

# TALK on Integration of Distributed Energy Resources into the Smart-Grid

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*Josep M. Guerrero* (S'01-M'04-SM'08) received the B.S. degree in telecommunications engineering, the M.S. degree in electronics engineering, and the Ph.D. degree in power electronics from the Technical University of Catalonia, Barcelona, Spain, in 1997, 2000 and 2003, respectively.

He is an Associate Professor with the Department of Automatic Control Systems and Computer Engineering, Technical University of Catalonia, Barcelona, where he currently teaches courses on digital signal processing, FPGAs, microprocessors, and renewable energy. Since 2004, he has been responsible for the Renewable Energy Laboratory, Escola Industrial de Barcelona. His research interests include photovoltaics, wind energy conversion, uninterruptible power supplies, storage energy systems, and microgrids.

*Dr. Guerrero* is the Editor-in-Chief of the International Journal of Integrated Energy Systems. He is also an Associate Editor for the IEEE TRANSACTIONS ON INDUSTRIAL ELECTRONICS, the IEEE TRANSACTIONS ON POWER ELECTRONICS, the International Journal of Power Electronics, and the International Journal of Industrial Electronics and Drives.

Worldwide electrical grids are expecting to become smarter in the near future, with interest in Microgrids likely to grow. A microgrid can be defined as a part of the grid with elements of prime energy movers, power electronics converters, distributed energy storage systems and local loads, that can operate autonomously but also interacting with main grid. Thus, the ability of intelligent Microgrids to operate in island mode or connected to the grid will be a keypoint to cope with new functionalities and the integration of renewable energy resources. The functionalities expected for these small grids are: black start operation, frequency and voltage stability, active and reactive power flow control, active power filter capabilities, and storage energy management. In this presentation, a review of the main concepts related to flexible Microgrids will be introduced, with examples of real Microgrids.

AC and DC Microgrids to integrate renewable and distributed energy resources will also be presented, as well as distributed energy storage systems, and standardization issues of these Microgrids. Finally, Microgrid hierarchical control will be analyzed looking at three different levels: i) a primary control based on the droop method, including an output impedance virtual loop; ii) a secondary control, which enables restoring any deviations produced by the primary control; and iii) a tertiary control to manage the power flow between the microgrid and the external electrical distribution system.

**10 February 2010 (Wed)**

**10.30am-11.30am**

*(Registration and Networking starts at 10am)*

*Light refreshments would be served)*

Biopolis, Matrix Building,  
Level 4, Creation Theatre

**REGISTRATION FOR THIS EVENT IS FREE**

Interested IES members can email your particulars & IES/IEEE membership Nos. (if any). Accreditation: PD points to be advised

Interested parties can email your particulars to [EPGC\\_Contact@ICES.a-star.edu.sg](mailto:EPGC_Contact@ICES.a-star.edu.sg) by 5 Feb 2010(Friday)

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