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**PACIFIC GAS AND ELECTRIC COMPANY**

**ELECTRIC PROGRAM INVESTMENT CHARGE**  
**2014 ANNUAL REPORT**

**FEBRUARY 27, 2015**

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February 27, 2015

Mr. Edward Randolph  
Director, Energy Division  
California Public Utilities Commission  
505 Van Ness Avenue  
San Francisco, CA 94102

**Re: 2014 Electric Program Investment Charge Program Annual Report**

Dear Mr. Randolph:

Pursuant to Decision (D.)12-05-037 – *Phase 2 Decision Establishing Purposes and Governance for Electric Program Investment Charge (EPIC) and Establishing Funding Collections for 2013-2020*, Pacific Gas and Electric (PG&E) hereby submits the 2014 Annual Report for the Electric Program Investment Charge Program.

In compliance with Ordering Paragraph 16, a copy will also be served on all parties in the most recent EPIC proceedings; the most recent general rate cases of PG&E, Southern California Edison Company (SCE), and San Diego Gas & Electric Company (SDG&E); and each successful and unsuccessful applicant for an EPIC funding award during the previous calendar year.

If you have any questions, please contact me at (415) 973-6998.

Sincerely,

/s/ Kevin J. Dasso

Kevin Dasso  
Electric Operations  
Senior Director, Technology & Information Strategy

cc: Maria Sotero – CPUC  
Kevin Dasso – PG&E  
Anu Vege – PG&E  
Cassandra Feliciano – PG&E  
Christopher Warner – PG&E  
Service Lists - A.12-11-001, A.12-11-002, A.12-11-003, A.12-11-004,  
A.12-11-009, A.13-11-003, A.14-11-003, A.14-05-005, A.14-05-003,  
A.14-05-004, A.14-04-034

PACIFIC GAS AND ELECTRIC COMPANY  
 ELECTRIC PROGRAM INVESTMENT CHARGE – 2014 ANNUAL REPORT  
 FEBRUARY 27, 2015

BASED ON ADOPTED EPIC ADMINISTRATOR ANNUAL REPORT OUTLINE

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# ELECTRIC PROGRAM INVESTMENT CHARGE – 2014 ANNUAL REPORT

FEBRUARY 27, 2015

## BASED ON ADOPTED EPIC ADMINISTRATOR ANNUAL REPORT OUTLINE

### 1. Executive Summary

#### a. Overview of Programs/Plan Highlights

Pursuant to the California Public Utilities Commission (CPUC or Commission) Decision (D.) 12-05-037, Pacific Gas and Electric (PG&E) and the other administrators of the Electric Program Investment Charge (EPIC) Program were directed to file annual reports each year beginning February 28, 2013 through February 28, 2020 with the Director of the Commission's Energy Division.<sup>1</sup> Annual Reports shall be served on all parties in the most recent EPIC proceeding; all parties to the most recent general rate case of each electric utility; and each successful and unsuccessful applicant for an EPIC funding award during the previous calendar year. In compliance with Ordering Paragraph (OP) 16 of D.12-05-037, and consistent with the Annual Report outline developed collaboratively by the EPIC Administrators and the Office of Ratepayer Advocates, PG&E submits its third annual report, documenting activities from January 1 through December 31, 2014.

#### PG&E's Technology Demonstration and Deployment Program Overview

In D.12-05-037, the Commission authorized funding in the areas of applied research and development, Technology demonstration and Deployment (TD&D), and market facilitation; the Investor-Owned Utility (IOU) role was limited to TD&D only. The decision defines TD&D as the installation and operation of pre-commercial technologies or strategies at a scale sufficiently large and in conditions sufficiently reflective of anticipated actual operating environments to enable appraisal of the operational and performance characteristics and the financial risks associated with a given technology. PG&E's 2012-2014 Investment Plan (Plan) includes TD&D projects in the following areas:

- 1) Renewables and Distributed Energy Resource Integration – integrate distributed energy resources, generation and store; improve transparency of resource information; increase generation flexibility
- 2) Grid Modernization and Optimization – optimize existing grid assets; prepare for emerging technologies; design and demonstrate grid operations of the future
- 3) Customer Service and Enablement – drive customer service excellence by leveraging PG&E's SmartMeter™ platform and offering greater billing flexibility; integrate Demand-Side Management (DSM) for grid optimization

There is a fourth category, Cross-Cutting/Foundational Strategies and Technologies, where the PG&E plan does not include any projects. This category refers to critical areas implicit within each of the above three program categories for focused, sustained and collaborative TD&D investment in order to modernize the grid and provide long-term benefits to Californians. Each of PG&E's TD&D projects were designed to achieve some combination of greater public and employee safety, increased reliability and/or lower costs.

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<sup>1</sup> The four EPIC program administrators are PG&E, Southern California Edison Company (SCE), San Diego Gas & Electric Company (SDG&E) and the California Energy Commission (CEC).

## PG&E's TD&D Program Highlights

On November 14, 2013, in D.13-11-025, the Commission approved PG&E's first EPIC Investment Plan. PG&E has since made significant progress with its portfolio of EPIC projects and received public recognition for the work we are accomplishing. A few milestones for select pilots are highlighted to demonstrate the success of the EPIC program to date:

**Project 16 – Vehicle-to-Grid Operational Integration** developed a test vehicle that can export up to 120 kilowatt (kW) of power to the grid to pilot providing temporary power for customers during planned or unplanned outages. The test vehicle was displayed at the Capitol Building in Washington, D.C. in November 2014 as well as at the Edison Electric Institute (EEI) Chief Executive Officer (CEO) conference in January 2015. Actively exhibiting the vehicle resulted in strong interest from various government agencies such as the Department of Energy (DOE) as well as many other utility companies across the country. Such interest could help drive longer term commercialization of the technology. The project team is also partnering with the National Renewable Energy Laboratory (NREL) to run additional testing on the vehicle.

**Project 01 – Energy Storage for Market Operations** leverages the existing 2.1 megawatts PG&E Vaca Dixon Battery Energy Storage System. The pilot has successfully been bidding into the California Independent System Operator (CAISO) Non-Generator Resource (NGR) market. To date, the project bid both energy and frequency regulation with a goal of understanding market dynamics, setting operational protocols and identifying NGR implementation issues.

**Project 18 – Appliance-Level Load Disaggregation** uses the data analytics capabilities of the SmartMeter™ platform to test appliance-level load disaggregation of the customer bill, providing an enhanced billing experience, insight into customer energy usage and potential personalized energy-saving tips. The project captures one minute load intervals that are used in an algorithm to determine how much energy specific devices are using. The pilot, already presented to 500 participants, is in-flight.

### b. Status of Programs

In D.13-11-025, the Commission approved 27 of the 29 projects proposed by PG&E in the Plan since two projects were formally withdrawn by PG&E prior to the issuance of this decision.<sup>2</sup> PG&E has implemented internal governance intended to ensure that approved projects within the TD&D program are specific EPIC projects. Governance at the program level requires PG&E to review projects in light of potentially changing marketplaces and evolving technologies, as well as confirm adherence to EPIC guiding principles and requirements through 2014. Of the 27 CPUC approved projects, PG&E has been actively engaged in 17 of them. Of these 17 projects: five are in the build/test phase; five are in the design/engineering phase; five are in the planning phase; and two are in the staging phase. The remaining projects are on-hold and as the 17 live projects begin to close out, PG&E will assess remaining funding amounts and determine whether to proceed with any of the ten on-hold projects, or add funding to any of the live projects.

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<sup>2</sup> PG&E originally proposed 26 projects in the Plan Application (A.12-11-003). Project 9 was subsequently split into two projects and project 10 was split into three projects resulting in a total of 29 projects. The projects formally withdrawn by PG&E were projects 4 and 7.

