

Enabling Technologies Development ETD-13-02 Solicitation Proposed Awards Back Up for 2/18/13 Business Meeting

Issue

The California Institute for Energy and Environment (CIEE) held a solicitation under ETD Contract No. 500-01-043 in the Distribution Grid and Smart Home Research Areas. Three projects were chosen for funding and need approval at an Energy Commission Business Meeting.

Background

In 2002, the Energy Commission awarded Contract No. 500-01-043 to the University of California, CIEE for the technical expertise, project management, and administrative duties needed to implement the Demand Response Enabling Technologies Development Grant Program.

In December 2007, the Energy Commission amended the contract with CIEE to expand the areas of research beyond DR. The new areas are enabling technologies research in electric distribution grid and energy efficiency in legacy buildings. With the amendment, the project name was changed to Enabling Technologies Development (Demand Response was dropped from the original name).

Between August and September of 2013, two Research Opportunity Notice (RON) solicitations, Distribution Grid and Smart Home, were offered by the Enabling Technologies Development Grant Program. The proposal solicitation, submittal, review, and award selection process is documented in the ETD Project Program Management Manual. The Distribution Grid and Smart Home RONs received five and eight proposals, respectively. CIEE provided six passing proposals to the Energy Commission Staff for selection. The three proposals, one Distribution Grid and two Smart Home projects, are recommended for funding.

Proposed Work

The three proposals recommended for funding will improve the reliability, energy cost, and energy value of California's electricity. These proposals will also maximize the market connection by reducing the information, communication and control technologies installation cost. The proposed projects are as follows:

Distribution Grid Solicitation:

1. Title: Control of Networked Electric Vehicles to Enable a Smart Grid with Renewable Resources

Bidder: Rajit Gadh, University of California, Los Angeles

Amount: \$400,000

Term: 12 months

This proposed research will develop control technologies to leverage the aggregated energy storage capabilities of electric vehicles that are networked together to improve renewable generation reliability, to support distributed system operation, and to supply peak load demand and ancillary support to the grid. These objectives will be achieved by using communication, computing, and control technologies for renewable resources, energy storage units, and networked electric vehicles (NEVs) management to enable a smart grid with renewable resources. NEVs are electric vehicles aggregated on a distribution grid to provide coordinated peak power support to increase power quality, greater grid stability, and reliability.

Smart Home Solicitation:

1. Title: Smart Power for the Smart Home: Inverter Connections, Power Factor Corrections, and Peak Reductions

Bidder: G. P. Li, University of California, Irvine

Amount: \$397,288

Term: 12 months

This proposed research will develop an Active Power Factor Correction (APFC) Inverter to control the power factor in real time to reduce residential peak load, improving power factors, and advancing load monitoring technology in zero net energy (ZNE) homes. The APFC will then be tested along with wireless load monitoring hardware in a smart ZNE home in Davis, California. The compiled and analyzed smart home data will be used to create a ZNE home baseline model for input into a feeder-level electrical grid model to simulate peak load reduction.

2. Title: Enabling Real-Time Residential Pricing with Closed Loop Customer Feedback

Bidder: Yusuf Ozturk, California State University, San Diego

Amount: \$199,932

Term: 12 months

The proposed research will develop a closed-looped customer feedback and cloud-based price control method to allow utilities to more accurately forecast future energy demands to better regulate customer pricing. This control method will be automatic and provide real-time balancing of energy demand and generation. This objective will be achieved by reconciling forecasted data with real power consumption and send real-time pricing information to the customer through mobile messaging (smartphone application). This solution will be deployed

with energy management and dynamic pricing solutions in cooperation with San Diego Gas & Electric.

Justification and Goals

- Improving the reliability/quality of California's electricity by reducing service interruptions through expanded service options and new system-wide capabilities.
- Improving the energy cost/value of California's electricity by providing real-time information and a means to automatically respond to supply-side problems.
- Maximizing market connection by reducing the installed cost of energy-related information, communication, and control technologies.