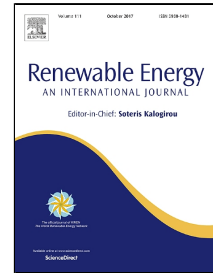


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Influence of Charge Control Strategies on Electricity Import/Export in Battery-Supported Photovoltaic Systems

Luigi Schibuola, Massimiliano Scarpa, Chiara Tambani



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1 Influence of Charge Control Strategies on Electricity Import/Export in 2 Battery-Supported Photovoltaic Systems

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4 Luigi Schibuola^a, Massimiliano Scarpa^{a*}, Chiara Tambani^a5 ^aUniversity IUAV of Venice – Dorsoduro 2206 – 30123 Venice – Italy

6 *Corresponding author

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8 E-mail addresses:

9 - luigi.schibuola@iuav.it10 - massimiliano.scarpa@iuav.it11 - chiara.tambani@iuav.it

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13 *This paper deals with the behaviour of battery-supported residential photovoltaic (PV) systems connected to smart*
14 *grids, with a special focus on the interface with electricity distributors. In particular, this paper is aimed at the*
15 *assessment of the benefits resulting from two predictive control strategies managing the charge of the electrochemical*
16 *storage unit, in comparison with the conventional control strategy and applied to various combinations of photovoltaic*
17 *system and battery pack sizes in a parametric analysis. The proposed control strategies dispatch electricity to the*
18 *battery pack or national grid depending on the state of charge and differ in the shape of the profile of exported*
19 *electricity, hence adapting to different interface profiles required at the electricity distributor's side. In particular, the*
20 *research shows that, by the proposed control strategies, the frequencies of occurrence of high values of exported*
21 *electricity may be decreased by almost 100%, whereas medium-high values of exported electricity by 50%. Moreover,*
22 *both of the control strategies are shown to be able to lower the yearly quadratic effective imbalance coefficient by*
23 *around 15% in case of PV systems sized for Zero Energy Buildings (ZEBs), thus showing opportunities in the mitigation*
24 *of electricity grid stresses from PV systems.*

25

26 *Keywords: photovoltaics; charge control strategy; smart grid; electricity import/export; Zero Energy Buildings*

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