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March 31, 2011

A. 08-06-002

Julie Fitch  
Director, Energy Division  
California Public Utilities Commission  
505 Van Ness Avenue  
San Francisco, CA 94102

**Re: SDG&E 2010 Annual Report on Demand Response Emerging Technologies Program**

Dear Ms. Fitch:

In accordance with Decision 09-08-027, Ordering Paragraph 14, attached please find San Diego Gas & Electric (SDG&E) Company's report. This report is also being served on the most recent service list in Application 08-06-001 et. al. and has been made available on SDG&E's website. The URL for the website is:

<http://www.sdge.com/regulatory/A08-06-002.shtml>

If you have any questions, please feel free to contact me.

Sincerely,

A handwritten signature in black ink, appearing to read 'J. Yamagata', is written over the word 'Sincerely,'.

Joy C. Yamagata  
Regulatory Manager

Enclosure

cc: A. 08-06-001 et. al. - Service List  
Steve Patrick – SDG&E  
Central Files

**DEMAND RESPONSE  
EMERGING  
TECHNOLOGIES  
PROGRAM**

**ANNUAL REPORT  
2010**

March 31, 2011



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## **I. Summary**

This annual report is being submitted as directed in Section 12.2.3 paragraph 3 and Ordering Paragraph 14 of Decision (D.) 09-08-027 Adopting Demand Response Activities and Budgets for 2009 through 2011. As described in Section IV E of the Amended Testimony in Support of San Diego Gas & Electric Company's (SDG&E) Amended Application for Approval of Demand Response Programs and Budgets for years 2009 through 2011 (Application (A.) 08-06-002) and authorized in California Public Utilities Commission (CPUC) D. 09-08-027, the DR-ET group continues to evaluate and demonstrate DR technologies that have strong potential to reduce power consumption during periods of higher energy prices or tight energy supplies in all SDG&E customer segments.

In 2009 SDG&E chartered DR-ET in the following areas: residential energy management and assessment technologies, centralized guest room controls, home area networks (HAN) solutions. The groundwork was also laid for commercial demand response assessment, interval data evaluation and Office of the Future projects moving forward next year.

## **II. Projects Completed in 2010**

### ***A. Hybrid Demand Control / Demand Response***

#### **1. Overview**

The controller continuously tracks building demand, and curtails HVAC loads whenever demand exceeds a pre-defined target. The controller will support additional curtailment during DR events, once SDG&E's DRAS server goes into production. Curtailment is done individually for up to 20 systems, in reverse order of priority. Non-HVAC systems can also be curtailed, but often lack appropriate controls. The controller has two maximum demand setpoints: one for daily usage, and another one for demand response.

#### **2. Collaboration**

This project is a collaborative effort with SDG&E's Demand Response Customer Program team and Commercial Account Executives. The results will be shared with other IOU's during scheduled monthly conference calls.

#### **3. Results**

Curtailment capacity of the tested system in DC mode in the best case is about 70kW. Curtailment capacity in DR mode is another 82kW in the best case. Total maximum demand by all HVAC systems is about 390kW. The HVAC systems make up about 25% of building peak demand in a hot summer month. The grand total best case curtailment capacity corresponds to about 10% of building peak demand.

#### **4. Next Steps**

Post report to ETCC website and transfer technology to customer programs and account executives.

### ***B. Residential Energy Management and Awareness Product Assessment***

#### **1. Overview**

The purpose of this project is to conduct an assessment of product offerings of residential energy management and awareness (REMA) companies. It will be a scan of the landscape of technology and energy information providers to identify key criteria of their product offerings, developmental status and capabilities in HAN. The goal is to narrow

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down the list of companies with promising, commercially available products and technologies to test in the field and roll out in programs. The assessment is not limited to technologies and services that are market ready or near market ready but also include products currently under development by various manufacturers and product development companies. The assessment will provide the status of ongoing research and development of residential energy related technologies and services. The term “products” includes but not limited to technologies (hardware, software) and services, as applicable. This assessment project will cover the business, technology, and service aspects of the REMA market and shall include the following four technology and service categories: 1. Home Area Network Technologies, 2. Web Portals, 3. Energy-Related Services and 4. Integrated Solutions.