Table 1:

1. Renewables and DER Integration
<ul style="list-style-type: none"> <li>• 3 Projects (Projects: 1, 2 &amp; 16) Funded as of December 31, 2014</li> <li>• Total Funding Range: \$9.9 million – \$12.0 million.</li> </ul>
2. Grid Modernization and Optimization
<ul style="list-style-type: none"> <li>• 8 Projects (Projects: 5, 8, 9A, 9B/10B, 9C, 14, 15, &amp; 19) Funded as of December 31, 2014.</li> <li>• Total Funding Range: \$15.7 million – \$18.9 million.</li> </ul>
3. Customer Service and Enablement
<ul style="list-style-type: none"> <li>• 6 Projects (Projects: 18, 21, 22, 23, 24 &amp; 25) Funded as of December 31, 2014.</li> <li>• Total Funding Range: \$8.2 million – \$10.1 million.</li> </ul>
<p>Total Projects Funded: 17</p> <p>Total Funding: \$33.8 million-\$41.0 million committed</p> <ul style="list-style-type: none"> <li>• <i>Projects are refined through a stage-gate approach in order to control committed funding. As funding requirements are better defined, remaining funds will be redirected to other projects, both new and existing, as needed to efficiently utilize customer funds.</i></li> </ul>

## 2. Introduction and Overview

### a. Background on EPIC

Funding for EPIC is authorized in Public Utilities Code (PUC) Section 399.8, which governed the Public Goods Charge (PGC) until expiration on January 1, 2012. The Commission opened an Order Instituting Rulemaking (R.11-10-003) to establish the Electric Program Investment Charge to preserve funding for the public ratepayer benefits associated with the renewables and research, development and demonstration (RD&D) activities provided by the electric PGC. The rulemaking included two phases with Phase I to establish the EPIC program on an interim basis in 2012, and Phase II to establish purposes and governance for EPIC to continue from 2013-2020.<sup>3</sup> The EPIC program administrators include three IOU – PG&E, SCE and SDG&E – and the CEC.

The Commission in its Phase I *Decision Establishing Interim Research, Development and Demonstrations and Renewables Program Funding Levels* (D.11-12-035), established 2012 funding at approximately \$142 million and authorized PG&E, SCE and SDG&E to institute the EPIC program, effective January 1, 2012, to collect funds for renewables programs, and Research, Development and Demonstration (RD&D) programs at the same level authorized in 2011. Additionally, the surcharge was imposed on all distribution customers, based on the existing rate allocation between customer classifications, and collected in the Public Purpose Program component of rates.

On May 24, 2012, the Commission issued its Phase II *Decision Establishing Purposes and Governance for Electric Program Investment Charge and Establishing Funding Collections for 2013-2020*. The decision established an annual funding amount of \$162 million annually for the 2013-2014 EPIC program cycle and set the funding allocations among the three IOUs as 50.1 percent, 41.1 percent and 8.8 percent for PG&E, SCE and SDG&E, respectively.<sup>4</sup>

The EPIC program is designed to assist the development of pre-commercialized, new and emerging clean energy technologies in California, while providing assistance to commercially viable projects. The goal of the EPIC programs is to support projects that help advance new technologies that further safety, reliability and affordability while advancing California's clean energy goal, including Senate Bill 17 Smart Grid Goals and PUC Section 740.1 goals focused on renewables integration and resource conservation, as well as greenhouse gas emissions reductions, economic development and low-emission vehicle and transportation support. EPIC supported activities are mapped to the different elements in the electricity system value chain consisting of: Grid Operations/Market Design, Generation, Transmission, Distribution and DSM.

### b. EPIC Program Components

Decision 12-05-037 authorizes the EPIC Program to fund investments in the following areas: (1) Applied Research and Development (\$55 million/year); (2) TD&D (\$75 million/year); and (3) Market Facilitation, consisting of market research, regulatory permitting and streamlining, and workforce development activities (\$15 million/year). PG&E and the other IOU Administrators were designated to administer EPIC funds only in the area of TD&D. The TD&D portion for PG&E is funded at approximately \$43.3 million as part of the first triennial plan cycle (2012-2014). The CEC was designated to administer funds in all of the remaining areas, including a portion of TD&D.

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<sup>3</sup> See Phase I D.11-12-035 and Phase II D.12-05-037.

<sup>4</sup> OP 7 of D.12-05-037 requires the total collection amount to be adjusted on January 1, 2015 and January 1, 2018 commensurate with the average change in the Consumer Price Index for Urban Wage Earners and Clerical Workers for the third quarter, for the previous three years.

### c. EPIC Program Regulatory Process

The Phase II decision provides the regulatory process and governance for the EPIC program. The decision requires EPIC Program Administrators to submit Triennial Investment Plans to cover three-year cycles for 2012-2014, 2015-2017, and 2018-2020. The investment plans must include details about planned investments as well as criteria for selecting and evaluating proposals. Each plan must be evaluated and approved by the Commission prior to program implementation. To date, Administrators have filed two Triennial Investment Plans for 2012-2014 and 2015-2017. In addition, Program Administrators are required to file annual reports on February 28, 2013 through February 28, 2020.

### d. Coordination

In order to ensure adequate coordination of the EPIC Program, the EPIC Administrators participate in regular review meetings, conduct joint webinars and workshops, and often collaborate on EPIC-related matters. The IOU EPIC program administrators meet at least weekly to discuss EPIC and their respective objectives for the program. The administrators work together to leverage consistent approaches, where feasible, for meeting the objectives of the EPIC Program. This collaboration resulted in the development of a common EPIC framework, approved by the Commission in D.13-11-025, to guide the individual investment plans.

### e. Transparent and Public Process

The program's administrators hold stakeholder workshops during the planning and implementation of the EPIC Triennial Investment Plans to ensure stakeholder concerns and feedback are received and properly addressed. In 2014, webinars to discuss the Second Triennial plan took place on February 21, March 17 and March 21. Notice for these events is provided to a broad range of stakeholders including technology vendors, researchers, academics and energy consultants. The utilities and the CEC will continue to maintain transparency in the process via webinars, workshops and discussion with the CPUC.

PG&E continues to remain accessible to the interested public; its website includes EPIC program information and updates.<sup>5</sup> Information regarding relevant EPIC solicitations will be posted on PG&E's EPIC webpage.

## 3. Budget

### a. Authorized Budget

2012-2014			
	Program Budget	Administrative Budget	CPUC Regulatory Oversight Budget
PG&E Program	\$43.3 million (TD&D only)	\$4.9 million	\$1.2 million
CEC Program (portion remitted by PG&E)	\$166.1 million (TD&D, Applied Research and Development, and Market Facilitation)	\$18.5 million	

<sup>5</sup> <http://www.pge.com/en/about/environment/pge/epic/index.page>.

## b. Commitments/Encumbrances

- PG&E Commitments: \$33.8 million - \$41.0 million committed as of December 31, 2014. The committed<sup>6</sup> range is defined having been vetted through the internal governance process and begun work on an initiation or planning phase.
- PG&E Encumbrances: \$11.8 million encumbered<sup>7</sup> as of December 31, 2014.
- CEC Remittances:
  - \$6.3 million remitted for Program Administration for calendar year 2014.
  - \$0 remitted for committed projects. The CEC did not request project funds during calendar year 2014. These costs are expected to be seen in 2015.
- CPUC Remittance: \$0.4 million remitted for Program Administration for calendar year 2014.

## c. Dollars Spent on In-House Activities

- For calendar year 2014, PG&E has spent \$2,514,691 on in-house project TD&D costs and \$436,109 on in-house Program Administration costs.

## d. Fund Shifting Above 5 Percent Between Program Areas

- All PG&E projects are within TD&D, thus there has been no fund shifting between program areas.

## e. Uncommitted/Unencumbered Funds

- \$2.3 million – \$9.5 million uncommitted/unencumbered funds<sup>8</sup> as of December 31, 2014. Projects without committed funding are in early scoping and review phases, pending further project and benefits analysis. The range of uncommitted funds is dependent on the range of committed funds from Section 3b.

## 4. Projects

### a. Summary of Project Funding

- For a summary of project funding please refer to Table 1 in Section 1b.

