

Enhancing storage integration in buildings with Photovoltaics: The European research project PV-ESTIA

Buildings are one of the world's largest "consumers" of electricity and, as a result, one of the largest emitters of greenhouse gases (GHGs) in the atmosphere. This issue has an immediate impact on the construction industry as the European Union (EU) Member States concentrate their efforts on increasing the number of Nearly Zero Energy Buildings (NZEBS), following the European directives. NZEBs are buildings that have reduced consumption through energy saving measures and derive a significant part of this consumption from Renewables. Already, all public buildings must be classified as NZEBs by the 1st of January 2019 and mostly, all new buildings should belong to this category by the 1st of January 2021, in order to meet the set objectives for climate change by 2030.

As NZEBs usually use photovoltaic (PV) systems to meet these requirements and their numbers are increasing, it is necessary to adjust the regulatory and regulatory framework and to convert NZEBs into electricity-friendly buildings in order to accelerate the transition from their current form, facilitating the further development of PV systems. Despite favourable environmental conditions, the Balkan and Mediterranean regions face the challenge of maintaining and increasing the growth rate of PV systems due to the unpredictable nature of PV production.

Through the promotion of national grant programs, but also of international research projects such as the project "Enhancing storage integration in buildings with Photovoltaics (PV-ESTIA)", the effort to develop a "greener" Europe through the development of the NZEBs is evident. The PV-ESTIA project focuses on PV technology in conjunction with Energy Storage and more specifically, the implementation of hybrid PV and Battery systems in public and residential buildings in Balkan and Mediterranean countries. The main objective of the project is to increase the self-consumption of electricity of buildings in this area, enhancing the penetration of PVs in the electricity grid, without affecting the stability and reliability of it. The project aims to change the way buildings with existing PVs are considered, approaching them as holistic systems that now interact efficiently with the electricity grid. Given the region's high solar potential and the gradually reduced cost of equipment, this approach is becoming more promising. The project is expected to be completed by the end of March 2020, having a total duration of 36 months.

After initially studying the current state of the Energy Storage policies of the participating countries (Cyprus, Greece, Bulgaria and Skopje), as well as the battery market itself in these areas, the project participants have been able to overcome the various bureaucratic and technical barriers that have emerged and to implement residential and public pilot systems in their countries. Moreover, the study of the current state has shown that non-subsidized Battery systems have a very long payback period and are justifiably attracting low investment interest so far. In general, with the existing policies in most EU countries, homeowners do not benefit from installing such systems.

The results derived from five residential pilot installations in Cyprus (in buildings with existing PVs), implemented in Nicosia in January 2019, showed a significant increase (~50%) in the Self-Consumption (the utilization rate of PV production) and the Self-Sufficiency (the contribution of PV production in the total energy consumption) Rates of the households. In addition, more than half of the total energy consumption now comes from the hybrid PV –

Battery system, thus significantly reducing electricity consumption from the grid and the corresponding GHG emissions (> 50%). On the basis of the above, PV-ESTIA is taking a step forward, presenting by the completion of the project a set of technical and policy recommendations that will pave the way for new and improved policies and assist in future decision-making so that the increase in the number of NZEBs is sustained. Generally, the project provides an opportunity to resolve potential problems regarding PV – Battery systems in Cyprus, through suggestions for changes to operating regulations and grid codes. In addition, the project proposes an innovative management scheme for residential hybrid PV – Batteries, to reduce electricity purchase costs by utilising the equipment to the greatest extent, turning buildings into a controllable energy source. Given the size of the building environment and its large impact on the overall energy consumption, hybrid PV – Battery systems are expected to have a significant contribution to energy efficiency in the near future.

For more information please contact the “FOSS” Research Centre for Sustainable Energy of the University of Cyprus at foss@ucy.ac.cy or at +357 22894321 and +357 22892272. You can also be further informed at www.foss.ucy.ac.cy and www.pvtechnology.ucy.ac.cy, as well as at the project’s website <https://pv-estia.eu>.



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