C S I R D & D P r o g r a m

Cross-cutting: Integration of Energy Efficiency, Demand Response and Energy Storage with PV

For utilities, energy efficiency and distributed PV can help defer the need to build additional peaking generation and T&D system infrastructure. For utility customers, distributed PV provides more control over energy costs. Installing a PV system is one of a number of options available to these customers. Their other choices include energy efficiency, energy storage, and demand response. Energy efficiency provides the most cost-effective means for addressing energy use within a home, business or community. Implementing energy efficiency measures not only reduces electricity demand but also helps reduce the size and required capital for a PV system. There is a gap in the current market for services that combine energy efficiency along with PV for the residential sector.

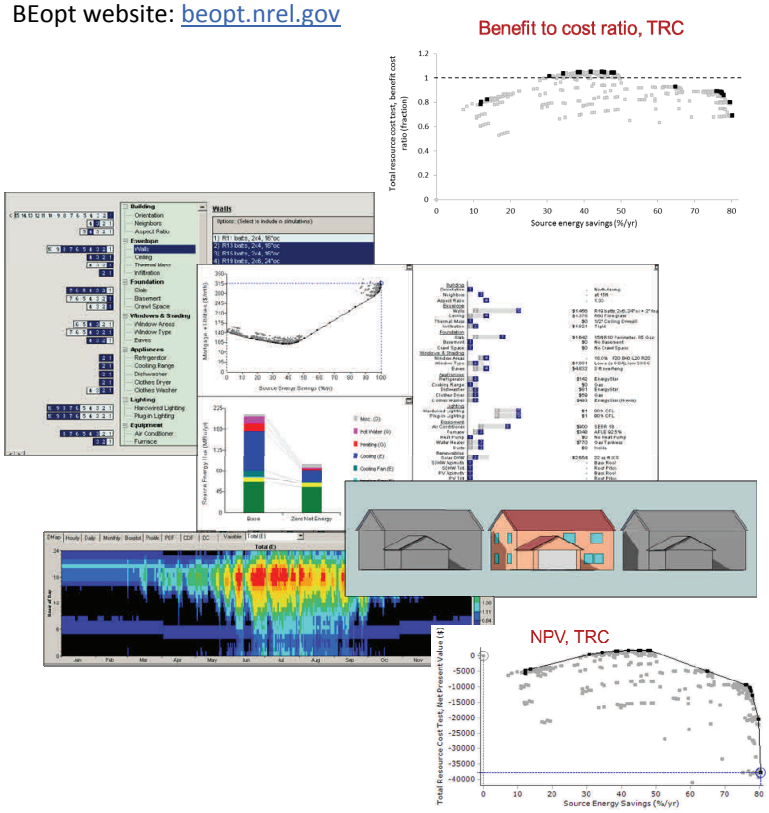
Beopt-CA (EX): A Tool for Optimal Integration of EE/DR/ES+PV for California Homes

Davis Energy Group/NREL

Partners: PG&E, E3

This project is developing the Building Energy Optimizer for California Existing Homes Beopt-CA (EX) modeling tool that supports the integration of energy efficiency, demand response, and energy storage with PV with a focus on getting to "Zero Net Energy" in the residential retrofit market. The project is enhancing the capabilities of the original BEopt tool developed by NREL to address the residential retrofit market. It is also extending the economic analysis to allow utility program managers (utility cost tests) and contractors the ability to optimize the integration of EE, DR, ES with PV, from their unique perspectives. The team is exploring the option of making the tool more relevant in California by linking it to the California Simulation Engine (CSE) used for building code compliance.

