

A Demonstration of Integrating Distributed Energy Resources

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The Rooftop Solar Situation is Creating Challenges

- The current PV adoption forecast indicates that a total of 35,000 residential PV systems may be installed by 2020 growing to over 80,000 by 2030.
- Increasing numbers of residential PV will cause an increase in excess PV generation being pushed back onto the grid which creates grid operational issues as well as exceeding transformer capacity and thermal loading limits.
- The business problem for customers will be the declining value of their PV system as SMUD continues to change the residential tariff rate to employ a cost-of-service time-of-use approach to billing residential customers.
- The PV industry is evolving their business models to integrate additional technologies with PV systems to address the business problem.

Objective and Approach

- To demonstrate that an integrated DER technology approach for residential customers can achieve the value proposition:
 - An integrated DER technology approach is superior to a stand-alone PV system relative to the goals and objectives of pursuing cost effective carbon, energy and grid operation cost reduction strategies.
- Install the following DER technologies with the PV system:
 - Smart thermostat
 - Heat pump water heater
 - Battery energy storage system
 - Home energy management system
 - Electric vehicle charger equipment (optional)

Demonstrating the Concept

- A key tenet is the “set it/forget it” automation and optimization of integrated DER technologies is important for customer adoption and ease of use.
 - Relieves the customer from having to actively engage in the management of their energy consumption.
- The home energy management system offers the opportunity to coordinate price signals and actions to/from the end use devices (e.g. control of the battery).
- Sample Design: 300 homes categorized into 3 bins:
 - Low PV export bin: smart thermostat and HEMS will be installed to employ a pre-cooling strategy to “absorb” the excess PV generation.
 - Medium PV export bin: add a HPWH to “store” the excess PV generation in addition to pre-cooling.
 - High PV export bin: add battery energy storage and discharge the stored excess PV generation during the peak demand TOD period.

Questions?

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