### **2. Collaboration**

This project is a collaborative effort with several internal groups of SDG&E. The results will be shared with other IOU's to the extent possible without violating any confidentiality with vendors, during scheduled monthly conference calls.

### **3. Results**

The results from the DR-ET assessments has been utilized by SDG&E's Residential customer programs and Smart Meter organization to select high scoring vendors for 2011 assessments. The report shortlisted the top thirty companies from 150 vendors.

### **4. Next Steps**

Assess top scoring vendors from REMA study.

## **III. Ongoing Projects in 2010**

### ***A. Multivendor HAN Assessment***

#### **1. Overview**

The purpose of this field demonstration is to demonstrate and evaluate technical capabilities of a multi-vendor HAN solution. This project will evaluate off-the-shelf home area network technologies used to manage customer energy usage. Each selected home will have multiple vendors' devices to evaluate technical challenges and assess interoperability. HAN connected devices will include energy management systems, plug load and appliance controllers and Programmable Communicating Thermostats (PCT's). HAN connectivity to a house electric meter will be included. Communications to the home will be through a contractor-hosted web portal with an internet gateway and a ZigBee interface to HAN connected devices. The field demonstration will include up to 12 homes.

#### **2. Collaboration**

This project is a collaborative effort with SDG&E's Smart Meter organization and residential customer programs. The results will be shared with other IOU's during scheduled monthly conference calls.

#### **3. Status**

The HAN technology has been installed in four homes. Determined new updated technology to reinstall since old equipment is no longer serviced. Approved proposal for previous homes.

#### **4. Next Steps**

Install new solution in homes in second quarter 2011. Once installation is completed, undertake DR-ET assessments in third quarter 2011 to demonstrate and evaluate technical capabilities including interoperability between different vendor technologies and solutions.

### ***B. 100 kW / 150 kWh Zinc-Flow Energy Storage***

#### **1. 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



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demand response applications. The system will be monitored remotely and data collected for analysis by the project partners.

### **2. 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.

### **3. Status**

The big-box retailer has signed the contract.

### **4. Next Steps**

Kick off meeting with CEC, vendor, and customer. Installation at the customer's site.

## ***C. Centralized Hotel Guest Room Controls***

### **1. 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.

### **2. Collaboration**

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

### **3. Status**

The centrally controlled hotel EMS system has been installed. The commissioning of the system is underway. Data collection

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instrumentation has been installed and baseline information gathered. The system has been tested, and the AC load has been cycled for a simulated DR Event. The initial report has been written, although the actual DR drop is unknown.

**4. Next Steps**

Install sub-meters. Retest a DR event and measure the load drop. Finish Report. Post on ETCC Website and transfer technology.

## **IV. Projects initiated in 2010**

### ***A. Wireless Controls and Monitoring for Commercial Buildings***

#### **1. Overview**

Emerging Technologies plans to assess a wireless technology for a Building Management System to control and monitor common HVAC equipment including AC Packages, Chillers, Boilers, and Thermostats. The solution includes an access point with a 6-mile range on top of the building with Nodes to control each device. Customers can control their devices through the customer interface and cloud computing. Emerging technologies team plans to test the system at three sites this year. The sites include a large commercial building with a central chiller, a large commercial building with multiple HVAC packages, and a large commercial building with existing BMS.

#### **2. Collaboration**

This project is a collaborative effort with SDG&E's Demand Response Customer Program team and Commercial Account Executives. The results will be shared with other IOU's during scheduled monthly conference calls.

#### **3. Status**

Vendor has been selected. Proposal has been approved.

#### **4. Next Steps**

Select customer sites for installation.

