A) General Information

Acronym: SOMMCC

Title of the User-Project: Synchronization of microgrids by a Microgrid Central Controller

TA Call: January 31st, 2012
Host Research Infrastructure: VTT (Finlandia)
Starting Date: 10/09/2012
End Date: 28/09/2012 (expected)
Lead User : Estefanía Planas
Organization: Apert Research Team, University of the Basque Country UPV/EHU
Additional Users:

B) Summary of the User-Project

A **Microgrid Central Controller** (MCC) has been implemented which improves the voltage quality of a microgrid. The microgrid is in the research infrastructure of **Tecnalia** and is formed by two diesel generators and different resistive and reactive loads. The diesel generators work in **island** and in an **autonomous** way using the **droop control** method. The microgrid is controlled following a **hierarchical control scheme**, where the local control of the generators is droop control. The MCC is connected to the generators in order to send the nominal values of the frequency and the voltage amplitude.

On the other hand, microgrids can work both connected and disconnected to the grid. In this case, the microgrid is always working in an autonomous way but in some cases (like damage of one diesel generator, high load, etc.) it would be interesting to connect the microgrid to the main grid.
This way, it is very interesting to add **a new function to the MCC that synchronizes** the voltage of the microgrid with the main grid. This way, the MCC could connect the microgrid to the main grid when the synchronism between the two voltages is reached. This synchronization could be done by means of Phasor Measurement Units (**PMU**) or other similar dispositives.

The realization of this proposed research has three main objectives:

- ✓ Addition of a new function to the MCC for synchronization of the microgrid.
- ✓ Use of PMUs or other synchronization dispositives.
- ✓ Warranty of stability of the microgrid during the connection, transient and disconnection from the main grid.

C) Main Achievement

The experimental platform needed for this project presented some problems that could not be solved. In order to carry on with the DERri project, it was adapted to the following tasks:

- State of the art of the applications of PMUs in microgrids all over the world.
- Analysis of the optimal placement of the PMUs in the experimental microgrids of Tecnalia and VTT:
    - Design of the placement and the number of PMUs needed for the model estimation of each microgrid.
    - Advantages and disadvantages of PMUs versus other kind of measurement

systems.

- Simulation of the proposed synchronization algorithm by means of software tools.
- Analysis of software and hardware requirements for the acquisition of the PMU data in the MGCC.

D) Dissemination of the Results

The results will be sent to a conference about renewable energy and power quality (ICREPQ 2013).

E) Use of the Resources

Some tests have been carried out in VTT but without the expected results.

Nr. of Users involved: 1
Access Days: 15
Stay Days: 22