REMOTE

REMOTE AREA ENERGY SUPPLY WITH MULTIPLE OPTIONS FOR INTEGRATED HYDROGEN-BASED TECHNOLOGIES

Project ID	779541
PRR 2024	Pillar 4 – H_2 end uses: stationary application
Call topic	FCH-02-12-2017: Demonstration of fuel cell-based energy storage solutions for isolated micro-grid or off-grid remote areas
Project total cost	EUR 6 740 031.40
Clean H_2 JU max. contribution	EUR 4 995 950.25
Project period	1.1.2018–30.6.2023
Coordinator	Politecnico di Torino, Italy
Beneficiaries	Ballard Power Systems Europe AS, Enel Green Power SpA, Engie EPS Italia SRL, Ethniko Kentro Erevnas Kai Technologikis Anaptyxis, Grupo Capisa Gestión y Servicios SL, Hydrogenics Europe NV, Instituto Tecnológico de Canarias SA, Instrumentación y Componentes SA, IRIS SRL, Orizwn Anonymh Techniki Etaireia, PowiDian, SINTEF AS, Stiftelsen SINTEF, TrønderEnergi AS

https://www.remote-euproject.eu/

PROJECT AND GENERAL OBJECTIVES

Remote demonstrated the technical and economic feasibility of H_2-based energy storage solutions (integrated power-to-power (P2P) systems, non-integrated power-to-gas and gas-to-power systems (G2P), customised P2P systems) deployed in three demonstrations, based on renewable energy source (RES) inputs (solar, wind and hydroelectric power) in isolated microgrid or off-grid remote areas. In the 5 years of the project (up to December 2022), the design, procurement, installation, operation and analysis of two demonstrations (in Greece and Norway) have been assessed; the third demonstration (in Spain) was commissioned in 2023.

NON-QUANTITATIVE OBJECTIVES

- Remote aimed to complete the demonstrations' design, installation and operation. The project has generated fundamental knowledge for the next generation of P2Ps based on fuel cells and H_2 technologies adapted to the market and society's needs, making use of scientific advances in the management of off-grid and isolated microgrids.
- The project aimed to build experience throughout the value chain of P2P systems and validate real demonstration units in representative applications of isolated microgrid or off-grid areas. This enabled suppliers, end users and general stakeholders to gain experience for the future deployment of these energy solutions.
- Remote aimed to gather technical data on the operation of H_2-based devices (proton-exchange membrane fuel cells, electrolysers) in long-term real operation in P2P applications. The operation of the P2P systems (lasting more than a year) has generated learning experiences regarding the behaviour of technologies such as fuel cells and electrolysers in P2P applications. Companies now know what to improve.
- The project aimed to complete detailed life-cycle analyses of RES-fed, H_2-based P2P systems in remote locations. The project allows for a detailed understanding of the complete life-cycle analysis achieved by the RES-based P2P systems in remote areas, in terms of metrics such as global greenhouse gas reduction thanks to the adoption of H_2 power in a local RES seasonal storage system.

PROGRESS AND MAIN ACHIEVEMENTS

- Remote has operated a demonstration for 1 year in Norway.
- The running and full analysis of the demonstration in Norway was completed. A technical analysis of the demonstration experience in terms of performance and lessons learned was conducted.
- It has operated a demonstration for 2.5 years in Greece.
- The running and full analysis of the demonstration in Greece was completed. The technical analysis of data collected was finalised.
- The project has also involved the design, commissioning and operation of H_2-based P2P plants.
- Remote finalised the installation and running of the new demonstration in Spain.
- Complete techno-economic analysis of the demonstration experience has been performed with real data, to develop an understanding of how to optimise P2P plants in the future, with improved efficiency and reduced costs.
- A business analysis of the H_2-based P2P plants for remote locations was developed and presented to the market stakeholders.

FUTURE STEPS AND PLANS

The project has finished.

PROJECT TARGETS

Target source	Parameter	Unit	Target	Achieved to date by the project	Target achieved?	SOA result achieved (by others)	Year in which SOA result was reported
MAWP (2014–2020)	Rated efficiency of electrolyser (alkaline)	kWh/kg	50 (2020); 49 (2024)	55–60	⚙	55–60	2020
	Rated efficiency of electrolyser (PEM)	kWh/kg	55 (2020); 52 (2024)	50	✓	50	2020
	Electrolyser footprint (PEM)	m^2/MW	100 (2020); 80 (2024)	273	⚙	10	2018–2020
	Rated efficiency of fuel cell (PEM)	% (LHV)	42–62 (2024)	45–55	✓	51	2018

Clean Hydrogen Partnership
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