### ***B. DR in Data Centers Scoping Study***

#### **1. Overview**

The overall goal of this project is to improve the understanding of DR opportunities and automation for data centers. The specific project objectives include conducting a set of field tests to evaluate and improve the understanding of the feasibility and adoption of DR in data centers, exploring practical barriers and opportunities, and identifying perceived versus actual risks as well as methods to overcome them. With the feasibility and adoption information, the consultant will determine a set of potential DR strategies to manage data center loads for both site infrastructure (such as HVAC and lighting) and IT infrastructure (including servers and storage).

## **2. Collaboration**

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

## **3. Status**

The Contract has been signed.

## **4. Next Steps**

Develop Custom Field tests and Monitoring Plans for IOU Contractor. Conduct the Field Tests and Demonstrations. Evaluate and Summarize Results from Field tests.

### ***C. Mainstreaming AutoDR***

#### **1. 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.

#### **2. 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.

#### **3. Results**

The Contract has been signed.

#### **4. Next Steps**

Mainstreaming Auto-DR. Evaluation of load shape changes and shed attenuation.

### ***D. Home Area Network with Smart Appliances Assessment***

#### **1. Overview**

The purpose of this project is to assess demand response enabled appliances alongside the home area network (HAN). Appliances include a washer, dryer, dishwasher, stove, microwave, and refrigerator. The DR enabled appliances have a communicating chip preinstalled, and they turn off features of the appliance to reduce demand instead of completely shutting of the appliance. These DR enabled appliances will connect to the HAN, which includes a gateway, programmable communicating thermostat, customer portal, and load controllers. Emerging Technologies

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will measure load drop 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.

### **2. Collaboration**

This project is a collaborative effort with SDG&E's Smart Meter organization and residential customer programs. The results will be shared with other IOU's during scheduled monthly conference calls.

### **3. Results**

Vendors have been selected.

### **4. Next Steps**

Approve Proposal. Test equipment in lab. Survey customer homes in Q1. Install in customer homes in Q2. Test and evaluate during the summer months. Write report in Q4.

## ***E. Home Area Network with Communicating Power Strips Assessment***

### **1. Overview**

The purpose of this project is to assess communicating power strips alongside the home area network (HAN). These DR enabled power strips will connect to the HAN, which includes a gateway, programmable communicating thermostat, customer portal, and load controllers. Emerging Technologies will measure load drop during a simulated demand response event. Also, energy efficiency using HAN with communicating powers strips will be compared to the previous years without enabling technologies. Vendors have been selected using results from the REMA Study.

### **2. Collaboration**

This project is a collaborative effort with SDG&E's Smart Meter organization and residential customer programs. The results will be shared with other IOU's during scheduled monthly conference calls.

### **3. Results**

Vendors have been selected.

### **4. Next Steps**

Approve Proposal. Test equipment in lab. Survey customer homes in Q1. Install in customer homes in Q2. Test and evaluate during the summer months. Write report in Q4.

## ***F. Home Area Network with Mobile Apps Assessment***

### **1. Overview**

The purpose of this project is to assess mobile apps alongside the home area network (HAN). The mobile app can access the HAN energy management system and the HAN, which includes a gateway, programmable communicating thermostat, customer portal, and load controllers. Emerging Technologies will measure load drop during a simulated demand response event. Also, energy efficiency using HAN with Mobile Apps will be compared to the previous years without enabling technologies. Vendors have been selected using results from the REMA Study.

### **2. Collaboration**

This project is a collaborative effort with SDG&E's Smart Meter organization and residential customer programs. The results will be shared with other IOU's during scheduled monthly conference calls.

### **3. Results**

Vendors have been selected.

### **4. Next Steps**

Approve Proposal. Test equipment in lab. Survey customer homes in Q1. Install in customer homes in Q2. Test and evaluate during the summer months. Write report in Q4.

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## **V. Budget**

SDG&E is on track to accomplish the DR-ET goals as per CPUC D. 09-08-027. SDG&E will be aggressively pursuing the goals of the DR-ET program as described in Section IV E of the Amended Testimony in Support of San Diego Gas & Electric Company's Amended Application for Approval of Demand Response Programs and Budgets for years 2009 through 2011 (A.08-06-002).