ForskEL-projektdag 10 Feb., 2016 at Energinet.dk.

PV2GRID: A Next Generation Grid Side Converter with Advanced Control and Power Quality Capabilities

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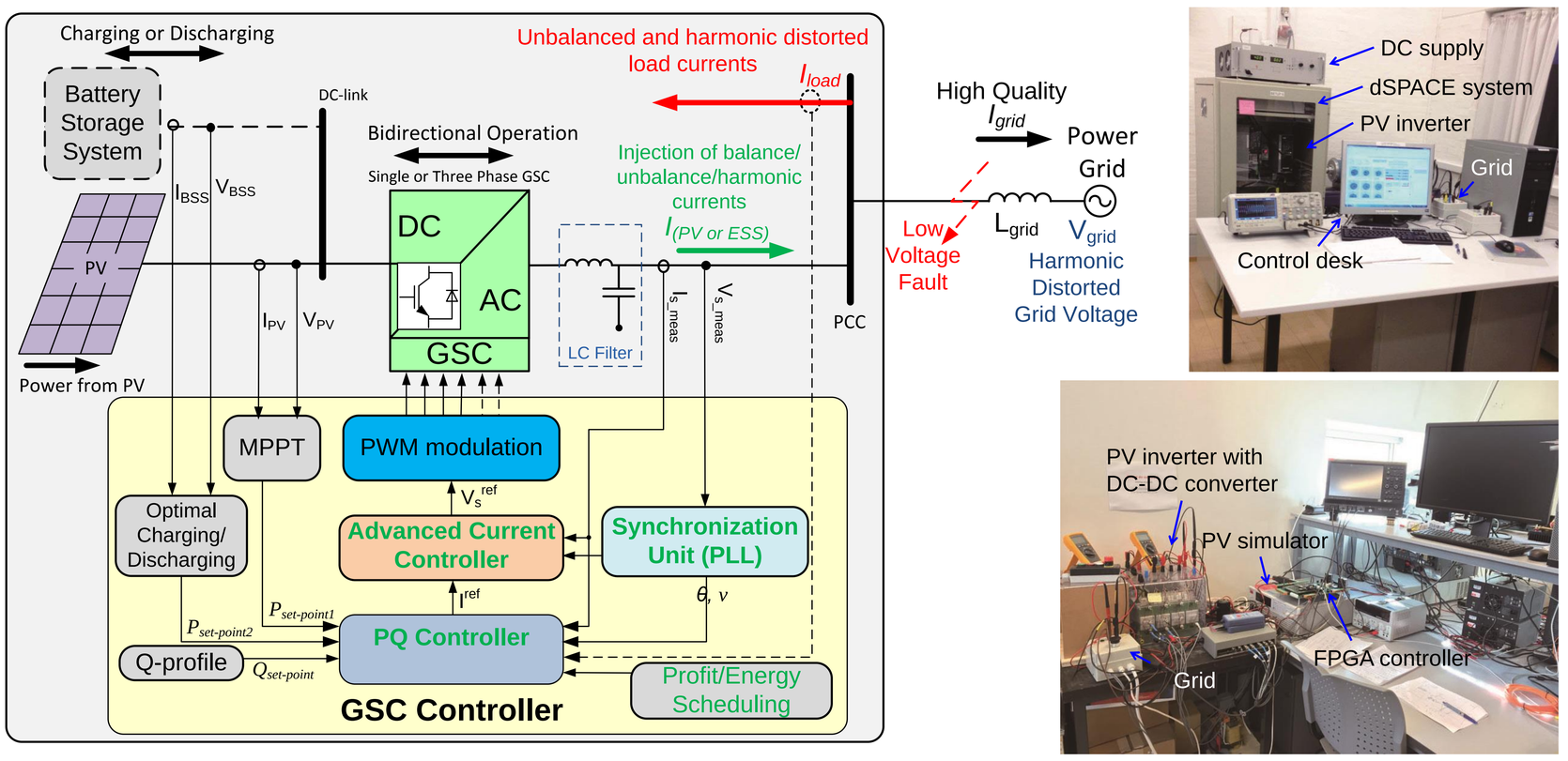
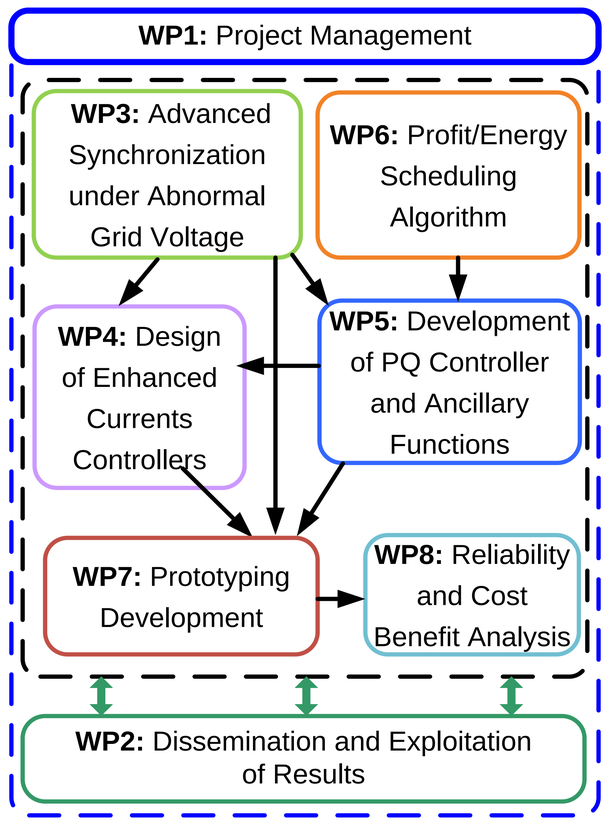
Description- Photovoltaics (PV) have the potential to become a major source of renewable energy and clean electricity in the future and can provide a significant share of European electricity demand. However, there are several challenges that need to be addressed prior to the widespread adoption and utilization of PV technologies. Grid side converter (GSC), which is the key for the PV integration, are still not capable of advanced control features that enable the full control of PV systems, e.g., with fault ride through, reactive power support, and power generation control. This project aims to develop a next-generation GSC with advanced control and novel operational mode capabilities, in order to further reduce the cost of PV energy.

