UNIVERSIDAD CARLOS III DE MADRID

# INTERNATIONAL WORKSHOP ON CONTROL OF CONVERTERS FOR SMART GRIDS

15th December, 2010

Leganés, Madrid
Spain

Organized by

Carlos III University
Electrical Engineering Department


PROGRAMME

9:00h **Opening/Welcome**

9:15h **Hierarchical Control for High Power Quality Power Plants with Microgrid Operation Capability.**

- Introduction: definition and functionalities
- Modeling and control of microgrids
- Hierarchical control of microgrids
- Secondary and tertiary control issues
- Conclusions

This presentation gives some examples of microgrids in the world, mainly focused on single and three-phase voltage source inverters. The modeling and control of these power electronics converters is presented. Concepts like frequency and voltage droop control are explained in detail, as well as the virtual impedance concept. The presentation also introduces the study of the hierarchical control of microgrids for DC and AC electrical systems. Secondary control issues are introduced to regulate frequency and amplitude voltage of the microgrid. As well, tertiary control issues, synchronization and grid interactivity between the grid and the microgrid are analyzed. Finally, the voltage unbalance and harmonic compensation by using decentralized controllers is presented.

11:00h *Break*

11:30h **Control of grid generators under unbalanced grid fault conditions**

- Introduction
- Generators under Grid Faults
- Power Control under Unbalanced Grid Faults
- Unbalanced Current Controllers
- Conclusions

Grid-connected power converters should be designed and controlled bearing in mind that they should guarantee a proper operation under generic grid voltage conditions. The proper operation of the power converter under unbalanced conditions is a challenging control issue. The injection of unbalanced currents under unbalanced grid voltage conditions allows attenuating power oscillations, maximizing the instantaneous power delivery, or balancing the grid voltage at the point of connection. Several reference current generation strategies under grid faults is another will be presented in this lecture since it is a crucial issue in the control of power converters. However, the injection of unbalanced currents into the grid cannot be accurately achieved by using most of the conventional current controllers used in the industry. For this reason, some improved control structures specifically designed to inject unbalanced currents into the grid will be also presented in this lecture.

13:15h **COM2PS: a practical case for making generation smarter**

14:30h **Closing**

LANGUAGE

English

WORKSHOP ORGANIZERS

Dr. Joaquín Eloy-García Carrasco
Dr. Jaime Alonso-Martínez de las Morenas
Dr. David Santos Martín

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MEETING ROOM

"Rey Pastor" Building, Video Conference Room (3.1.S08)

WORKSHOP LECTURERS

Dr. Josep Guerrero
Dr. Pedro Rodríguez
Dr. Ricardo Valverde

REGISTRATION AND INFORMATION

Registration is free, but it is required in order to get a copy of the presentations.

Web: http://gcsp.uc3m.es

REGISTRATION FORM

## International Workshop on Control of Converters for Smart Grids

Pleased send by:

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ACCOMADATION

The following hotels are suggested:

HOTEL TRYP LEGANÉS
+34 91 689 61 61 Leganés (next to University)

HOTEL CARLTON
+34 91 539 71 00 Madrid (next to Atocha train station)

TRANSPORT

Carlos III University is sited in Leganés (aprox. 12 km south of Madrid)

By train: line C5 from Atocha train station to Leganés train station. University is in a walking distance from Leganés train station.