### b. Project Status Report (See Appendix A)

- See Project Status Report, Appendix A, with project details as of December 31, 2014. The Project Status Report is based on the format provided in Attachment 6 of D.13-11-025.

### c. Description of Projects

- The project descriptions, provided below, are as of December 31, 2014.
- Note: On-hold projects are included in the summary.

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<sup>6</sup> “committed funds” are monies budgeted for a particular project.

<sup>7</sup> “encumbered funds” refer to monies specified within contracts signed during a previous triennial investment plan cycle and associated with specific activities under that contract.

<sup>8</sup> “uncommitted” and “unencumbered” funds refer to monies that are not identified in solicitation plans or obligated to a particular project – these funds are considered unspent.

## Project #01 – Energy Storage for Market Operations

- i. Investment Plan Period
  - 1st Triennial (2012-2014).
- ii. Assignment to Value Chain
  - Grid Operations/Market Design.
- iii. Objective
  - Develop technologies and strategies for efficient and optimized bidding and scheduling of Energy Storage Technologies (ESTs) in CAISO markets and demonstrate those strategies using PG&E’s existing Sodium Sulfur Battery Energy Storage Systems (NaS BESS).
- iv. Scope
  - Develop and deploy technology to enable fully automated resource response to CAISO market awards.
  - Quantify the values that battery resources can capture in CAISO markets.
  - Inform Cost Effectiveness Models.
  - Provide Guidance on Regulatory Compliance.
- v. Deliverables
  - Demonstration of automated and remote control application for generic energy storage resources to interface with existing Supervisory Control and Data Acquisition (SCADA) systems.
  - Report that summarizes actual financial performance from participation in CAISO markets.
  - Report that compares actual performance vs. hypothetical performance quoted in industry reports.
  - Comply with regulatory requirements and establish a framework for accounting standards applicable to energy storage.
- vi. Metrics
  - 3a – Maintain/Reduce operations and maintenance costs.
  - 7b – Increased use of cost-effective digital information and control technology to improve reliability, security, and efficiency of the electric grid (PUC §8360).
  - 7h – Deployment and integration of cost-effective advanced electricity storage and peak-shaving technologies, including plug-in electric and hybrid electric vehicles, and thermal-storage air conditioning (PUC § 8360).
  - 9c – EPIC project results referenced in regulatory proceedings and policy reports (Business Plan references: CPUC Rulemaking 10-12-007) - this project would provide data to understand the cost-effectiveness of battery storage.
- vii. Schedule
  - 2 years.
- viii. EPIC Funds Encumbered
  - \$75,136.

- ix. EPIC Funds Spent
  - \$541,755.
- x. Partners
  - N/A.
- xi. Match Funding
  - N/A.
- xii. Match Funding Split
  - N/A.
- xiii. Funding Mechanism
  - N/A.
- xiv. Treatment of Intellectual Property
  - Not expecting to develop patents or trademarks based on project at this time.
- xv. Status Update
  - Project is in the Build/Test phase.
  - Project team has been bidding/scheduling the resource in CAISO markets since Q3 2014.
  - Participating in frequency and day ahead markets.

## Project #02 – Energy Storage for Distribution Operations

- i. Investment Plan Period
  - 1st Triennial (2012-2014).
- ii. Assignment to Value Chain
  - Grid Operations/Market Design/Distribution.
- iii. Objective
  - Demonstrate the ability of a utility operated energy storage asset to address capacity overloads on the distribution system and improve reliability.
- iv. Scope
  - Deploy utility operated energy storage asset at a single site.
  - Demonstrate peak shaving use case along with other site-specific use cases as suggested by distribution operators.
- v. Deliverables
  - Identify energy storage site based on project objectives.
  - Issue Request for Proposal (RFP) and select vendors for hardware, controls system and EPC contract.
  - Construct and integrate energy storage system.
  - Test system and analyze results to prove project objectives.
- vi. Metrics
  - 1c – Avoided procurement and generation costs.
  - 7b – Increased use of cost-effective digital information and control technology to improve reliability, security, and efficiency of the electric grid (PUC§ 8360).
  - 7d – Deployment and integration of cost-effective distributed resources and generation, including renewable resources (PUC § 8360).
  - 9c – EPIC project results referenced in regulatory proceedings and policy reports (Business Plan references: Deferring a capacity upgrade has been identified as a key potential value of ESTs and noted in filings with the CPUC/Assembly Bill (AB) 2514).
- vii.. Schedule
  - 3 years.
- viii. EPIC Funds Encumbered
  - \$59,000.
- ix. EPIC Funds Spent
  - \$56,798.
- x. Partners
  - TBD.
- xi. Match Funding
  - N/A.

xii. Match Funding Split

- N/A.

xiii. Funding Mechanism

- N/A.

xiv. Treatment of Intellectual Property

- TBD.

xv. Status Update

- Project is in the Planning phase.
- Project has identified a site and location has been approved in January.
- Team is preparing to launch a RFP for energy storage hardware controls system and associated EPC contract.

## Project #03 – Mobile and Stationary Energy Storage Synergies

- i. Investment Plan Period
  - 1st Triennial (2012-2014).
- ii. Assignment to Value Chain
  - Grid Operations/Market Design.
- iii. Objective
  - The project aims to reduce existing barriers to deployment of battery energy storage systems by demonstrating whether post-Electric Vehicle (EV) second life batteries can cost-effectively perform electric distribution services. The project will attempt to demonstrate the potential for reduced energy storage system costs via: (a) the development of an integration platform for deploying such batteries (Phase I); and (b) the use of lower cost second life batteries in the integrated platform (Phase II).
- iv. Scope
  - Develop a standardized physical enclosure and a means for electrically connecting the batteries.
  - Develop a battery management system specifically tailored for second life batteries to control the charging and discharging of these batteries and to interface with SCADA systems.
  - Develop or acquire necessary power conversion equipment.
  - Conduct phased testing of integration platform.
  - Based on the results of Projects 1 and 2, identify an ideal location to test the integration platform performing identified distribution services, market services, or both.
- v. Deliverables
  - Technical specification sheet for an integration platform.
  - Physical enclosure and integration platform to connect second-life batteries.
  - Demonstration of second-life batteries performing stationary end-uses.
- vi. Metrics
  - To be determined at end of their initiation or planning phase.
- vii. Schedule
  - 3 years.
- viii. EPIC Funds Encumbered
  - None.
- ix. EPIC Funds Spent
  - None.
- x. Partners
  - N/A.
- xi. Match Funding
  - N/A.

- xii. Match Funding Split
  - N/A.
- xiii. Funding Mechanism
  - N/A.
- xiv. Treatment of Intellectual Property
  - N/A.
- xv. Status Update
  - Project is currently on-hold.

**Project #04 – Expand Test Lab and Pilot Facilities for New Energy Storage Systems**

Formally Withdrawn. CPUC A.12-11-003, 10/15/2013.

## Project #05 – New Forecast Methods for Improved Storm Damage Modeling

- i. Investment Plan Period
  - 1st Triennial (2012-2014).
- ii. Assignment to Value Chain
  - Distribution.
- iii. Objective
  - Demonstrate that emerging capabilities in mesoscale modeling can now be implemented cost effectively to provide more granular and accurate weather forecasting input to PG&E's storm damage prediction model, and to other PG&E forecasting applications. The goal is more effective and granular damage prediction, and therefore more efficient response to storm events.
- iv. Scope
  - Project focus is on development, deployment, and implementation of an operational version of the Weather Research and Forecasting (WRF) mesoscale model to support PG&E's forecasting program. (not in scope for this project is enhancements to PG&E's Restoration Work Plan other than improved forecast damage numbers)
- v. Deliverables
  - End product will be a fully functional mesoscale modeling system known as POMMS (PG&E Operational Mesoscale Modeling System). This system will provide detailed weather input into PG&E's damage prediction modeling system (SOPP).
- vi. Metrics
  - 3a – Maintain/Reduce operations and maintenance costs.
  - 4a –GHG emissions reductions (MMTCO<sub>2</sub>e).
  - 5c – Forecast accuracy improvement.
  - 5e – Utility worker safety improvement and hazard exposure reduction.
- vii. Schedule
  - 3 years.
- viii. EPIC Funds Encumbered
  - \$491,340.
- ix. EPIC Funds Spent
  - \$266,503.
- x. Partners
  - TBD.
- xi. Match Funding
  - N/A.
- xii. Match Funding Split
  - N/A.

xiii. Funding Mechanism

- N/A.

xiv. Treatment of Intellectual Property

- TBD.

xv. Status Update

- Project is in the Staging phase.
- Setup of data flow and processing underway.
- Integration of data models to storm planning processes will continue through 2015.

