



Flexible Ecological Multi-purpose Advanced Generator

Fuel Cells based systems have the potential to replace in principle every battery powered electric system, but also to be applied in much more applications which are now impossible for battery powered systems for reasons of autonomy, and are therefore performed with internal combustion engines.

In the field of generic, all purpose applications, fuel cells require to be combined with battery storage and ultra capacitors, operating in a symbiotic hybrid mode to effectively meet the varying load requirements of each specific application at the lowest cost and the most responsive operating mode.

FEMAG intends to explore optimised integration of components and power aggregates, delivering an energy generator, closed, of small power, based on the integration of a fuel cell with a battery pack and supercapacitors, for the flexible supply at variable power of small portable non automotive devices.

FEMAG proposes to develop a product which is based on Fuel Cells, but is combined with all the components required to make its application flexible, simple and able to satisfy not only the base power consumption, but also relative peaks of consumption of associated machines, within utilisation profiles prefixed at the design stage.

Design criteria are expected to be capitalised into an expert system for the design of aggregated generators basing on boundary utilisation profiles.

Main goals

Define and test suitable design configurations for power systems in the range from 0.125 to 1 kW based on the integration of PEMFC with complementary power ancillaries

- Develop symbiotic hybrid modes to effectively meet the varying load requirements of each specific application at the lowest cost and the most responsive operating mode
- Identify adequate set of components for such systems (batteries, ultra-capacitors and controllers)
- Certify the boundary conditions within which such systems are able to operate reliably.
- Develop and demonstrate an advanced expert system for the design of complex generators based on FCs in the range of 0.5 to 3.1 kW
- Deliver a prototype demonstrative generator powering a wheelchair for people with disabilities.

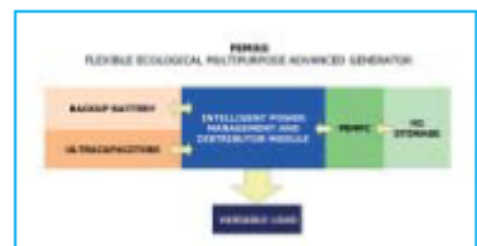
Project approach

FEMAG methodology is based on the integration of commercial and pre-commercial devices and components, and targets high replicability as a main patrimony to be generated.

The aggregated FEMAG generator will be designed around the criteria of minimising fuel cell rated power, entrusting to backup batteries and ultracapacitors the supply of power transients, and put the cell in the condition to work only at fixed power output, extending its life.

The project involves both experimental and computational optimisation of aggregated systems, and exploits experimental design to set up rigorous testing activities.

Experimental design is a very powerful and comprehensive methodology, allowing to plan and carry out experiments in such a way that maximum possible information is gained. It is very useful in the investigation of several aspects in the course of knowledge acquisition from experimental data.



Additional information:

Title: Flexible Ecological Multi-purpose Advanced Generator

Acronym: FEMAG

Programme: Collective Research and Co-operative Research (CRAFT)

Instrument: STREP

Projected total cost (€): 1,058,022

Maximum EC contribution (€): 585,067

Partners:

- University of Rome "Tor Vergata" - Dept. of enterprises Engineering - Italy - RTD performer
- Molecular Network GmbH - Germany - RTD performer

- Graz University of Technology - Austria - RTD performer
- AGT S.r.l. - Italy - SME
- Nuova Fima S.p.A. - Italy - SME
- Szwed Sp. z o.o. - Poland - SME
- Enertron GmbH - Germany - SME
- IBE S.L. - Spain - SME
- ASL Rome E - Germany - Other Participant

