff Maschinen- und Anlagenbau GmbH, Stühff GmbH, Tecnodelta SRL, GKN Sinter Metals Engineering GmbH, Parco Scientifico Tecnologico per l'Ambiente SpA, Institutt for Energiteknikk, Helmholtz-Zentrum Hereon GmbH, Fondazione Bruno Kessler, Engie, Centre national de la recherche scientifique

http://www.hycare-project.eu/

PROJECT AND OBJECTIVES

The main objective of HyCARE is the development of a prototype hydrogen storage tank using a solid-state hydrogen carrier on a large scale. The tank will be based on an innovative concept, joining hydrogen and heat storage, to improve the energy efficiency of the whole system. The tank will be joined to a proton-exchange membrane (PEM) electrolyser as the hydrogen provider and a PEM fuel cell as the hydrogen user at the Engie Crigen laboratory, located in Île-de-France. As of 2023, the system is undergoing testing.

NON-QUANTITATIVE OBJECTIVES

- **Safety.** The project aims to achieve low temperatures and pressures for storing hydrogen using carriers.
- **Energy efficiency.** The project aims to improve the energy efficiency of hydrogen storage through the use of heat storage using phase change materials.

PROGRESS AND MAIN ACHIEVEMENTS

- Finalisation of the tank's assembly – using metal hybrid and phase change material tanks and pumping system components – was achieved. Pre-commissioning tests (i.e. FAT tests) were concluded in November 2022, enabling the tank transfer.
- The tank was moved to the installation site at the beginning of December 2022.
- At the installation site, fuel cells genset were received in September 2022 and the final commissioning was performed (assembly with the tank and partial SAT) in mid December 2022.
- System integration procedures were concluded in terms of long-term shutdown and control logic. The activation procedure and testing are under way.
- Following the progress with the tank system, techno-economic analysis is under way. Dissemination and exploitation of the project results are also being conducted.

FUTURE STEPS AND PLANS

- Finalisation of system activation was planned for March 2023. Testing of the demonstrator will take at least 4 months.
- A final exploitation event was planned for 21 April 2023 to showcase the project's tank and results.
- Techno-economic analysis, life cycle analysis and a market deployment plan will be finalised at the end of the project, in July 2023. The project is receiving support from the Horizon Results Booster platform for business plan development.

QUANTITATIVE TARGETS AND STATUS

Target source	Parameter	Unit	Target	Achieved to date by the project	Target achieved?
Project's own objectives	Volumetric capacity of H_2 carrier	kg of H_2 per unit of volume of carrier	N/A	Reversible capacity at 55 °C at 1–25 bar of less than 70	⚙
	Gravimetric capacity of H_2 carrier	% of H_2 weight in the carrier		Reversible capacity at 55 °C at 2–20 bar is equal to 1.1	
	Hydrogen storage capacity	Maximum amount of H_2 in kg that can be stored in the system		Estimated reversible capacity of 44 at 55 °C, 1–25 bar	
	Max. tank pressure	Pressure rating of the H_2 carrier tank in bar	< 50	40	✓
	Cyclability	Number of full cycles until reaching a 2 % reduction in the gravimetric capacity of the H_2 carrier	250	250	

Clean Hydrogen Partnership
Co-funded by the European Union