## **Project #06 – Demonstrate Communication Systems Allowing the California Independent System Operator Corporation to Utilize Available Renewable Generation Flexibility**

- i. Investment Plan Period
  - 1st Triennial (2012-2014).
- ii. Assignment to Value Chain
  - Grid Operations/Market Design.
- iii. Objective
  - This project would attempt to demonstrate the use of accepted communications protocols to allow the CAISO to send an operating signal to reduce output under specified conditions, as allowed by contracts.
- iv. Scope
  - TBD.
- v. Deliverables
  - N/A.
- vi. Metrics
  - N/A.
- vii. Schedule
  - N/A.
- viii. EPIC Funds Encumbered
  - None.
- ix. EPIC Funds Spent
  - None.
- x. Partners
  - N/A.
- xi. Match Funding
  - N/A.
- xii. Match Funding Split
  - N/A.
- xiii. Funding Mechanism
  - N/A.
- xiv. Treatment of Intellectual Property
  - N/A.
- xv. Status Update
  - Project is currently on-hold.

**Project #07 – Demonstrate Systems to Ramp Existing Gas-Fired Generation More Quickly to Adapt to Changes in Variable Energy Resources Output**

Formally Withdrawn. CPUC A.12-11-003.

## Project #08 – Distribution System Safety and Reliability through New Data Analytics Techniques

- i. Investment Plan Period
  - 1st Triennial (2012-2014).
- ii. Assignment to Value Chain
  - Transmission and Distribution.
- iii. Objective
  - Develop and test a System Tool for Asset Risk (STAR) which would be an enterprise software application that Electric Operations will use to calculate and display (graphically and geospatially) risk scores for electric transmission, substation and distribution assets. The STAR will enable an automated, system-wide application to improve risk identification, prioritization, and investment decisions to support electric system safety.
- iv. Scope
  - Demonstrate whether the ever-increasing amounts of data can be mined and combined for targeted, cost-effective use. Potential scenarios include risk-based asset management, safety hazard mitigation and proactive outage prediction using self-serve and virtual integration environments. This project proposes to demonstrate innovative technologies related to data analytics including instant data ad-hoc search and correlation, “mash-ups,” visualization, data recognition and other data analytics solutions.
- v. Deliverables
  - Overview of existing applications and data sources.
  - Assessment of existing data source quality.
  - High-level future business processes by functional area.
  - Inventory of asset risk algorithms (formulas or complexity) for “In Scope” asset classes.
  - Consolidated business requirements.
  - Vendor scoring and selection.
  - High-level Change Management Approach.
  - Proof of concept prototype.
- vi. Metrics
  - 7c – Dynamic optimization of grid operations and resources; including appropriate consideration for asset management and utilization of related grid operations and resource, with cost-effective full cyber security (PUC §8360).
  - 3a – Maintain/Reduce operations and maintenance costs: With the improved understanding of risk, there could be a better tool for evaluating projects such as asset replacement.
- vii. Schedule
  - 1.5 years.
- viii. EPIC Funds Encumbered
  - \$1,988,737.

- ix. EPIC Funds Spent
  - \$1,670,069.
- x. Partners
  - N/A.
- xi. Match Funding
  - N/A.
- xii. Match Funding Split
  - N/A.
- xiii. Funding Mechanism
  - Pay for performance.
- xiv. Treatment of Intellectual Property
  - N/A.
- xv. Status Update
  - Project is in the Build/Test phase.
  - Prototype nearing completion.
  - User training and user acceptance testing initiated.

## Project #09A – Close Proximity Switching

- i. Investment Plan Period
  - 1st Triennial (2012-2014).
- ii. Assignment to Value Chain
  - Transmission/Distribution.
- iii. Objective
  - This project explores and seeks to discover effective, new tools to operate underground oil filled switches safely.
- iv. Scope
  - Test new tools and techniques for safely operation of underground oil filled switches. Evaluate alternatives to decrease probability of injury to workers and public. Help design and manufacture a robotic tool to allow remote operation. Develop the necessary parts/ adaptors to be used on various types (manufacturer, brand, age, etc.) of underground switches.
- v. Deliverables
  - A working prototype for the various underground oil filled switching tools.
- vi. Metrics
  - 5a – Outage number, frequency and duration reductions.
  - 5e – Utility worker safety improvement and hazard exposure reduction.
- vii. Schedule
  - 2 years.
- viii. EPIC Funds Encumbered
  - \$186,908.
- ix. EPIC Funds Spent
  - \$107,699.
- x. Partners
  - N/A.
- xi. Match Funding
  - N/A.
- xii. Match Funding Split
  - N/A.
- xiii. Funding Mechanism
  - N/A.
- xiv. Treatment of Intellectual Property
  - PG&E has no current patents or licensing agreements signed. Future Intellectual Property is to be determined.

xv. Status Update

- Project in in the Design/Engineering phase.
- End user requirements for prototype gathered.
- Currently building robotic arm prototype including lab testing.
- Field trial is expected to commence in early 2015.

## Project #09B and 10B – Network Conditioned-Based Maintenance

- i. Investment Plan Period
  - 1st Triennial (2012-2014).
- ii. Assignment to Value Chain
  - Transmission/Distribution.
- iii. Objective
  - Attempt to provide accurate network component and vault conditions and utilize these conditions to establish improved Condition Based Maintenance/Replacement systems. Project focus is on development, testing, deployment, and implementation of new technologies in support of the existing network Condition-Based Maintenance (CBM) System.
- iv. Scope
  - The high-level scope of this project is to investigate the use of new technologies to improve safety and operational performance of the distribution networks located in San Francisco and Oakland.
- v. Deliverables
  - Assess new technologies and feasibility of application on the Distribution Networks. Includes technical and economic assessments and prototypes as appropriate.
- vi. Metrics
  - 1c – Avoided procurement and generation costs.
  - 3a – Maintain/Reduce operations and maintenance costs.
- vii. Schedule
  - 2.5 years.
- viii. EPIC Funds Encumbered
  - \$52,000.
- ix. EPIC Funds Spent
  - \$51,584.
- x. Partners
  - N/A.
- xi. Match Funding
  - N/A.
- xii. Match Funding Split
  - N/A.
- xiii. Funding Mechanism
  - N/A.
- xiv. Treatment of Intellectual Property
  - PG&E has no current patents or licensing agreements signed. Future Intellectual Property is to be determined.

xv. Status Update

- Project is in the Planning phase.
- Phase I was an assessment of appropriate technologies and research areas that could be used. This was completed in December of 2014.
- Phase II consists of competitively bidding research areas and beginning research in the 2nd quarter of 2015.

