

Evaluating the Impacts of Customer-Sited Renewable Energy Systems: Methods and Challenges

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ABSTRACT

Public benefit and utility programs increasingly include renewable energy technologies in the portfolio of items that receive financial incentives to offset greenhouse gas emissions or peak electricity demand. These renewable energy programs are increasingly subject to the same evaluation scrutiny as energy efficiency programs. Approaches for estimating the energy and demand impacts of these systems, however, are less standardized and can result in program realization rates far less than 100 percent of impacts estimated and tracked in program databases.

This paper explores the issues associated with estimating and evaluating energy production and demand offsets for three renewable energy technologies: photovoltaic systems (PVs), wind turbines, and electricity from biogas systems (anaerobic digesters). In this paper we report results from two programs, but draw upon our experience evaluating four programs that provide incentives for customer -sited renewable energy systems in different regions of the country. We include metering results from the two programs. Both provide incentives for PV systems, and one program also includes incentives for wind turbines and anaerobic digesters.

For each of the three types of renewable energy systems we discuss methods for estimating energy production and peak offset. We compare energy estimates to inverter readings, discuss the required data inputs, explore challenges associated with the estimates, and the factors that led to discrepancies between estimated and measured energy production. KEMA standardized our approaches for estimating and verifying energy production (kWh) and peak offset (kW) from the renewable energy systems as part of the evaluation of the Focus on Energy (public benefits) program in Wisconsin (Focus on Energy 2008).