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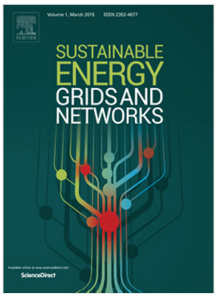

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Disaggregating Solar Generation From Feeder-Level Measurements

Emre C. Kara[a,1,*], Ciaran M. Roberts[b], Michaelangelo Tabone[d,2], Lilliana Alvarez[f], Duncan S. Callaway[e], Emma M. Stewart[c,1]

[a] *Grid Integration Systems and Mobility Group, SLAC National Accelerator Laboratory, Menlo Park, CA, USA*
[b] *Energy Storage and Distributed Resources Division, Lawrence Berkeley National Laboratory, Berkeley, CA, USA*
[c] *Infrastructure Systems, Cyber and Physical Resilience, Lawrence Livermore National Laboratory*
[d] *Civil and Environmental Engineering, Stanford University, Stanford, CA, USA*
[e] *Energy and Resources Group, University of California, Berkeley, CA, USA*
[f] *Riverside Public Utilities, Riverside, CA, USA*

Abstract

Photovoltaic (PV) systems are increasing in distribution systems, but utilities lack visibility of the generation of this distributed PV. This paper presents a set of methods for disaggregating the photovoltaic (PV) generation downstream of a measurement device that measures net load using only readily available measurements. We propose two strategies in which we use measurements from the substation as well as a proxy solar irradiance measurement. Using these two measurement points, we first propose a multiple linear regression strategy. We estimate a relationship between the measured reactive power and the load active power consumption, which are then used in real-time disaggregation. Then, we expand this strategy to reconstruct the errors in the estimators, thus separating the solar and load signals from their aggregate. We show that it is possible to disaggragate the generation of a 7.5 megawatt photovoltaic site with a root-mean-squared error of $\approx$ 450 kilowatts.

Keywords: solar generation, regression models, load disaggregation, distribution system

*Corresponding author: Emre C. Kara, emrecan@slac.stanford.edu.
[1] This work was completed while the author was at Lawrence Berkeley National Laboratory.
[2] This work was completed while the author was at University of California Berkeley.

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