## Project #09C – Discrete Reactors

- i. Investment Plan Period
  - 1st Triennial (2012-2014).
- ii. Assignment to Value Chain
  - Transmission.
- iii. Objective
  - Gain operating experience with Distributed Series Reactors (DSR) and to determine whether such devices would operate safely and effectively on PG&E's transmission system.
  - Reduce load tripping that would otherwise be required to mitigate thermal overloads following extreme double line outages (n-2 line).
- iv. Scope
  - The DSR Demonstration Project installs: (1) 99 reactor units on the Ravenswood-San Mateo 115 kV line, (2) servers at a PG&E facility, complete with all Smart Wire System Manager Software, and (3) communication links between the DSR units on the 115 kV line and the Grid Control Centers in SFGO and Vacaville to support the monitoring and control of the reactor units.
- v. Deliverables
  - Job Estimate to engineer, procure, construct, and test the DSRs.
  - White paper describing project including go/no go recommendation.
  - Final report describing overall project, including findings from the operations and testing of DSR units and a recommendation as to whether or not to install the DSRs elsewhere in the PG&E system.
- vi. Metrics
  - 5a – Outage number, frequency and duration reductions.
- vii. Schedule
  - 2.5 years.
- viii. EPIC Funds Encumbered
  - \$168,579.
- ix. EPIC Funds Spent
  - \$281,241.
- x. Partners
  - N/A.
- xi. Match Funding
  - N/A.
- xii. Match Funding Split
  - N/A.
- xiii. Funding Mechanism

- N/A.

xiv. Treatment of Intellectual Property

- PG&E has no current patents or licensing agreements signed. Future Intellectual Property is to be determined.

xv. Status Update

- Project is in the Design/Engineering phase with expected completion in Q1.
- A contracting process with Smart Wires to procure DSRs underway.
- Targeting Material Order and White Paper to commence in late Q1/early Q2.
- On track for in-service test to begin in Q3.

## Project #10A – Dissolved Gas Analysis

- i. Investment Plan Period
  - 1st Triennial (2012-2014).
- ii. Assignment to Value Chain
  - Transmission and Distribution.
- iii. Objective
  - Develop tools and algorithms that substation equipment (distribution and transmission) that tests for dissolved gasses or other precursor data that would assist in understanding the condition of the equipment.
- iv. Scope
  - TBD.
- v. Deliverables
  - TBD.
- vi. Metrics
  - To be determined at end of their initiation or planning phase.
- vii. Schedule
  - TBD.
- viii. EPIC Funds Encumbered
  - None.
- ix. EPIC Funds Spent
  - None.
- x. Partners
  - N/A.
- xi. Match Funding
  - N/A.
- xii. Match Funding Split
  - N/A.
- xiii. Funding Mechanism
  - N/A.
- xiv. Treatment of Intellectual Property
  - PG&E has no current patents or licensing agreements signed. Future Intellectual Property is to be determined.
- xv. Status Update
  - Project is currently on-hold.

## Project #10C – Underground Cable Analysis

- i. Investment Plan Period
  - 1st Triennial (2012-2014).
- ii. Assignment to Value Chain
  - Distribution.
- iii. Objective
  - Develop tools and algorithms that analyze load and operating characteristic data from underground cables in order to develop an understanding of potential failure points, cable maintenance needs, and cable life expectancy.
- iv. Scope
  - TBD.
- v. Deliverables
  - TBD.
- vi. Metrics
  - TBD.
- vii. Schedule
  - TBD.
- viii. EPIC Funds Encumbered
  - None.
- ix. EPIC Funds Spent
  - None.
- x. Partners
  - N/A.
- xi. Match Funding
  - N/A.
- xii. Match Funding Split
  - N/A.
- xiii. Funding Mechanism
  - N/A.
- xiv. Treatment of Intellectual Property
  - PG&E has no current patents or licensing agreements signed. Future Intellectual Property is to be determined.
- xv. Status Update
  - Project is currently on-hold.

## Project # 11 – Demonstrate Self-Correcting Tools to Improve System Records and Operations

- i. Investment Plan Period
  - 1st Triennial (2012-2014).
- ii. Assignment to Value Chain
  - Transmission/Distribution.
- iii. Objective
  - Demonstrate tools that identify and register existing assets in an attempt to improve the integration between utility planning and operations. As part of the demonstration, implement self-correcting technologies that identifies plan vs. actual discrepancies and updates system records automatically. High priority use cases include: (1) mapping of transformers to primary phase; (2) mapping of customers to transformers; and (3) precision mapping of PG&E's overhead and underground network.
- iv. Scope
  - TBD.
- v. Deliverables
  - TBD.
- vi. Metrics
  - TBD.
- vii. Schedule
  - TBD.
- viii. EPIC Funds Encumbered
  - None.
- ix. EPIC Funds Spent
  - None.
- x. Partners
  - N/A.
- xi. Match Funding
  - N/A.
- xii. Match Funding Split
  - N/A.
- xiii. Funding Mechanism
  - N/A.
- xiv. Treatment of Intellectual Property
  - PG&E has no current patents or licensing agreements signed. Future Intellectual Property is to be determined.

xv. Status Update

- Project is currently on-hold.

## **Project #12 – Demonstrate New Technologies That Improve Wildlife Safety and Protect Assets From Weather-Related Degradation**

- i. Investment Plan Period
  - 1st Triennial (2012-2014).
- ii. Assignment to Value Chain
  - Transmission/Distribution.
- iii. Objective
  - Demonstrate new strategies and technologies in an attempt to improve animal and bird protection, reduce outages caused by animals and birds, and protect assets from expensive weather-related degradation such as fog related corrosion.
- iv. Scope
  - TBD.
- v. Deliverables
  - TBD.
- vi. Metrics
  - TBD.
- vii. Schedule
  - TBD.
- viii. EPIC Funds Encumbered
  - None.
- ix. EPIC Funds Spent
  - None.
- x. Partners
  - N/A.
- xi. Match Funding
  - N/A.
- xii. Match Funding Split
  - N/A.
- xiii. Funding Mechanism
  - N/A.
- xiv. Treatment of Intellectual Property
  - PG&E has no current patents or licensing agreements signed. Future Intellectual Property is to be determined.
- xv. Status Update
  - Project is currently on-hold.

## **Project #13 – Demonstrate New Communication Systems to Improve Substation Automation and Interoperability**

- i. Investment Plan Period
  - 1st Triennial (2012-2014).
- ii. Assignment to Value Chain
  - Transmission/Distribution.
- iii. Objective
  - Demonstrate new strategies and technologies in an attempt to convert and integrate multiple existing proprietary technologies within the substation environment for more effective operations. Substations are key operational hubs and represent significant investments, which must be further leveraged by engaging with vendors to create the next generation of interoperable substation services and products.
- iv. Scope
  - TBD.
- v. Deliverables
  - TBD.
- vi. Metrics
  - TBD.
- vii. Schedule
  - TBD.
- viii. EPIC Funds Encumbered
  - None.
- ix. EPIC Funds Spent
  - None.
- x. Partners
  - N/A.
- xi. Match Funding
  - N/A.
- xii. Match Funding Split
  - N/A.
- xiii. Funding Mechanism
  - N/A.
- xiv. Treatment of Intellectual Property
  - PG&E has no current patents or licensing agreements signed. Future Intellectual Property is to be determined.
- xv. Status Update
  - Project is currently on-hold.

## Project #14 – Next Generation SmartMeter™ Telecom Network Functionalities

- i. Investment Plan Period
  - 1st Triennial (2012-2014).
- ii. Assignment to Value Chain
  - Grid Operations/Market Design/Distribution/Demand-Side Management.
- iii. Objective
  - This project explores and attempts to discover effective, new network applications and devices to leverage and improve the SmartMeter™ communications network.
- iv. Scope
  - Leverage the existing SmartMeter™ network to support additional applications. Inform future uses of the SmartMeter™ network as to message capability, security, latency, and engineering constraints. Specifically focus on:
    - i. Testing new devices to support network functions and capabilities not previously envisioned (e.g., new data streams, faster data collection).
    - ii. Evaluating alternatives to decrease future upgrade, maintenance and/or operational costs.
    - iii. Demonstrating different network applications each focused on separate use cases.
- v. Deliverables
  - Evaluation of new applications and devices, their associated data traffic impact on the SmartMeter™ network, and a recommendation of which items warrant consideration for full-scale deployment.
- vi. Metrics
  - 7f – Deployment of cost-effective smart technologies, including real time, automated, interactive technologies that optimize the physical operation of appliance and consumer devices for metering, communications concerning grid operations and status, and distribution automation (PU Code §8360).
  - 7k – Develop standards for communication and interoperability of appliances and equipment connected to the electric grid, including the infrastructure serving the grid (PU Code §8360).
- vii. Schedule
  - 2.75 years.
- viii. EPIC Funds Encumbered
  - \$2,919,979.
- ix. EPIC Funds Spent
  - \$1,363,081.
- x. Partners
  - TBD.
- xi. Match Funding
  - N/A.

xii. Match Funding Split

- N/A.

xiii. Funding Mechanism

- N/A.

xiv. Treatment of Intellectual Property

- PG&E has no current patents or licensing agreements signed. Future Intellectual Property is to be determined.

xv. Status Update

- Project is in the Design/Engineering phase.
- Developed 12 use cases that leverage SmartMeter™ network.
- Phase 1 network bandwidth assessment complete.
- Testing of initiatives ongoing in 2015, initiated Mixed-Use Data and Streetlights in January.