BEopt website: beopt.nrel.gov



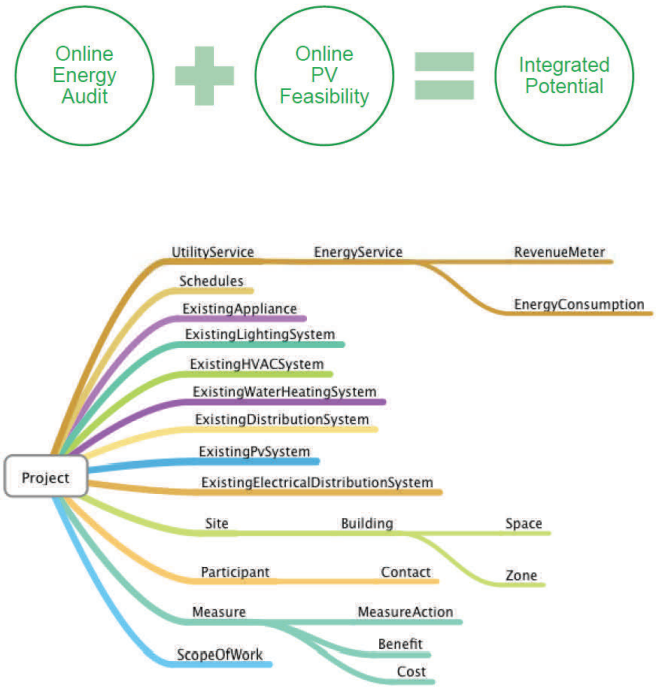
An Integrated Energy Project Model

kW Engineering

Partners: Solarnexus, Save Energy 123

This project developed an Integrated Energy Project (IEP) data model that enables the capture of best practices for integrating energy efficiency measures with PV system deployment. The IEP Model introduces a common language to project stakeholder software applications for assessing energy efficiency or solar and provides a comprehensive, standardized definition for EE/DR+PV projects. This data model is publically available and aims to simplify and streamline the procurement process, reduce time and costs for both the consumer and contractors, produce a better return on investment for both, and remove a key market barrier for the adoption of both efficiency measures and PV. The project was completed in April 2012.

Project website: www.iepmodel.net



Cross-cutting: Integration of Energy Efficiency, Demand Response and Energy Storage with PV

Low-Cost, Smart-Grid Ready Solar Re-Roof Product Enables Residential Solar Energy Efficiency Results

BIRAenergy

Partners: General Electric, SDG&E

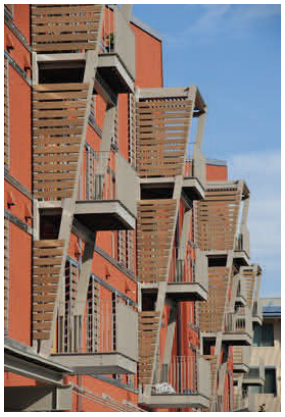
This project is focused on demonstrating a new plug and play PV system as a cost-effective retrofit measure during a residential re-roof or other deep retrofit event. The plug and play PV is being installed on six demonstration homes in the SDG&E service territory, spanning a range of economic, geography, vintage, and energy efficiency levels. One of the six is a showcase home in Chula Vista, CA which in partnership with the city and SDG&E, is a high efficiency home used for community tours and education. A second home in Santee, CA will demonstrate a "zero net energy" retrofit, which includes additional efficiency measures, demand-responsive appliances, an integrated home energy management (HEM) system and an energy storage system along with PV. Key activities include: 1) Evaluation of the installation costs, barriers and performance of a new plug and play PV retrofit system. 2) Assessment of existing and potential financing options to cover the costs of the PV system, energy efficiency upgrades and non-energy building retrofits (e.g., re-roof) in a single, readily available package. 3) Analysis of target markets and marketing materials for this PV retrofit system. 4) An assessment of the impact that this PV retrofit product, along with efficiency improvements and demand response capability will have on the utility distribution-grid. 5) Development of a business plan for contractors performing re-roofs to also install a PV retrofit system as a sustainable product offering, independent of the availability of incentives for renewable systems.

West Village Energy Initiative: CSI RD&D Project

UC Davis

Partners: UC Davis Energy Institute, Davis Energy Group, E3, GE, PG&E

The West Village Project at the University of California, Davis, is one of the first large scale communities to be Zero Net Energy entirely through energy efficiency and on-site generation. The UC Davis team will test and demonstrate existing and new storage technologies for smaller systems in community-wide applications. The team will also research and demonstrate the integration of Advanced Metering Infrastructure (AMI) with PV and DG as well as test and demonstrate hybrid solar (PV/Thermal). The West Village Project will be used to test and evaluate several business models for deploying community distributed solar and will document the most promising ones. Lastly, the team will test, demonstrate and assess virtual net metering approaches, energy storage to mitigate the impacts of high penetration PV deployment and the use of solar resource forecasting to optimize storage charging and dispatch.



LEARN MORE:

One stop for all solar in California: GoSolarCalifornia.ca.gov

CSI RD&D website: calsolarresearch.ca.gov

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