The H2SusBuild project consortium announces completion of the first project phase, which foresaw installation of the small-scale RES-H2 hybrid energy system prototype plant.

In April 2010, the small-scale RES-H2 hybrid energy system prototype installation was completed towards demonstrating the H_2SusBuild concept at prototype scale. This reduced-scale prototype installation aims to verify the synergistic operation of the various system components developed within the project, and to evaluate the system viability, efficiency and Safety, when integrated within a real building environment, through monitoring over time. Furthermore, it will serve as pilot for the subsequent design and installation of a full-scale RES-H2 hybrid energy system demonstrator.

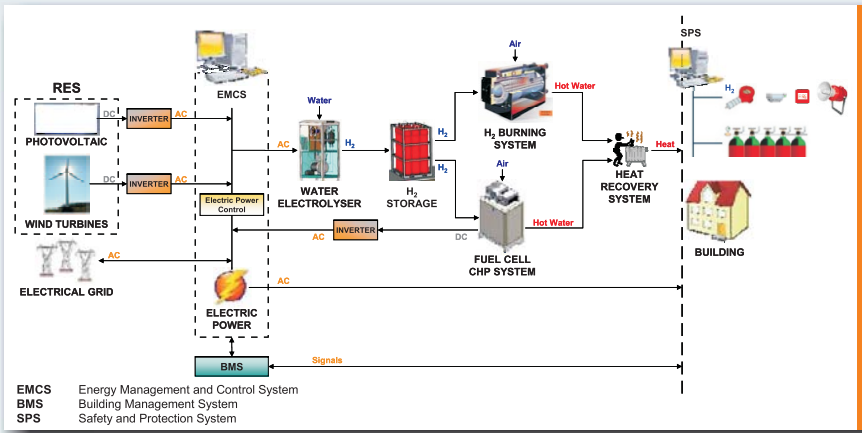
The small-scale pilot installation consists of a RES system composed of photovoltaic solar panels as well as wind power generators, coupled with a high-efficiency water electrolysis prototype unit for the production of hydrogen, appropriately developed for internal use in domestic environments. The produced hydrogen is stored in form of pressurized gas and consumed on-demand by a PEMFC-based micro-cogeneration unit, which produces electric power in case of shortage of Renewable Energy. More specifically, the installed RES system is used to harvest the primary energy to be directly applied to cover part of the building's contingent loads. In case of excess Renewable Energy availability, the excess energy is converted into hydrogen to be used as energy storage medium. In case of Renewable Energy shortage, the stored hydrogen is applied as green fuel in order to cover the electrical energy demand of part of the selected demo building in Lavrion Technological and Cultural Park (Lavrion, Greece), through power generation by means of Fuel Cells.

Additional system components consist of:

- the hydrogen distribution grid, which collects the hydrogen from the generation facility (i.e. the electrolyser), transfers it to the storage facility, and distributes it to the hydrogen consumption facility (i.e. the Fuel Cells-based power generation module);
- the Energy Management and Control System (EMCS), which includes hardware, software and control strategies for effective load and energy management. The EMCS manages the RES in parallel with the consumption grid demand, to monitor operations, maximize efficiency and manage the resources;
- the Safety and Protection System, which integrates hydrogen gas detectors, flame detectors, heat detectors, smoke detectors, visual and acoustic alarms as well as other safety devices to guarantee Safety in the building.

Various prototype components such as a domestic water electrolyser (1-4 Nm^3/h rated hydrogen production), a small-scale (5,8 kWe) PEMFC-based micro-cogeneration unit, and a small-scale Type II composite pressure vessel prototype (50 litres water capacity, max. operating pressure 350 barg), as well as all the additional components of the small-scale RES-H2 hybrid energy system prototype were installed in a selected building in Lavrion Technological and Cultural Par (Greece). The site is managed by the National Technical University of Athens. The building hosting the installation consists of a ground floor with a surface area of 375 m^2 and an attic floor in the north side of the building of 157 m^2 (total surface area 532 m^2)

The development of the H2SusBuild RES-H2 hybrid energy system will allow demonstrating to what extent hydrogen gas storage can be applied to balance the intermittent nature of RES technologies, thus ensuring continuous operation of energy systems based on RES applied to cover the thermal as well as electrical energy needs of buildings.The next step will foresee extensive testing activities on the small-scale RES-H2 hybrid energy system aimed at the collection of extensive sets of data to be used to design the full-scale RES-H2 hybrid energy system. Installation of the full-scale system is planned to be completed by Month 36 (September 2011).



Full-scale RES-H2 hybrid energy system

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