

BIG HIT

BUILDING INNOVATIVE GREEN HYDROGEN SYSTEMS IN AN ISOLATED TERRITORY: A PILOT FOR EUROPE



BIG HIT

Project ID:	700092
PRD 2023:	Panel 6 – H2 valleys
Call topic:	FCH-03.2-2015: Hydrogen territories
Project total costs:	EUR 7 748 848.00
Clean H₂ JU max. contribution:	EUR 5 000 000.00
Project period:	1.5.2016–30.4.2022
Coordinator:	Fundación para el Desarrollo de las Nuevas Tecnologías del Hidrógeno en Aragón, Spain
Beneficiaries:	Calvera Maquinaria e Instalaciones SL, Community Energy Scotland Limited, Danmarks Tekniske Universitet, Giacomini SpA, ITM Power (Trading) Limited, Ministry for Transport, Infrastructure and Capital Projects (Malta), Orkney Islands Council, Shapinsay Development Trust, Symbio, European Marine Energy Centre Limited, Scottish Hydrogen and Fuel Cell Association Ltd

<https://www.bighit.eu/>

PROJECT AND OBJECTIVES

The BIG HIT project is a major first step towards creating a genuine hydrogen territory in the Orkney Islands. Orkney has over 50 MW of installed wind, wave and tidal capacity, generating over 46 GWh of renewable power per year, and it has been a net exporter of electricity since 2013. Hydrogen is proposed as a solution to minimise the curtailment problems in Orkney caused by the weak connection with the UK mainland. The hydrogen produced is used in thermal, power (co-generation) and transport applications locally.

NON-QUANTITATIVE OBJECTIVES

- BIG HIT aimed to perform a life cycle assessment study; this is now complete. The first report was submitted during the second year of the project, and the final report, including operational data, was submitted at the end of the project.
- The project aimed to perform a business model study for integrated energy systems based on hydrogen technologies across the islands. The first report was submitted during the second year of the project, and the final report, including operational data, was submitted at the end of the project.
- It aimed to perform a social life cycle assessment. The first report was submitted during the second year of the project, and the final report, including operational data, was submitted at the end of the project.
- The project aimed to set up the Hydrogen Territories Platform; this platform was launched. Four webinars have been conducted to date. The platform will be used in the Hydrogen energy applications for valley environments

in northern Netherlands (HEAVENN) and Deployment of a H₂ ecosystem on the island of Mallorca (Green Hysland) projects as well, with a continuation of its activities and goals.

- BIG HIT aimed to perform a first analysis of lessons learned from the project about the connection of electrolysers in power grids with high penetration of renewable energy sources (optimal model), marination of electrolysers, etc. The outputs were included in the final report and in the deliverables related to project operation and maintenance.

PROGRESS AND MAIN ACHIEVEMENTS

- The main project equipment has been built: five H₂ trailers (250 kg of H₂ storage), a H₂ catalytic boiler (30 kW), a 1 MW electrolyser, five H₂ fuel cell vans and a 75 kW fuel cell (co-generation).
- The project developed the logistics of moving hydrogen through an archipelago (a multielement gas container moving H₂ between the islands by ferry, and logistics optimisation).
- BIG HIT developed the Hydrogen Territories Platform.

FUTURE STEPS AND PLANS

- The project finished in 2022. Some of the equipment and facilities remain operational in Orkney.
- BIG HIT performed an impact analysis. Final reports on the environmental and social impact and the business model analysis were published and made available to the public.
- The main project results, conclusions and lessons learned have been presented at the Hydrogen Territories Platform webinars.

QUANTITATIVE TARGETS AND STATUS

Target source	Parameter	Unit	Target	Achieved to date by the project	Target achieved?	SoA result achieved to date (by others)	Year for reported SoA result
Project's own objectives	Hydrogen catalytic boiler power	kW	40	30		30 kW commissioned; 10 kW FAT completed	N/A
	Availability of fuel cell light-duty vehicles (including cars)	%	98	98	✓	98	2017
	HRS durability	years	10	5		Other projects / HRSs have been running for longer periods	5 years SoA in 2020 according to the FCH 2 JU MAWP