## Project #15 – Grid Operations Situational Intelligence

- i. Investment Plan Period
  - 1st Triennial (2012-2014).
- ii. Assignment to Value Chain
  - Grid Operations/Market Design/ Distribution/Demand-Side Management.
- iii. Objective
  - The objective of this pilot is to attempt to develop and pilot a real-time data visualization software platform for use by Electric Distribution Operations end users.  
  
If viable, data will be integrated from various data sources and displayed on Distribution Control Center video walls and individual desktop computers, with potential for future scalability to handheld devices.
- iv. Scope
  - Scope includes the integration of data (network model, loading, SmartMeters™, outages, fire, weather, etc.) and a real-time data visualization platform for Distribution Operations. The Distribution Management System (DMS) platform and predictive analytics are not included in the scope.
- v. Deliverables
  - Demonstrate Real-time Data Visualization Platform—with data integration from variety of data sources and a visual interface that include geospatial, list and trending layers.
- vi. Metrics
  - 5a – Outage number, frequency and duration reductions.
  - 7b – Increased use of cost-effective digital information and control technology to improve reliability, security and efficiency of the electric grid (PUC §8360).
  - 3a – Maintain/Reduce operations and maintenance costs.
- vii. Schedule
  - 2 years.
- viii. EPIC Funds Encumbered
  - \$840,848.
- ix. EPIC Funds Spent
  - \$781,611.
- x. Partners
  - N/A.
- xi. Match Funding
  - N/A.
- xii. Match Funding Split
  - N/A.
- xiii. Funding Mechanism
  - N/A.

xiv. Treatment of Intellectual Property

- PG&E has no current patents or licensing agreements signed. Future Intellectual Property is to be determined.

xv. Status Update

- Project is in the Build/Test phase.
- Project team is currently pulling data extracts from PG&E sources and designing use case dashboards.
- A prototype dashboard is installed at PG&E's Fresno distribution control center for gathering user feedback.

## Project #16 – Vehicle-to-Grid Operational Integration

- i. Investment Plan Period
  - 1st Triennial (2012-2014).
- ii. Assignment to Value Chain
  - Distribution.
- iii. Objective
  - Demonstrate whether electric vehicles can be used as a resource that could provide the capability to connect to the distribution grid to improve power quality, reduce the length of customer planned or unplanned outages, reduce feeder congestion, and manage costs associated with increased demand and reliability. A demonstration would include using PG&E’s electric vehicle fleet to supply power to individual customers during distribution system repairs.
- iv. Scope
  - Develop approximately 125 kW exportable power capabilities from an extended range hybrid electric truck. Seek to create the protocols necessary to safely connect the truck to the appropriate grid connection points.
- v. Deliverables
  - Develop operating requirements for the vehicle.
  - Develop safety and interconnection protocols to connect the vehicle to the grid.
  - Define and document power requirements for different outage/usage scenarios.
  - Develop operating protocols (when and how the vehicles will be used).
  - Develop emergency protocols.
  - Develop the hardware and software required to connect the vehicle to PG&E’s system.
  - Build a limited number of vehicles for field testing.
- vi. Metrics
  - 5a – Outage number, frequency and duration reductions.
  - 5e – Utility worker safety improvement and hazard exposure reduction.
  - 3a – Maintain/Reduce operations and maintenance costs.
  - 4a – GHG emissions reductions (MMTCO<sub>2</sub>e).
- vii. Schedule
  - 2.5 years.
- viii. EPIC Funds Encumbered
  - \$1,231,590.
- ix. EPIC Funds Spent
  - \$1,575,366.
- x. Partners
  - N/A.

- xi. Match Funding
  - N/A.
- xii. Match Funding Split
  - N/A.
- xiii. Funding Mechanism
  - N/A
- xiv. Treatment of Intellectual Property
  - PG&E has no current patents or licensing agreements signed. Future Intellectual Property is to be determined.
- xv. Status Update
  - Project is in the Build/Test phase.
  - Equipment arrived in December for export power and driveline efficiency testing sponsored by NREL/DOE.
  - Vehicle has been exhibited at several venues including Washington, D.C. Capital Building, and the EEI CEO conference.

## Project #17 – Industry Participation to Leverage EPIC Dollars

- i. Investment Plan Period
  - 1st Triennial (2012-2014).
- ii. Assignment to Value Chain
  - Transmission/Distribution.
- iii. Objective
  - Leverage and participate in RD&D industry collaboration efforts.
- iv. Scope
  - Potential programs include EPRI's Intelligrid, Integration of Distributed Renewables, Energy Storage, Risk Mitigation Strategies, and Distribution Grid Modernization programs.
- v. Deliverables
  - N/A.
- vi. Metrics
  - To be determined at end of their initiation or planning phase.
- vii. Schedule
  - 3 years.
- viii. EPIC Funds Encumbered
  - None.
- ix. EPIC Funds Spent
  - None.
- x. Partners
  - N/A.
- xi. Match Funding
  - N/A.
- xii. Match Funding Split
  - N/A.
- xiii. Funding Mechanism
  - N/A.
- xiv. Treatment of Intellectual Property
  - N/A
- xv. Status Update
  - Project is currently on-hold.

## Project # 18 – Appliance-Level Load Disaggregation

- i. Investment Plan Period
  - 1st Triennial (2012-2014).
- ii. Assignment to Value Chain
  - Demand-Side Management.
- iii. Objective
  - This project focuses on delivering the energy cost by major appliances to customers.
- iv. Scope
  - This project will use the data enabled by the SmartMeter™ platform in an attempt to provide appliance-level itemization of monthly bill charges to customers, without their completing any audit or subscribing to any new service. This project assumes that minute level meter data is available.
- v. Deliverables
  - Results of disaggregation accuracy.
  - Strategy for deployment appliance level billing.
- vi. Metrics
  - 1f – Avoided customer energy use.
  - 1h – Customer bill savings (dollars saved).
- vii. Schedule
  - 1.5 years.
- viii. EPIC Funds Encumbered
  - \$831,028.
- ix. EPIC Funds Spent
  - \$627,319.
- x. Partners
  - N/A.
- xi. Match Funding
  - N/A.
- xii. Match Funding Split
  - N/A.
- xiii. Funding Mechanism
  - N/A.
- xiv. Treatment of Intellectual Property
  - PG&E has no current patents or licensing agreements signed. Future Intellectual Property is to be determined.

xv. Status Update

- Project is in the Build/Test phase.
- Load disaggregation for ~500 customers and customer presentment via Disaggregation vendor website is currently underway.
- First surveys and focus groups completed in January 2015 with results expected in mid Q1 2015.
- Evaluation of vendor algorithm accuracy in progress.

