

PACIFIC GAS AND ELECTRIC COMPANY
APPENDIX B
INFORMATIONAL SUMMARY OF ENERGY EFFICIENCY (EE) AND
DEMAND RESPONSE (DR) RESEARCH, DEVELOPMENT AND
DEMONSTRATION (RD&D) ACTIVITIES

Pacific Gas and Electric Company
Appendix B
Informational Summary of Energy Efficiency (EE) and Demand Response (DR)
Research, Development and Demonstration (RD&D) Activities

The Electric Program Investment Charge (EPIC) Decision 13-11-025 requires informational summaries of the investor-owned utilities' (IOU) "RD&D" activities undertaken as part of their approved Energy Efficiency (EE) and Demand Response (DR) portfolios. Pacific Gas and Electric Company's (PG&E) understanding is that the California Public Utilities Commission (CPUC or Commission) requests this information to confirm non-duplication of efforts as well as to demonstrate that projects rejected as part of the EE or DR Program are not funded in EPIC.

PG&E's EE, DR and EPIC Programs Are Distinct Programs With Separate Objectives

PG&E established its EE Program in 1976 and its DR Program in 1959. Each program has a **distinct** program focus, which is described in further detail below and is **separate** from EPIC's focus. Both the EE and DR programs are subject to quarterly filings which include detailed project specific information. A summary of RD&D type activities has been provided here in Table B-2 along with the reference to those respective and detailed filings.

PG&E maintains coordination between the EE, DR and EPIC programs to avoid duplication while also identifying potential complementary efforts.

While each program has a different intent and focus area, the programs owners meet regularly to review projects to confirm there is no duplication and also identify potential areas for collaboration. The program owners have developed program guidelines to delineate the differing focus areas which will be used and refined on an ongoing basis, and is provided in Table B-1

Summary of Energy Efficiency and Demand Response RD&D –Type Activities

Energy Efficiency Programs and EPIC

PG&E's EE Program is part of California's statewide program enabling energy efficiency products and services for customers, including rebates and incentives, energy analyses, training and education. Activities in the Energy Efficiency – Emerging Technology Program (EE-ETP) Program are not generally considered "RD&D" as they are focused on assessing, demonstrating, and deploying existing technologies; compared to the stronger pre-commercial technology focus for EPIC. The EE-ETP Program facilitates

customer adoption of commercially available new and underutilized EE technologies, practices, and tools.

In general, the distinction PG&E makes between EE-ET and EPIC programs is that EPIC has a focus on pre-commercial electric grid integration, interaction and grid-operationalization of EE technologies at the aggregated level (i.e., aggregated saved load from individually focused EE technologies), as opposed to EE-ET's focus on customer side technologies and individual customer adoption via incentives. The market facilitation of new technologies, a component of EE-ET, is explicitly disallowed in EPIC for the IOUs thereby further delineating IOU EE and EPIC programs. Finally, while EE-ET is for both electric and gas applications, EPIC is for Electric Technology Demonstration and Deployment only.

Demand Response Program and EPIC

- *Demand Response Emerging Technologies (DRET) Program and Demand Response (DR) Pilot Program*

PG&E's DR Program is part of California's statewide program enabling customer shift or reduction of electricity consumption in response to either economic or reliability signals. Activities in the DRET Program or DR Pilot Program are not generally considered "RD&D" as they are focused on assessing, demonstrating, and deploying existing technologies; compared to the pre-commercial technology focus for EPIC. PG&E's DRET Program facilitates customer adoption of DR technologies, strategies, and services. PG&E's DR Pilot Program tests new concepts or program design, to address a specific area of concern or gap in existing DR programs or to advance a new DR policy or operational requirement.

In general, the distinction PG&E makes between both DR-ET and EPIC programs is that EPIC has a focus on pre-commercial electric grid integration, interaction and grid-operationalization of DR technologies at the aggregated level (i.e., aggregated reduced load from individually focused DR programs) as opposed to DRET's focus on customer side technologies and individual customer adoption. The market facilitation of new technologies, a component of DR-ET, is explicitly disallowed in EPIC for the IOUs thereby further delineating IOU DR and EPIC programs.

