PV2GRID
A next generation grid side converter with advanced control and power quality capabilities

Project duration: from 04.2015 to 03.2018
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Publishable Summary

Several goals have been set at international and European levels regarding the energy and climate change of the planet. According to the European Union, these objectives are well known as the “20-20-20” targets by 2020, which require that 20% of energy consumption is produced from Renewable Energy Sources (RES), a 20% reduction in greenhouse gas emissions and a 20% improvement of energy efficiency. Higher goals are being set for 2030 (27%, 40%, and 30% respectively). This project focuses on the large scale deployment of photovoltaic (PV) systems through improving their grid integration. The driving forces of this ambitious project focus on three issues of critical significance that inhibit the massive deployment of PVs: (a) the variable/insolation-dependent nature of PV generation, (b) the problems associated with massive distributed generation (e.g. grid unbalance, harmonics), and (c) the need to develop appropriate fault ride through (FRT) solutions to allow them to support the grid during faults. It is expected that the project results and products developed will address the challenges and achieve the objectives with regards to the grid interconnection and the large-scale deployment of PV systems as set by the implementation plan of the Solar Europe Industry Initiative (SEII).

The most crucial point with regards to the grid integration of PV systems is the grid side converter (GSC) which is based on power electronic technology. GSCs are still not capable of advanced control features that enable the full control of RES with FRT capabilities, reactive power support and generation control. The major objective of this project is to develop a next-generation GSC (one for single- and one for three-phase systems) with advanced control and novel operational mode capabilities, which will benefit all stakeholders of PV systems in terms of:

a) A seamless integration of PV systems in the power grid

b) A further larger scale deployment of PV systems due to the several advantages of the new converters

c) Possibilities to extend the GSC technology to other green technologies

d) Maximization of the utilization of PV systems in order to improve the power system operation

e) Increase of the incomes/returns from a solar energy investment for a self-sustainable market of PV systems.

The GSCs designed and developed in this project will achieve an improved performance ensuring the proper grid integration of PV systems under any grid conditions. Additionally, the new GSCs will be enhanced with novel operational functionalities that will allow new operating approaches. The new operating modes will contribute to the development of multifunctional industrial products that

can be used for the grid integration of several new technologies with emphasis on PV systems. The novel operational functionalities of the GSC will pave the way for a higher penetration of solar energy and will maximize the utilization of PV systems in order to:

- Enhance the value and increase the competiveness of PV systems
- Maximize the income of a solar project for a self-sustainable market of PV systems
- Enhance the stability and reliability of power systems
- Improve the power quality and minimize the power losses of Distribution Networks (DN)

Project consortium

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Participating countries and financing:

Country	**Number of organisations involved**	**Project costs in EUR**	**Public funding in EUR**
Cyprus	2	90’624	84’700
Denmark	1	108’432	97’589
Total	*3*	*199’056*	*182’289*

Funding agencies involved and contracts

Funding Agency	**Contract N° and Title**
Research Promotion Foundation (RPF)	KOINA/SOLAR-ERA.NET/0114/02
Energinet.dk (ForskEL)	2015-1-12359/PV2GRID
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