

REMOTE

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



Project ID:	779541
PRD 2023:	Panel 4 – H2 end uses – stationary applications
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 costs:	EUR 6 740 031.40
Clean H₂ 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 Sociedad Limitada, Hydrogenics Europe NV, Instituto Tecnológico de Canarias SA, Instrumentación y Componentes SA, Iris SRL, Orizwn Anonymh Techniki Etairaia, Powidian, Sintef AS, Stiftelsen Sintef, TrønderEnergi AS

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

PROJECT AND OBJECTIVES

REMOTE is demonstrating the technical and economic feasibility of H₂-based energy storage solutions (integrated power-to-power (P2P) systems, non-integrated power-to-gas and gas-to-power systems (P2G + G2P), customised P2P systems) deployed in three demonstrations, based on renewable energy source (RES) inputs (solar, wind, hydro) 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) is in the commissioning phase. The demonstration analysis and the exploitation plans are being finalised.

NON-QUANTITATIVE OBJECTIVES

- REMOTE aims to complete the demonstrations' design, installation and operation. REMOTE has created fundamental know-how for the next generation of P2Ps based on fuel cells and H₂ technologies adapted to the market and society's needs, making use of scientific advances in the management of off-grid areas 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 enables 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 H₂-based devices (PEMFC, 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 analysis of RES-fed, H₂-based P2P systems in remote loca-

tions. 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 H₂ in a local RES-storage system at seasonal range.

PROGRESS AND MAIN ACHIEVEMENTS

- REMOTE has achieved 1 year of experience of operation of the demonstration in Norway.
- It has achieved 2.5 years of experience of operation of the demonstration in Greece.
- The project has significant experience of the design, commissioning and operation of three H₂-based P2P plants.

FUTURE STEPS AND PLANS

- The running and full analysis of the demonstration in Norway have been completed. Technical analysis of the demonstration experience in terms of performance and lessons learned is being finalised.
- The running and full analysis of the demonstration in Greece have been completed. The technical analysis of the collected data is being finalised.
- REMOTE has finalised the installation of the new demonstration in Spain. The demonstrator has been commissioned and is operational.
- 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 H₂-based P2P plants for remote locations is being developed and will be presented to the market stakeholders.

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 of SoA target
MAWP addendum (2018–2020)	Rated efficiency of the 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 the fuel cell (PEM)	% LHV	42–62 (2024)	45–55	✓	51	2018
	Rated efficiency of the electrolyser (Alkaline)	kWh/kg	50 (2020) 49 (2024)	55–60	⚙️	55–60	2020