## Project #19 – Enhanced Data Techniques and Capabilities via the SmartMeter™ Platform

- i. Investment Plan Period
  - 1st Triennial (2012-2014).
- ii. Assignment to Value Chain
  - Grid Operations/Market Design/Demand-Side Management/Field Meter Operations.
- iii. Objective
  - The project is to explore and attempt to discover effective, new data that can be collected and studied for further benefits. Demonstrate the type of additional data that can be collected and/or processed through the SmartMeter™ platform. Evaluate impact of any increased data traffic on the SmartMeter™ network. Focus on new data collection that makes the SmartMeter™ platform more robust for more customers.
- iv. Scope
  - Demonstrate the collection of new data from SmartMeters™. Current working list under consideration includes:
    - i. Highly Granular kilowatt hour (kWh) (e.g., 1 minute).
    - ii. New Data Channels.
    - iii. New meter ‘trap’ alarm (e.g., when temperature values are exceeded).
    - iv. Alarm: interval usage exceeds customer \*max\*.
    - v. Alarm: interval usage exceeds customer preset limit.
    - vi. Security \*event\* of certain meter conditions.
    - vii. Validate and improve outage messages and logs.
- v. Deliverables
  - Evaluation of new data, their associated data traffic impact on the SmartMeter™ network, and a recommendation of which data warrants consideration for full-scale deployment. Evaluation should provide key inputs to a business case for general deployment.
- vi. Metrics
  - 7f – Deployment of cost-effective smart technologies, including real time, automated, interactive technologies that optimize the physical operation of appliance and consumer devices for metering, communications concerning grid operations and status, and distribution automation.
  - 1h – Customer bill savings (dollars saved).
  - 1f – Avoided customer energy use (kWh saved).
  - 7b – Increased use of cost-effective digital information and control technology to improve reliability, security and efficiency of the electric grid.
- vii. Schedule
  - 2.75 years.
- viii. EPIC Funds Encumbered
  - \$473,167.

- ix. EPIC Funds Spent
  - \$475,903.
- x. Partners
  - N/A.
- xi. Match Funding
  - N/A.
- xii. Match Funding Split
  - N/A.
- xiii. Funding Mechanism
  - N/A.
- xiv. Treatment of Intellectual Property
  - PG&E has no current patents or licensing agreements signed. Future Intellectual Property is to be determined.
- xv. Status Update
  - Project is in the Design/Engineering phase.
  - 4 use cases for gathering new data was developed.
  - Evaluating vendors and assessing their capabilities.
  - Received and reviewing SOW proposals for evaluation.

**Project #20 – Demonstrate the Benefits of Providing the Competitive, Open Market with Automated Access to Customer-Authorized SmartMeter™ Data to Drive Innovation**

Formally notified CPUC on 10-31-13, project may be terminated as refined scope does not appear to meet safety, reliability and affordability guiding principles for priority R&D.

## Project #21 – Automatic Identification of Distributed Photovoltaic Resources

- i. Investment Plan Period
  - 1st Triennial (2012-2014).
- ii. Assignment to Value Chain
  - Distribution/Demand-Side Management.
- iii. Objective
  - This project is to validate and attempt to integrate a software platform to identify Unauthorized Interconnection (UI) leveraging SmartMeter™ data collected. The funding from EPIC will focus solely on integration and piloting of a software solution with PG&E's billing and interconnection database.
- iv. Scope
  - Develop partnerships to develop or pilot software.
  - Develop integration and communication platform for auto-ID of UIs.
  - Successfully demonstrate ability to automatically integrate software with billing and interconnection.
- v. Deliverables
  - Successful integration of software with PG&E's Advanced Billing System (ABS).
  - Successful tracking of all UIs identified.
  - Successful tracking of communication and conversion of UIs to interconnection.
- vi. Metrics
  - 5d – Public safety improvement and hazard exposure reduction.
  - 5f – Reduced flicker and other power quality differences.
  - 5c – Forecast accuracy improvement.
- vii. Schedule
  - 3 years.
- viii. EPIC Funds Encumbered
  - \$110,355.
- ix. EPIC Funds Spent
  - \$75,284.
- x. Partners
  - N/A.
- xi. Match Funding
  - N/A.
- xii. Match Funding Split
  - N/A.

xiii. Funding Mechanism

- N/A.

xiv. Treatment of Intellectual Property

- PG&E has no current patents or licensing agreements signed. Future Intellectual Property is to be determined.

xv. Status Update

- Project is in the Planning phase.
- Developed test algorithm to identify interconnections.
- Designed and finalized phone survey for engaging customers.
- Survey of ~700 customers underway.

## Project #22 – Electric Vehicle Submetering

- i. Investment Plan Period
  - 1st Triennial (2012-2014).
- ii. Assignment to Value Chain
  - Grid Operations/Market Design/Distribution/Demand-Side Management.
- iii. Objective
  - EV submetering pilot to test subtractive metering process and Electric Vehicle Service Providers (EVSP) business models.
- iv. Scope
  - EV submetering pilot will entail EVSPs delivering submeter data to IOU for subtraction from customer's primary meter to create an EV and a house bill. Customer will be responsible for both bills. In Phase 2, EVSP will be responsible for bill.
- v. Deliverables
  - Process to receive EVSP submetered data.
  - Process to subtract EV data from primary meter to create two bills.
  - Inclusion of EV portion of bill on customer's monthly bill.
  - Obtain 3rd party evaluator for both phases of pilot through an RFP.
  - Incentive payments to EV Meter Data Management Agents.
- vi. Metrics
  - 4a – GHG emissions reductions (MMTCO<sub>2e</sub>).
  - 1h – Customer bill savings (megawatt hour (MWh) saved).
- vii. Schedule
  - 4.17 years.
- viii. EPIC Funds Encumbered
  - \$933,800.
- ix. EPIC Funds Spent
  - \$671,506.
- x. Partners
  - TBD.
- xi. Match Funding
  - N/A.
- xii. Match Funding Split
  - N/A.
- xiii. Funding Mechanism
  - N/A.

xiv. Treatment of Intellectual Property

- TBD.

xv. Status Update

- Project is in the Build/Test phase.
- Lack of enrollments is mostly due to lack of Underwriters Laboratories (UL) certification by hardware providers, however the team has customers in waiting upon safety approval. Customer allotment is expected to be 125.

## Project #23 – Photovoltaic Submetering

- i. Investment Plan Period
  - 1st Triennial (2012-2014).
- ii. Assignment to Value Chain
  - Grid Operations/Market Design/Distribution/Demand-Side Management.
- iii. Objective
  - To obtain additional un-netted photovoltaic (PV) data in an attempt to support customer experience and provide additional information to customers.
- iv. Scope
  - Submeter chip to be installed at output of customer owned PV. Data will be used to help customers understand Net Energy Metering (NEM) bills. Additionally, current PV providers with NGOM may submit their data to PG&E for presentation on My Energy.
- v. Deliverables
  - Obtain third party through RFPs to install submeter chips.
  - Develop communication protocol between submeters and PG&E billing system.
  - Develop protocol for PV providers to send Net Generation Output Meter (NGOM) information to PG&E.
  - Display on My Energy.
- vi. Metrics
  - 5c – Forecast accuracy improvements.
  - 7b – Increased use of cost-effective digital information and control technology to improve reliability, security and efficiency of the electric grid (PU Code §8360).
- vii. Schedule
  - 3 years.
- viii. EPIC Funds Encumbered
  - \$170,000.
- ix. EPIC Funds Spent
  - \$162,443.
- x. Partners
  - N/A.
- xi. Match Funding
  - N/A.
- xii. Match Funding Split
  - N/A.
- xiii. Funding Mechanism
  - N/A.

xiv. Treatment of Intellectual Property

- PG&E has no current patents or licensing agreements signed. Future Intellectual Property is to be determined.

xv. Status Update

- Project is in the Initiation phase.
- Team is targeting metering pilot Q3 2015 launch with discussions for a solution provider on-going.
- Project team is progressing on data exchange discussions with a solar developer.