Electric Program Investment Charge (EPIC) Has a Distinct and Mandatory Focus Area on Safety, Reliability and/or Affordability/Cost-effective Policy Advancement as It Relates to the Grid

The EPIC program is primarily focused on the demonstration of pre-commercial technologies in addition to not yet widely commercialized strategies and technologies to enable the safe, reliable operations of the grid while advancing policy cost-effectively. IOU EPIC funds are used for Technology Demonstration and Deployment that map to the Electric Value Chain areas Grid operations/Market Design, Transmission, Distribution, and Grid integration of Demand Side management elements (such as EE and DR). Utilities EPIC funds cannot be used for Generation only Technology Demonstration & Deployment.

In order to demonstrate the focus of each program area, Table B-1 summarizes the EE-ETP, DR-ET and DR Pilot, and EPIC programs described above.

**TABLE B-1
PACIFIC GAS AND ELECTRIC COMPANY
SUMMARY OF PROGRAM DIFFERENCES**

	EE ETP	DR ET/Pilot	EPIC
Does the program demonstrate grid optimization technologies or customer side technologies?	Customer Side	Customer Side	Grid Optimization
Does the program demonstrate pre-commercial/not yet widely commercialized or commercialized technologies?	Not yet widely commercialized & commercially available	Commercially available	Pre-commercial or not yet widely commercialized
Does the program support electric or gas applications?	Electric & Gas	Electric only	Electric only
Does the program have a demand side focus or grid integration focus?	Demand Side	Both (demand side for ultimate grid integration)	Grid Integration
Does the program focus on the site specific net effect on load or aggregated effect on load?	Site Specific	Both	Aggregated
What aspect of technologies does the program evaluate?	Performance & energy claim demonstration	Demand claim	N/A (Stronger focus on demonstration)
Does the program evaluate the existing program and process?	No	NO	NO
Does the program assess the technology capability of peak load reduction or load shifting?	Load reduction	Both	Both
Does the program have a focus of market facilitation of new technologies?	YES	YES	NO

Table B-2 summarizes the activities most similar to “RD&D” in PG&E’s approved EE and DR portfolios, which encompasses the EE-ETP and DR-ETP projects including project description/ purpose, funding, deliverables and progress to date.

The EE-ETP projects listed in the table are a subset of ETP activities that can be referenced from the ETP Quarterly Database (submitted to the CPUC on April 15,

2014)¹ and could appear similar to potential EPIC projects, however are differentiated and unique. The selected projects evaluate demand-side technologies and strategies such as residential /SMB energy management systems and real time energy usage strategies. The energy efficiency program focus for these projects is on site specific load reduction and incentive/rebate program/product development.

The DR-ET projects listed in the table can be referenced from page 5 to 17 of the *Emerging Markets & Technology Demand Response Projects 2014 Semiannual Report* (submitted to the CPUC on March 31, 2014).²

The DR Pilot projects listed in the table can be referenced from page 176 to 178 of the *Decision 12-04-045: Decision Adopting Demand Response Activities and Budgets for 2012 through 2014 (April 19, 2012.)*³

1 The ETP Quarterly Report is located at a restricted portion of <http://eestats.cpuc.ca.gov/>.

2 https://www.pge.com/regulation/DemandResponse2012-2014-Projects/Reports/PGE/2014/DemandResponse2012-2014-Projects_Report_PGE_20140331_300398.pdf.

3 https://www.pge.com/regulation/DemandResponse2012-2014-Projects/Final-Decisions/CPUC/2012/DemandResponse2012-2014-Projects_Final-Dec_CPUC_20120419_D-12-04-045_237127.pdf.

