



PIATTAFORMA
ENERGIE
RINNOVABILI

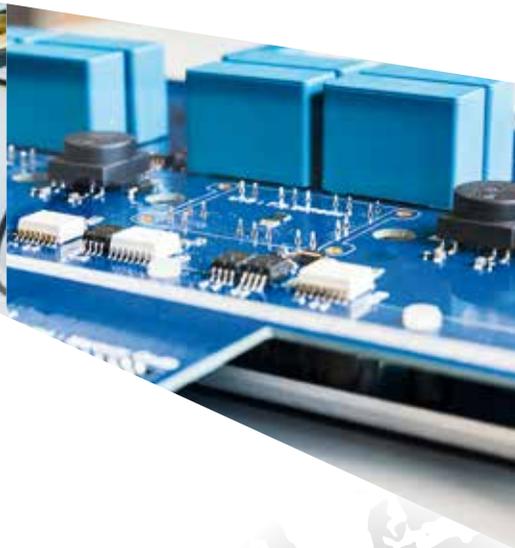
ABOUT US

Since 2010 the Renewable Energy Facility (*Piattaforma Energie Rinnovabili*) carries out research into renewable energy technologies and microgrid energy systems.

Managed by Sardegna Ricerche, the regional agency for innovation, the facility is a publicly funded research centre and collaborates with other Sardinian research groups from University of Cagliari and CRS4. Its role is to act as a conduit between academia, industry and the Regional government to foster the development of renewable energy technologies.

The facility has over 600m² of laboratories dedicated to research activities covering a range of technical applications, including renewable energy to grid integration, microgrids, biomass, hydrogen, energy storage, vehicle to grid integration.

The *Piattaforma* opens its laboratories and facilities to people working in academia, research organizations and industry, providing space and services. It also organizes dissemination activities for stakeholders, decision makers and end-users, and offers training and research opportunities for students.



SARDEGNA RICERCHE

THE RENEWABLE ENERGY FACILITY

HOW TO REACH US

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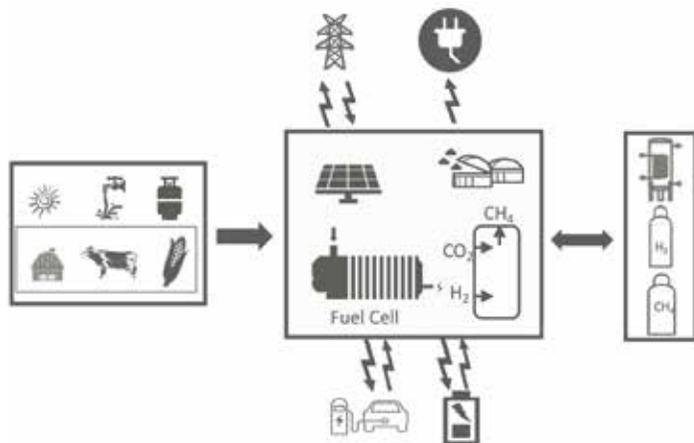
POR FESR
SARDEGNA 2014-2020



OUR MICROGRID

All energy facilities and pilot plants of the Renewable Energy Facility (*Piattaforma Energie Rinnovabili*) are connected in a local microgrid. We adopted an integrated approach, coordinating different forms of energy demand and production in order to obtain an energy island capable of achieving instantaneous energy balancing in any environmental and operational condition. The microgrid is designed to be flexible and suitable for R&D activities, and to achieve the following goals:

- Optimize the integration of the existing production and storage systems with the electric and thermal demand
- Minimize CO₂ emissions
- Test and integrate different storage systems (thermal, chemical and electrochemical)
- Achieve instantaneous energy balancing of the building in any condition.



MAIN EQUIPMENT

- Anaerobic digestion pilot plant (working volume of 1 m³) capable of operating under psychrophilic, mesophilic and thermophilic conditions
- Fast catalytic pyrolysis pilot plant capable of operating within a temperature range of 450-600°C and using biomass and other residues
- Hydrogen generators (2 Nm³/h PEMFC technology)
- Hydrogen storage tanks in the gaseous phase (4,5 kg or 50 Nm³) and through metal hydrides (0,15 kg)
- Fully instrumented PEMFC stack (1,2 kW)
- PEMFC Power System for microgrid support with 5 kW of electric power
- Test station for feeding and management of low-power fuel cells and metal hydride vessels
- Photovoltaic systems of different technologies: traditional amorphous, high efficiency monocrystalline and high concentration
- Microgrid test bench supplied by 6 kW concentration photovoltaic system supported by a 10 kWh electrochemical storage system with programmable electronic load for the implementation of control algorithms
- Microgrid with real loads supplied by 8 kW amorphous photovoltaic system and supported by a 10kWh capacity storage system
- Test bench for electro-mobility testing (charging station, control of charging station, propulsion system)
- Power grid simulator with a rated power of 50 kVA
- Characterization, modelling and control of energy storage systems
- Method and Analysis procedure for power quality characterization of microgrid, smart grid and power systems.

RESEARCH PROJECTS

- Research activities on energy management issues in microgrids regarding the processes of production, conversion, storage and use of energy

- Development of Energy Management Control Algorithms for micro and smart grids and for electro mobility integration in a smart grid
- Development of Battery Management System for novel electrochemical storage systems
- Integration of active filter and energy storage devices for the improvement of power quality in smart grids
- Development of novel configuration and topology of inverter for smart grids
- Use of biogas produced by anaerobic digestion of different biomass for SOFC supply
- Bio-methane synthesis from locally produced Hydrogen and Carbon Dioxide via bio methanogenesis
- Integration in microgrids of production and storage of chemical energy (Bio-methane and Hydrogen)
- Evaluation of SOFC and PEMFC fuel cells co-generators (heat and power) performance in the local microgrid
- Integration and evaluation of the hydrogen technologies in the local microgrid
- Thermal storage systems for microgrid support
- Integration of electric mobility into the microgrid, through V2G (Vehicle to Grid) technologies.

DISSEMINATION AND SUPPORT PROJECTS

In addition to research activities, the *Piattaforma* also carries out programs and projects for:

- scientific and technological dissemination on the research topics of the facility
- training in energy efficiency and smart grids issues
- raising awareness about sustainable energy issues.