## Project #24 – Demand-Side Management for Transmission and Distribution Cost Reduction

- i. Investment Plan Period
  - 1st Triennial (2012-2014).
- ii. Assignment to Value Chain
  - Grid Operations/Market Design/Transmission/Distribution/Demand-Side Management.
- iii. Objective
  - Assess how to best utilize DSM resources to create a “surgical” customer- and location-specific approach to assist with distribution capacity constraints.
- iv. Scope
  - Acquire data and develop the tools, methodology and framework to target, value, acquire and make use of high impact customer load reductions at the distribution feeder level.
- v. Deliverables
  - Deployment of data logging devices on a scientific sample of existing SmartAC™ Cycling customers to enable load impact analysis at the feeder level.
  - An infrastructure to make real time data available on feeder level load impacts to distribution operations.
  - A report describing a case study methodology of targeting and valuing customer side peak load reductions at the feeder level. Final deliverables subject to Phase I planning outcomes.
- vi. Metrics
  - 4a – GHG emissions reductions (MMTCO<sub>2</sub>e).
  - 1h – Customer bill savings (MWh saved).
  - 7b – Increased use of cost-effective digital information and control technology to improve reliability, security and efficiency of the electric grid (PUC §8360).
- vii. Schedule
  - 2 years.
- viii. EPIC Funds Encumbered
  - \$1,283,826.
- ix. EPIC Funds Spent
  - \$899,612.
- x. Partners
  - N/A.
- xi. Match Funding
  - N/A.
- xii. Match Funding Split
  - N/A.

xiii. Funding Mechanism

- N/A.

xiv. Treatment of Intellectual Property

- PG&E has no current patents or licensing agreements signed. Future Intellectual Property is to be determined.

xv. Status Update

- Project is in the Build/Test phase.
- Project team has deployed ~150 data loggers on AC systems with additional ~150 remaining in Q1 2015.
- Setup of external data logging service complete with ability to access data remotely.

## Project #25 – Direct Current Fast Charging Mapping

- i. Investment Plan Period
  - 1st Triennial (2012-2014).
- ii. Assignment to Value Chain
  - Distribution/Demand-Side Management.
- iii. Objective
  - Attempt to develop, pilot, and validate approaches that help determine the optimal location of direct current (DC) fast chargers based on traffic patterns and distribution grid infrastructure.
- iv. Scope
  - Acquire travel pattern data and grid infrastructure capability data in an attempt to identify low-cost, high utilization areas in which to integrate DC fast chargers into PG&E's distribution system.
- v. Deliverables
  - Process to identify optimal DC fast charging sites.
  - A map that presents the locations of optimal DC fast charging sites in a meaningful manner to customers.
- vi. Metrics
  - 3a – Maintain/Reduce capital costs.
  - 3d – Number of operations of various existing equipment types before and after adoption of a new smart grid component, as an indicator of possible equipment life extensions from reduced wear and tear.
  - 7l – Identification and lowering of unreasonable or unnecessary barriers to adoption of smart grid technologies, practices, and services.
- vii. Schedule
  - 2 years.
- viii. EPIC Funds Encumbered
  - None.
- ix. EPIC Funds Spent
  - None.
- x. Partners
  - N/A.
- xi. Match Funding
  - N/A.
- xii. Match Funding Split
  - N/A.
- xiii. Funding Mechanism
  - N/A.

xiv. Treatment of Intellectual Property

- PG&E has no current patents or licensing agreements signed. Future Intellectual Property is to be determined.

xv. Status Update

- Project is in the Initiation/Planning phase.

## **Project #26 – Pilot Measurement and Telemetry Strategies and Technologies That Enable the Cost-Effective Integration of Mass Market Demand Response Resources into the California Independent System Operator Corporation Wholesale Market**

- i. Investment Plan Period
  - 1st Triennial (2012-2014).
- ii. Assignment to Value Chain
  - Grid Operations/Market Design/Demand-Side Management.
- iii. Objective
  - Attempt to develop, pilot and validate approaches and technologies that enable the cost-effective integration (specifically, the measurement and telemetry) of mass market Demand Response (DR) resources into the CAISO wholesale market. While other DR projects focus on integration of DR resources into various utility and future ISO operational needs, this project intends to test alternative telemetry solutions and technologies to satisfy CAISO operational visibility requirements.
- iv. Scope
  - TBD.
- v. Deliverables
  - TBD.
- vi. Metrics
  - TBD.
- vii. Schedule
  - TBD.
- viii. EPIC Funds Encumbered
  - None.
- ix. EPIC Funds Spent
  - None.
- x. Partners
  - N/A.
- xi. Match Funding
  - N/A.
- xii. Match Funding Split
  - N/A.
- xiii. Funding Mechanism
  - N/A.
- xiv. Treatment of Intellectual Property
  - PG&E has no current patents or licensing agreements signed. Future Intellectual Property is to be determined.

xv. Status Update

- Project is currently on-hold.

## 5. Conclusion

### a. Key Results – PG&E’s 2014 EPIC Program

Through the course of 2014, PG&E’s EPIC program made significant progress and achieved noteworthy successes on many of the projects. Of the 17 live projects: five are in the build/test phase; five are in the design/engineering phase; five are in the planning phase; and two are in the staging phase. Since the launch of the program, PG&E has established a Program Management function to provide oversight of the EPIC program. For calendar year 2014, PG&E spent approximately \$9,608,000, of which \$8,780,000 was spent on TD&D and \$828,000 was spent on program administration. In addition to oversight, the Program Management provides:

- Communications with interested vendors and suppliers through channels such as referrals and industry events (e.g., Grid Edge Executive Council and Silicon Valley Leadership Group).
- Coordination with the other IOUs and CEC through weekly administrator calls.
- Other EPIC program support such as providing comments to select CEC Program Opportunity Notices (PONs).

As of February 28, 2015, PG&E has issued a total of four technology related RFPs through EPIC. With the EPIC program focus on TD&D, PG&E will continue to focus its future reporting of solicitations on technology related contracts and will not be reporting the procurements for various general planning and support roles. Additionally, PG&E expects the EPIC program to continue through 2020 and awaits the Commission’s decision on its Second Triennial Plan, which PG&E filed on May 1, 2014.

### b. Next Steps for EPIC Investment Plan

PG&E, in conjunction with the other IOU administrators and the CEC, hosted stakeholder webinars. One webinar took place February 21, 2014 and focused on the planning for the Second Triennial. Two additional webinars were held on March 17th and March 21st, 2014 with a continued focus on the Second Triennial plan.

In 2015, PG&E will work with the other IOUs and CEC to host two additional public workshops; also, a CEC-hosted workshop aimed at gathering feedback on the implementation of the First Triennial plan is scheduled for February 2015. PG&E will also continue to promote the EPIC program through participation in various forums such as industry events and taking vendor and supplier referrals.

Additionally, PG&E is forecasting multiple pilots to complete in 2015 and eagerly anticipates sharing its findings via the pilot final reports.

### c. Issues That May Have Major Impact on Progress in Projects

Inherent to the RD&D nature of the EPIC program, as projects progress through the phases, it is likely some projects will not be executed exactly as planned. Projects may have their scope/approach refined and some will be stopped or redirected when no longer seen to be in the best interest of customers. PG&E is mitigating some of this risk by managing the EPIC projects and phases with a stage-gated approach, providing an off-ramp for projects if they are deemed to be no longer efficient uses of funds. Some potential reasons that projects may not be successful include: changes in the market place have made the project obsolete (or relatively less attractive); a different technology has emerged that could produce the desired results at a lower cost so the original project is no longer a compelling use of funds; or, as is typical with R&D projects in other industries, the technology may prove to not yet be ready for commercialization. Furthermore, while the more obvious goal of technology demonstration is to help advance the pre-commercial technologies to market, there are related goals, which include determining the clean technology areas that are feasible for additional study and investment versus the areas that should no longer be pursued. In some cases, success may be defined by determining a conclusion about

a lack of commercial scalability for the technology prior to spending the entire amount for which the project was budgeted.

**APPENDIX A**  
**ELECTRIC PROGRAM INVESTMENT CHARGE**  
**2014 ANNUAL REPORT**