**TABLE B-2
PACIFIC GAS AND ELECTRIC COMPANY
SUMMARY OF THE ACTIVITIES IN PG&E'S APPROVED EE AND DR PORTFOLIOS**

Project	Purpose	Funding	Deliverables	Progress to date
<i>EE-ET Program</i>				
Smart Thermostats Lab Testing and EM&V Studies	Evaluate load reduction potential and associated energy savings potential of smart thermostats at customer sites. Conduct comprehensive Smart Thermostat evaluations to determine the energy savings potential for a vendor agnostic residential incentive program.	\$280,000	An ET report	Ongoing project, 30% progress
Packaged Heating, Ventilation and Air Conditioning (HVAC) Advanced Controls and Sensors Scaled Field Placement	Assessment of HVAC controls and sensors to allow small and medium business (SMB) customer access to functionalities previously only available to large energy management system for large buildings. This project will speed the introduction and adoption of technology and enable response to Peak Day Pricing or time-of-use (TOU) rates.	\$216,000	An ET report	Ongoing project, 95% progress
Small Commercial Energy Management System (EMS) (Siemens EcoView)	Scaled field placement to evaluate energy savings in small commercial buildings with Siemens EcoView EMS.	\$470,000	An ET report	Ongoing project, 60% progress
ET Home Energy Management Scaled Field Placement of Smart Thermostats	Four phase project to track customer interaction, satisfaction, and energy savings from normative/behavioral messaging via mobile app and web portal as it relates to customers programmable communicating thermostat.	\$1,206,247	An ET report	Ongoing project, 95% progress
Expanded West Village Monitoring Project (Ramp-up from 24-150 units)	Monitor major residential and non-residential end uses at the community and building level against planned performance specifications.	\$740,000	An ET report	Ongoing project, 80% progress

**TABLE B-2
PACIFIC GAS AND ELECTRIC COMPANY
SUMMARY OF THE ACTIVITIES IN PG&E'S APPROVED EE AND DR PORTFOLIOS
(CONTINUED)**

Project	Purpose	Funding	Deliverables	Progress to date
PG&E/Honda Smart Home Demonstration Showcase	Partner with Honda and University of California, Davis to monitor the performance and the interaction with the grid of a single family Zero Net Energy model home at West Village. EE ETP is focusing on monitoring of EE technologies and end uses, while the Electric Vehicle (EV) and Distributed Generation teams are focusing on the grid interaction.	\$440,000	An ET report	Ongoing project, 50% progress
<i>DR-ET Program⁴</i>				
Use of commercial kitchen ice machines for Permanent Load Shifting (PLS) (page 5-6)	Access the load shift capability of energy efficient ice machines and identify the impact of shifting ice making to off-peak on business operations. Determine the customer adoptability of this technology and identify the suitable ice machine for this application.	Budgets are set at program area. The approved budget for 2012 to 2014 is \$3,749,238, budget spent in 2012 is \$114,274, budget spent in 2013 is \$523,867, budget spent in 2014 is \$190,026, and the remaining budget is \$2,921,071	A final report presenting the analysis results will be posted to the Emerging Technologies Coordinating Council website.	Completed in Q4 2013 – Q1 2014
Investigation of DR as a flexible load product (page 7-8)	Provide an understanding of the load variation. Analyze the expected operational change with the projected Distributed Energy Resource penetration by 2017. Identify key attributes of DR products for operator flexibility and changing operational requirements.		A final report summarizes the findings of the end-use load analysis to inform PG&E's next DR application.	Decided a customer sampling strategy. Constructed average hourly load profiles and created load profile analysis tool.
SMB Automated Demand Response (ADR) Programmable Communicating Thermostat (PCT) demonstration (page 8-10)	Identify the impact of advanced thermostats to SMB's operational efficiency, energy savings, and DR. Evaluate the EE and DR benefits and load impact of two-way communicating PCT. Demonstrate DR enabling technologies to SMB customers. Provide HVAC energy use management tool to help SMB customers adapt to TOU rates.		An SMB ADR program based on the assessment with a targeted rollout in 2015.	Started in Q4 2013. In the process of assessing contractor responses. Developed marketing material to help contractors explain the program to customers.

⁴ https://www.pge.com/regulation/DemandResponse2012-2014-Projects/Reports/PGE/2014/DemandResponse2012-2014-Projects_Report_PGE_20140331_300398.pdf.