Grid-Connected PV Inverters



Project Flow

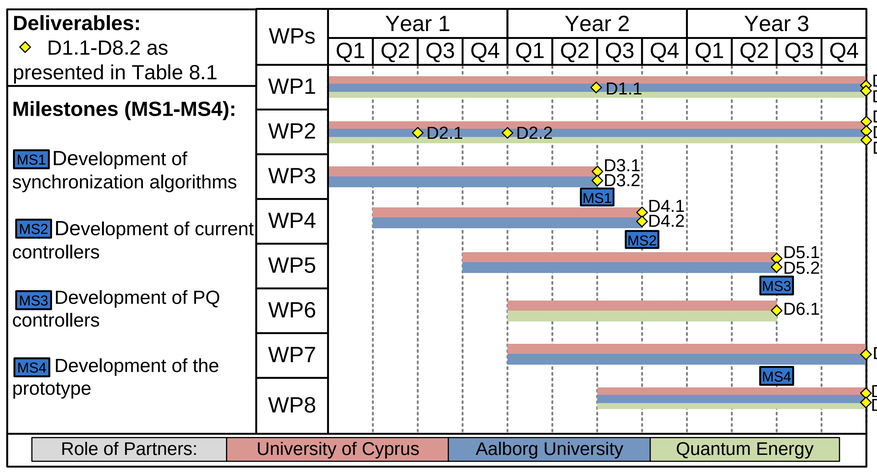


Summary of the Past Project Year

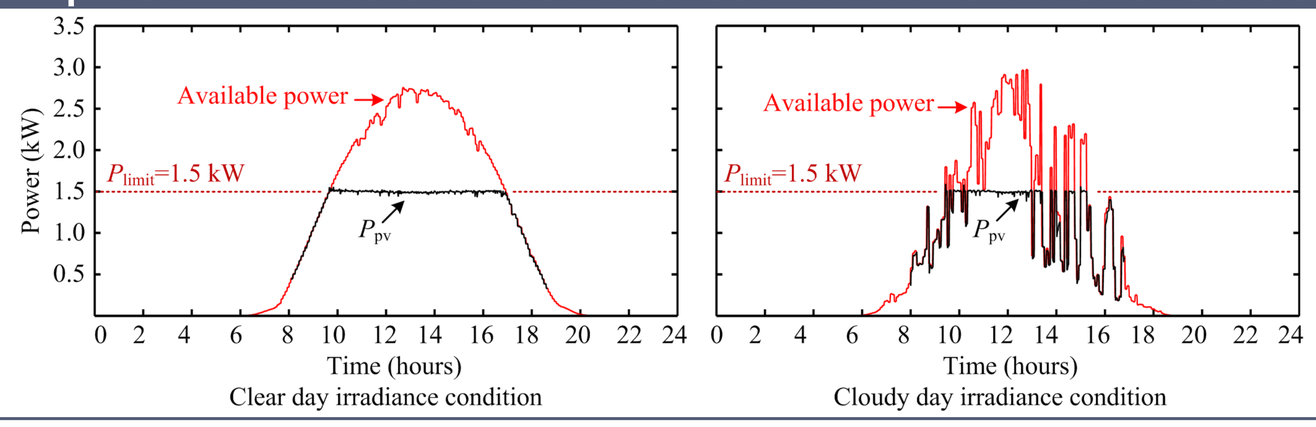
In general, the project is running well as what have scheduled in the project proposal. The major activities in last year were:

- Recruitment of a Research Assistant, who is working on the project and has built up the hardware system for the project.
- Dissemination of the current outcomes and publicity of the project.

Deliverables listed in the project proposal were accomplished by the due time. Specifically, for Deliverables D2.1 and D2.2, links for the project have been launched (e.g., AAU - http://goo.gl/SO03Kp, UCY - http://goo.gl/UuAPFe) and posters/info-graphics have also presented at the host universities. For Deliverables D2.3 and D2.4, five journal papers have been published with the PV2GRID project, and one conference paper, which has also been presented at the 9th International Conference on Power Electronics and ECCE Asia (ICPE-ECCE Asia 2015), where valuable comments and recognition of the project have been received. There will be two more conference papers to be presented in the spring of 2016.



Example of an Advanced Active Power Control: Constant Power Generation



Dissemination of the Results

Journal papers

- Y. Yang, K. Zhou, F. Blaabjerg, "**Enhancing the Frequency Adaptability of Periodic Current Controllers with a Fixed Sampling Rate for Grid-Connected Power Converters**," in *Power Electronics, IEEE Transactions on* , vol.PP, no.99, pp.1-1
- Y. Yang, K. Zhou, F. Blaabjerg, "**Current Harmonics From Single-Phase Grid-Connected Inverters—Examination and Suppression**," in *Emerging and Selected Topics in Power Electronics, IEEE Journal of* , vol.4, no.1, pp.221-233, March 2016
- Y. Yang, F. Blaabjerg, H. Wang, M. G. Simoes, "**Power Control Flexibilities for Grid-Connected Multi-Functional Photovoltaic Inverters**, " in *IET Renewable Power Generation*, vol. PP, no. 99, pp. 1-10.
- L. Hadjidemetriou, E. Kyriakides, Y. Yang, F. Blaabjerg, "**A Synchronization Method for Single-Phase Grid-Tied Inverters**," in *Power Electronics, IEEE Transactions on* , vol.31, no.3, pp.2139-2149, March 2016.
- A. Sangwongwanich, Y. Yang, F. Blaabjerg, "**High-Performance Constant Power Generation in Grid-Connected PV Systems**," in *Power Electronics, IEEE Transactions on* , vol.31, no.3, pp.1822-1825, March 2016

Conference papers

- A Synchronization Scheme for Single-Phase Grid-Tied Inverters Under Harmonic Distortion and Grid Disturbances. (APEC 2016)
- Benchmarking of Constant Power Generation Strategies for Single-Phase Grid-Connected Photovoltaic Systems. (APEC 2016)
- Benchmarking of Phase Locked Loop based Synchronization Techniques for Grid-Connected Inverter Systems. (ICPE-ECCE Asia 2015)

For more information, please visit www.et.aau.dk