



**Making an impact  
on the clean  
energy transition**

**ENERGY**

# BRINGING CLEAN POWER TO ISOLATED LOCATIONS



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## Taking renewable energy further

While zero-carbon energy sources such as wind and solar are useful in remote areas, their effectiveness either depends on the weather, or their output is curtailed by insufficient grid capacity. Hydrogen fuel cell systems can overcome these limitations and totally or partially replace diesel generators.

REMOTE is demonstrating two types of hydrogen fuel-cell-based energy-storage solutions in three locations: on a milking facility in the Canary Islands, Spain; an agri-food processing unit in Agkistro, Greece; and a fish farm and homes in Rye, Norway.

## Getting off the grid

The REMOTE demo has avoided the need to build a 20-km transmission line connected to the main grid in Agkistro. This would have been considerably more expensive than the hydrogen option. In addition, fuel-cell- and hydrogen-based power-to-power (P2P) systems have medium- to long-term storage capacity which is more viable than battery systems that only store energy over the short term. The milking facility in La Aldea de San Nicolás, on Gran Canaria, is surrounded by nature reserves, which means that the grid cannot be expanded. A local hydroelectric power plant will be used to produce hydrogen which will be stored and used to power the farm when the hydroelectric plant cannot meet demand.

Lessons learnt from the REMOTE demos will help improve the technology so that the solution can be replicated effectively in other off-grid areas.

**People living and working in off-grid areas often have to rely on noisy, polluting diesel generators for electricity. The FCH JU-funded REMOTE project is showing how hydrogen fuel cells offer a cleaner alternative that is technically and economically viable.**



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**CUTTING COSTS, BOOSTING PERFORMANCE**

In addition to the need for performance improvements, the cost of hydrogen production and conversion technology has to be reduced through economies of scale to make it more attractive than fossil-fuel-powered alternatives.

**EASY TO REPLICATE**

The FCH JU-funded demos are designed to be easily replicable and adaptable to demand. With more than 10 000 inhabited islands and 30 000 off-grid telecoms towers worldwide, powered largely by diesel generators requiring expensive, imported fuel and regular maintenance, the market potential for greener technology is huge. **The goal?** To help suppliers and users gain experience with such systems, to be applied in the next generation of designs. Demonstrating to the energy community and decision-makers how fuel-cell-based H<sub>2</sub> energy-storage solutions are more efficient and require less maintenance than fossil-fuel-powered technology will help boost their use. **Key results?** REMOTE has defined the technical and business cases for the demonstration sites, along with the value chain. The regulatory framework has been analysed and technical specifications for each demonstration site have been developed. The first algorithm needed to help run the technology has been developed and can be used in future applications of these P2P solutions. In addition, the project was named best renewable energy project in the innovation section at the European Sustainable Energy Week 2020.

**KEY ACHIEVEMENTS**

**EUR 410/MWh UNIT COST**

for the hydrogen-based power-to-power solution in Agkistro over 10 years, compared to EUR 864/MWh for a new 20-km cable connection to the grid

**67 %**

of the electricity stored in the hybrid H<sub>2</sub> battery system at the Agkistro demo site can be retrieved for use (known as round-trip efficiency)

**48 TO 57 TONNES**

of CO<sub>2</sub> production saved per year (projected) from reduced use of diesel generators at the Gran Canaria demo site

**AROUND 60 %**

of local renewable energy generation is provided to users through the P2P system at the Rye demo site, which would otherwise be lost because of the mismatch between RES generation and demand

**IMPACT**

**OPERATION IN ALL-WEATHER CONDITIONS**

including self-starting in low temperatures

**LOW OPERATING COSTS**

due to long lifetime and minimal need for regular or predictive maintenance – long-term potential for total cost of operation less than that of diesel generators

**HIGHER OPERATING EFFICIENCY**

for combustion and storage, and extended run times compared to conventional technologies

**FEWER REGULATORY HURDLES**

when setting up hydrogen power infrastructure in environmentally protected areas

**EMISSION SAVINGS**

of 1.5 gigatonnes of CO<sub>2</sub> per year (4 % of global emissions) could be achieved if the world's 750 million islanders were to replace their diesel generators with hydrogen power

**REPLICATION**

of the REMOTE concept in off-grid areas could provide an estimated potential capacity of 2 gigawatts annually for an investment of EUR 340 million per year

FIND OUT MORE



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