

## A) General Information



<b>Acronym:</b>	MICROEFIRE
<b>Title of the User-Project:</b>	Research for the Development of a Low Voltage Microgrid for the Integration of Distributed Resources Under the Criteria of Improving Energy Efficiency and to Facilitate Demand Response
<b>TA Call:</b>	7 <sup>th</sup> Call of Proposals, 30 June 2012
<b>Host Research Infrastructure:</b>	DNV KEMA – Flex Power Grid Lab
<b>Starting Date:</b>	27-06-2013
<b>End Date:</b>	19-07-2013
<b>Lead User (Name-Institution-Country):</b>	Dr. Guillermo Escrivá-Escrivá, Universitat Politècnica de València, Valencia, Spain
<b>Additional Users (Name-Institution-Country):</b>	-

## B) Summary of the User-Project

In this project, the basis of a micro-grid is established, including the implementation with commercial devices and the definition of the control system of the different components. The network management raises two premises of control, improving the energy efficiency of the systems involved and to provide the necessary tools to facilitate demand response within the electrical system.

As a result of the research, a control system to manage different types of micro-grids can now be defined. This system will support both configurations:

- electrically isolated or
- other self-sufficient facilities.

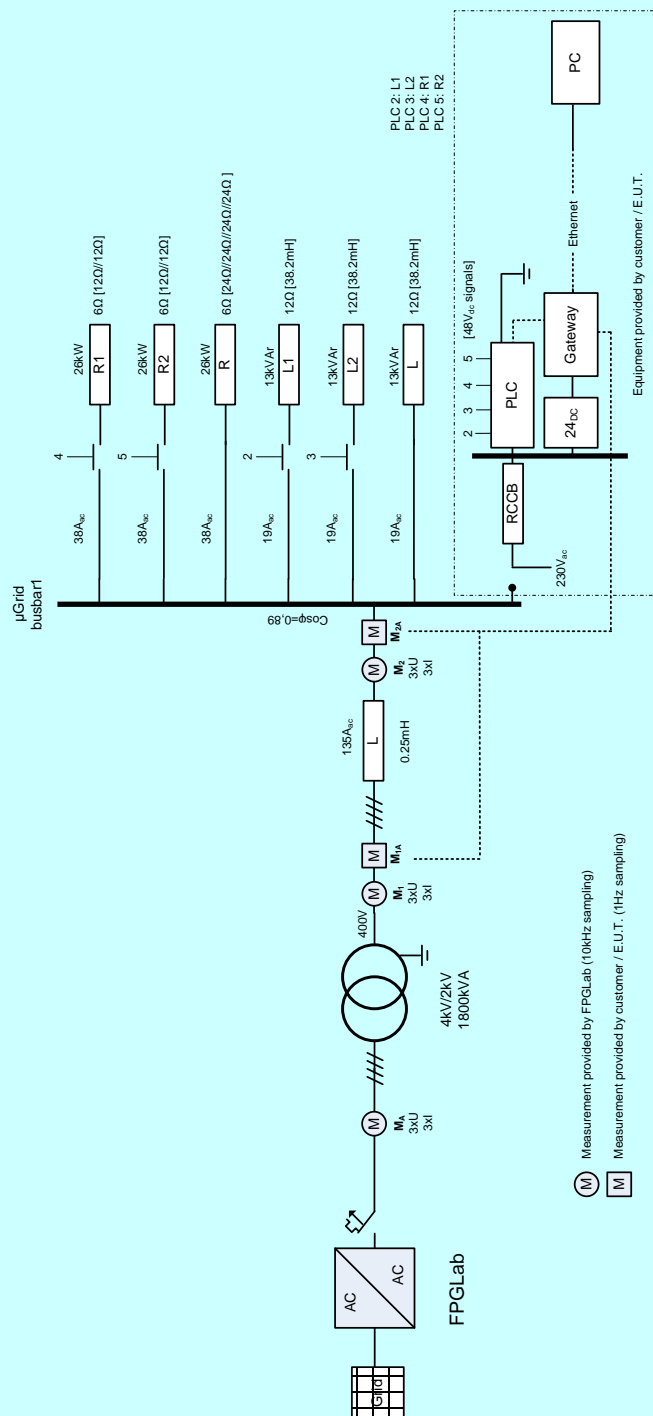
The methodology used during the access to the DERri research facility consists of analyzing a real and operational micro-grid facility; in order to be able to define (project) the requirements for the implementation of the Micro-grid in the Institute for energy engineering (IIE) at the university premises in Valencia, Spain.

The objective is to obtain a document with all the necessary technical and operational specifications. The report obtained, based on the experimental investigation performed within this project is the starting point for the IIE Micro-grid at the university premises in Valencia, Spain.

## C) Main Achievements

After analyzing the test results the following conclusions can be drawn:

- The power meter 710 by Schneider Electric is suitable for measuring the electrical phenomena in a LV micro-grid, at least in the first stage. It has been identified that in order to obtain more detailed information of the system, it would be necessary to install a complementary meter devoted to real time characteristics at a specific electrical point of interest within the system.
- The selected sample frequency of the power meter within the automatized system is 1Hz. The magnitudes obtained are given in RMS and THD values of voltages and currents.
- the PLC ,Twindo TWDLCAA40DRF, is suitable to perform control (connection and disconnection) of the loads and the energy resources involved in the micro-grid.
- The control system architecture to manage the micro-grid is presented in the attached figure.
- For TCP-IP connection the gateway TWDXAFD010 is required, as used during the testing.
- The typical Spanish protection systems (circuit breakers and residual current circuit breakers (RCCBs)) have been found to be suitable for protection of the micro-grid system. In particular, voltage transients must be taken into account when using RCCBs in circuits feeding electronic equipment, such as PCs, as they might lead to nuisance trips or alternatively to reduced protection levels.



The Control system architecture envisaged for the IIE micro-grid application and as used during this investigation and testing.

#### D) Dissemination of the Results

A scientific contribution is going to be presented at the *International Conference on Renewable Energies and Power Quality (ICREPQ'14)*, which will be held in the Presidency of University of Córdoba, Córdoba (Spain) from 8 to 10 of April, 2014.

#### E) Use of the Resources

Access Days/Units (DNV KEMA): 14

Stay Days (DNV KEMA): 23