**DEMAND RESPONSE
EMERGING TECHNOLOGIES PROGRAM**

 **SEMI-ANNUAL REPORT 2013**

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# Summary

The report is being submitted pursuant to Ordering Paragraph 59, and the discussion at pages 145 – 146 of Decision (D.). 12-04-045, which adopted budgets and programs for SDG&E’s Demand Response portfolio for the 2012 – 2014 program cycle.

Ongoing projects include Mainstreaming AutoDR evaluation, Zinc-Flow Energy Storage, HAN with Smart Appliances, Flywheel Energy Storage, EIC Smart Home Demonstration, and Smart Grid Integration Software Project.

# Completed Projects in 2012

## Centralized Hotel Guest Room Controls

### Overview

The purpose of this assessment is to gain an understanding of the potential increases in energy efficiency and ability to participate in demand response (DR) events when a hotel uses a centrally controlled room energy management system (EMS). The product to be evaluated in a hotel in San Diego is a centrally controlled energy management system suited for the hospitality industry. The System shall include a smart digital thermostat with infrared occupancy sensor in each guest room and central interface network including server and software to enable EMS functions. The thermostat will be connected to each guest room HVAC unit. Network communications will be via cabling backbone to each guest room. The system will provide centralized control of individual room energy use based upon room sale occupancy allowing the room to be placed in a “deep” energy conservation mode when not occupied or rented and activate load shed mode during DR events.

### Collaboration

The results will be shared with other investor-owned utilities (IOUs) during scheduled monthly conference calls.

### Status

The report draft was completed in 2011; however some measurements turned out incomplete or inaccurate and need to be repeated. The project is waiting for summer-like weather conditions to complete measurement and verification.

### Next Steps

Complete measurement and verification in Q3 or Q4, then update and publish final report on ETCC by Q4 and transfer technology.

# Ongoing Projects in 2012

## 100 kW / 150 kWh Zinc-Flow Energy Storage

### Overview

Premium Power’s systems are fully integrated with zinc-bromide (“ZnBr”) flow batteries, power electronics, communications, mechanicals, controls and interconnections using UL-certified modular building blocks that can be “racked and stacked” in transportable or stationary configurations. The system will be employed for peak shaving, load management and/or demand response applications. The system will be monitored remotely and data collected for analysis by the project partners.

### Collaboration

This project is a collaborative effort with California Energy Commission’s Public Interest Energy Research Program. Also, PG&E and SDG&E’s RD&D teams are contributing to this project. The results will be shared with other IOU’s during scheduled monthly conference calls.

### Status

Site has been selected. Installation in 2012. Evaluation for at least a year.

### Next Steps

Install at Site.

## Mainstreaming AutoDR

### Overview

The goal of this project is to facilitate and accelerate the adoption and outreach of Auto-DR both in new construction and in existing buildings, engage industry stakeholders and participation, and provide support to codes and standards.

### Collaboration

This project is in collaboration with PG&E and SCE. The results will be shared with other investor-owned utilities (IOUs) during scheduled monthly conference calls.

### Status

Technology and market evaluation, as well as M&V and data processing have been completed.

### Next Steps

Final report and applicable technology transfer are planned for completion in 2013.

## Home Area Network with Smart Appliances Assessment

### Overview

The purpose of this project is to assess demand response enabled appliances and related devices alongside the home area network (HAN). Appliances and devices include washer, electric dryer, dishwasher, electric water heater, electric range, programmable communicating thermostat, in-home display, whole home load monitor and refrigerator/freezer. The DR enabled appliances have a communicating chip preinstalled and can turn off or delay features or change setpoints to dynamically reduce demand of the appliance. The DR enabled appliances connect to the HAN, which includes a gateway, programmable communicating thermostat, in-home display, customer portal, and load monitor. Emerging Technologies will measure individual appliance load drops during a simulated demand response event. Also, energy efficiency using HAN with Smart Appliances will be compared to the previous years without enabling technologies. Vendors have been selected using results from the REMA Study.

### Collaboration

This project is a collaborative effort with SDG&E’s Customer Programs. The results will be shared with other IOU’s during scheduled monthly conference calls.

### Status

Delivery and installation of all appliances and related devices has been completed. Commissioning of “smart” features and installation of PCTs has been completed. All DR simulations and other on-site measurements and functional tests have been completed. Customer surveys have been completed. Early analysis shows some appliances have significant load shifting and energy reduction capabilities but limited DR potential due to loads not being immediately “dispatchable”. Overall, the appliances appear very energy efficient; additional savings resulting from smart features appear limited.

### Next Steps

. Results will be compiled and Final Report will be completed in Q1 2013.

## Smart Grid for Buildings

### Overview

The purpose of this project is to assess a solution to optimize the operation of energy resources against user-defined constrains, including but not limited to economics, reliability, comfort, and safety. In the case of utilities, the solution will interface with conventional and alternative energy generation, energy storage, and energy consumption resources, thereby optimizing and aggregating them into a virtual power plant, capable of meeting financial, reliability and other operational objectives of assets. These assets may range from loads, micro grids, to larger electric distribution feeders and transmission grids.

### Collaboration

The results will be shared with other IOUs during scheduled monthly conference calls.

### Status

Vendor and host site has been selected, proposals and contracting has completed. Installation is complete; commissioning including the integration of multiple interconnected building systems is scheduled to be completed by Q2 2013. Power logging capabilities down to the breaker level have been set up and are ready for upcoming measurement and verification tasks.

### Next Steps

Complete commissioning. Perform evaluation. M&V and data analysis are scheduled for Q2 and Q3 2013, final report and technology transfer are scheduled for Q4 2013.

## Energy Innovation Center Demonstration showcase

### Overview

The purpose of this project is to develop a demonstrational showcase that exhibits energy saving demand response projects and activities. The showcase will be used for educational purposes and be placed in SDG&E’s recently commissioned Energy Innovation Center. The two main DR technologies that will be demonstrated will be Home Area Network technology and lighting controls in the EIC.

### Collaboration

The results will be shared with other IOU’s during scheduled monthly conference calls.

### Status

Most of the technologies in the Smart Home and the Lighting Controls have been installed and showcased. The next step is to complete the smart home technology installation for smart appliances and SEP 2.0 integration.

### Next Steps

Complete Phase II (Self-Guided Tour) in Q2 2013.

## 10 kW / 40 kWh Flywheel Energy Storage

### Overview

Berkeley Energy Sciences Corporation is developing a low-cost Flywheel Energy Storage Device. The first generation device is 40 kWh / 10 kW. This flywheel uses high-strength steel as a rotor, and this design has a 20 year lifetime with over 90% AC to AC efficiency. This project leads to BESC’s second generation technology which is 125kW/500kWh.

### Collaboration

This project is in collaboration with CEC PIER. BESC received a $1.8M grant from PIER to build the flywheel. SDG&E will provide Measurement and Evaluation.

### Status

PIER Funds to be released Q4 2012.

### Next Steps

Wait for vendor to build the flywheel after the funds are released. It will take 18-24 months to build the flywheel.

# Budget

George Katsufrakis’ May 31, 2011 testimony in the 2012 – 2014 DR proceeding (Exhibit SGE-4), Chapter III, pages GMK-47 – GMK-50 described the activities of DR-ET.