**TABLE B-2
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(CONTINUED)**

Project	Purpose	Funding	Deliverables	Progress to date
Assessment of tools for predicting commercial building electricity demand (page 10-11)	Develop criteria metrics for evaluating energy information tool in supporting commercial building enrollment and participation in DR programs. Test the tool performance in predicting whole building electricity demand on non-DR and DR event days.		A final report based on a field test during the 2014 season.	Performed a market survey. Started soliciting vendor of primary interest for field tests.
Assessment of Plug-in Electric Vehicle (PEV) commercial charging station usage patterns (page 11-12)	Analyze the charging patterns of commercially-sited PEV charging to determine the potential of commercial PEV charging as a reliable DR resource.		An analysis used to inform the PG&E's next DR application	Processed the PEV charging data. Created vehicle activity profiles for analysis.
Development of agricultural irrigation DR estimation tool (page 12-14)	Develop a tool to estimate the DR potential of agricultural pumps when processing DR technology incentive applications.		An internal tool and an external web-based tool.	Developed an internal version of the tool for testing.
Analysis of the costs and benefits of transitioning OpenADR 1.0 customers to OpenADR 2.0 (page 14-15)	Determine and quantify the costs, benefits, and challenges of transitioning customers from OpenADR 1.0 to OpenADR 2.0.		A final report presenting the analysis results.	Collected and analyzed legacy installations data. Recruiting customers for the study
Participation in Electric Power Research Institute (EPRI) Project Set (PS)170B research into DR and PLS technology adoption (page 15-16)	PS170B project set is to assess, test, and demonstrate the application of various technological advances such as integrated energy management control systems, linking load-control technology with smart end-use devices to enable more sophisticated and effective demand response, PLS techniques. Address the decision criteria for developing a demand response portfolio in the context of retail and wholesale market structures.		Utilize the best practices and findings of 170B to develop new DR programs and technologies.	Attended two Program Advisory meetings held in 2013 and one so far in 2014. Met with EPRI on multiple occasions to discuss project details and provide input on PS170B.
Development of customer outreach and training for new Leadership in Energy and Environmental Design (LEED) DR credit (page 16-17)	Develop and implement DR training and outreach for customers and project sponsors pursuing the new LEED DR credits to get access to an important audience of key groups of professionals who would otherwise be more difficult for the utility to engage with.		Educational material and training sessions at the PEC and across PG&E's service territory.	Identified potential opportunities to include DR in future LEED training seminars.

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(CONTINUED)**

Project	Purpose	Funding	Deliverables	Progress to date
<i>DR-Pilot Program</i> ^{5,6}				
Commercial and Industrial Based Intermittent Resource Management Pilot 2 (page 176-177)	Engage third party DR participants to provide PG&E with DR resources that would integrate with the CAISO wholesale energy market and assist with renewables integration.	\$2,458,336	A field demonstrations	Ongoing project, 25% progress
Transmission and Distribution (T&D) Pilot (page 177)	Explore and demonstrate the feasibility and the viability of applying SmartAC and select AutoDR enabled Commercial and Industrial resources to provide services to assist T&D planning and operations.	\$2,458,336	A scoping study and then a field demonstration.	Ongoing project, 10% progress
PEV Pilot (page 177-178)	Test willingness and processes required for third parties to provide grid services in exchange for providing electric vehicle customers with upfront incentives. Evaluate customer acceptance of the concept and the potential customer satisfaction benefit.	\$3,000,000	A final report presenting the study results.	Ongoing project, 5% progress

5 **Project Scope:** https://www.pge.com/regulation/DemandResponse2012-2014-Projects/Final-Decisions/CPUC/2012/DemandResponse2012-2014-Projects_Final-Dec_CPUC_20120419_D-12-04-045_237127.pdf.

6 **Budget/Progress:** http://www.pge.com/includes/docs/pdfs/mybusiness/energysavingsrebates/demandresponse/cs/February2014_ILPreport.pdf.