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PAGLIA ORBA SMART NETWORK

RENEWABLE ENERGY AND HYDROGEN STORAGE ENSURING AUTONOMY AND ENERGY EFFICIENCY IN AN ISLAND ENVIRONMENT

Installed on the site of the Université de Corse Pasquale Paoli and CNRS in Ajaccio on the MYRTE, PAGLIA ORBA platform – literally "Advanced platform for managing electricity in an island environment combining storage and renewable energy solutions - Autonomy objective" – an electric micro-network (not connected to the island's network) i.e. a smart grid in an island environment.

This platform couples electricity production from renewable sources (100 kWc photovoltaic plant) to a hydrogen chain (production technologies, storage and fuel cells) in order to test its relevancy in terms of energy supply issues.

The aim is to stabilise and strengthen the electrification of isolated sites in a reliable, continuous and green manner.

In brief: to ensure continuous service to users while conserving their natural environment.

KEY DATA

- 100 kWc of solar panels
- Multiple storage systems: batteries (lead, ion, redox, NaNiCl2), mechanical (flywheel, STEP) and hydrogen
- I.e. 100 kW/1000 kWh of storage
- Hybridisation between possible storage solutions

INNOVATIONS

- The PAGLIA ORBA platform, which uses 100 kWc of photovoltaic panels connected to the EDF network, will supply 20 households. This micro-network will power homes, offices and electric vehicles. The priorities are: ensuring self-supply with an injection of surplus energy to the grid and isolation from the main grid for a few hours a day.
- In order to overcome the intermittent nature of renewable energy sources, electricity not consumed by the network (at time T) is sent to the McPhy electrolyser installed on the PAGLIA ORBA platform. Thanks to a chemical reaction between water and the electricity, the electrolyser produces hydrogen.
- In this way, McPhy Energy has been able to deploy a solution supplying 10 kilos of hydrogen a day (at a pressure of 10 bar). This hydrogen energy can then be stored in solid form (5 to 10 kg of storage capacity in phase 2 of the project) before being converted back into electricity when required by the network (e.g. in the evening or during peaks in consumption) via a fuel cell.

STAKEHOLDERS

CNRS
Università di Corsica Pasquale Paoli
CEA
McPhy energy

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République Française
Ministère de l'Environnement, de l'Énergie et de la Mer
Ministère du Logement et de l'Habitat Durable

RESULTS

- The expected results of the PAGLIA ORBA platform can be calculated both qualitatively and quantitatively.
- Qualitatively, it preserves Corsica's natural environment by using green energy while, at the same time, increasing the skills of the island's technical teams.
- Furthermore, it validates the concept of combining photovoltaic electricity production and storage solutions in the form of hydrogen as well as the overall output of installations.
- The installation was completed early in 2016. The next step will be to evaluate the overall price of the hydrogen chain in order to compare it with traditional solutions.

PROJECT EXTENSION: FOCUS ON HYDROGEN MOBILITY

/// HYWAY & H2 ENGIE GNVERT STATION: GREEN MOBILITY IN THE HEART OF THE REGIONS

If the tests conducted on the PAGLIA ORBA platform are conclusive, hydrogen energy could provide a range of new applications for the entire island of Corsica e.g. hydrogen mobility, which is used by regions wishing to tackle air pollution and climate change.

Hydrogen vehicles have a range of first rate benefits. The high energy density of hydrogen doubles vehicles' autonomy compared to electric vehicles and allows them to be refuelled in under five minutes ensuring increased productivity and time savings for users. These 'zero-emissions' vehicles (i.e. no CO2 or particles) only release water thereby contributing to better air quality and better living conditions for city dwellers.

In order to support the growth in zero-emissions mobility, McPhy Energy plans to deploy a series of hydrogen refuelling stations in France and abroad. This is the case of the ENGIE GNVert station on the CNR site in Lyon in the context of the Hyway project.
Managed by the Tenerrdis cluster, the Hyway project uses a unique and innovative model for deploying fleets of electric utility vehicles fitted out with hydrogen kits permitting them to double their autonomy by accessing two refuelling stations in Grenoble and Lyon.
The first users will be pioneers of sustainable hydrogen mobility.

Designed and installed by McPhy Energy, the Lyon station can refuel HyWay vehicles in under seven minutes at a pressure of 350 bars.
Located at the Port de Lyon CNR, a busy logistics hub in the centre of the city, the station can refuel (with hydrogen) around fifteen vehicles a day i.e. four times more than in the pilot station.

This modular project will be further developed in 2017.
The hydrogen will be produced on site by installing an electrolyser running on 100% renewable electricity produced by CNR. This station will also have an NGV refuelling station and electrical charging stations to become a truly "green" multi-fuelling station.

HYWAY IN FIGURES

- 50 electric hydrogen vehicles (Kangoo ZE-H2)
- 2 hydrogen refuelling stations in Grenoble and Lyon
- During the first four months of operation, the vehicles have:
  - Driven over 60,000 kilometres
  - Refuelled over 280 times in the stations
  - Clocked up over 10,000 km on the most used vehicle

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