

December 21, 2012

Advice 4077-E-A

(Pacific Gas and Electric Company ID U 39 E)

Public Utilities Commission of the State of California

Subject: Reply to Energy Divisions Request to Pacific Gas and Electric Company Regarding Advice Letter 4077-E, Demand Response 2012-2014 Pilot Projects in Compliance with Decision 12-04-045

Purpose

Pacific Gas and Electric Company (PG&E) hereby submits this supplemental filing to PG&E's Advice Letter 4077-E that adds additional tasks to PG&E's Plug-in Electric Vehicle (EV) Pilot at the request of the California Public Utilities Commission's Energy Division and requests authorization to extend the timeline and budgets of all of the pilots: the Intermittent Renewable Resource Management (IRM2) Pilot, the Transmission and Distribution (T&D) Pilot, and the EV Pilot, described in Advice Letter 4077-E to the end of 2015. This supplement replaces Advice Letter 4077-E in its entirety.

Background

On June 29, 2012, PG&E filed Advice Letter (AL) 4077-E that included a plan for its IRM2, T&D, and EV pilots in compliance with Decision (D.) 12-04-045. PG&E requested that the California Public Utilities Commission (CPUC or Commission) approve the detailed plan included in AL 4077-E.

On July 27, 2012, the Commission's Energy Division (ED) suspended AL 4077-E for 120 days.

On November 5, 2012, the ED submitted a data request to PG&E requesting additional information on PG&E's EV pilot plan and whether PG&E can incorporate EV second life batteries as part of this pilot.

On November 20, 2012, AL 4077-E was suspended again for 45 days.

On November 28, 2012, PG&E responded to ED's data request for a plan to include EV second life batteries in the proposed EV pilot.

On December 11, 2012, ED requested PG&E to file a supplement to AL 4077-E to include the EV second life battery plan.

Given the timeframe in D.12-04-045 allowing the pilots to be for 3 years, 2012 through 2014, a year has passed without approval of PG&E's pilots, and it is possible that the original goals of the pilots cannot be accomplished without an extension of the pilots' end dates.

Supplemental Changes to IRM2, T&D, and EV Pilots

In this supplemental filing, PG&E requests that it be allowed to extend the pilot timelines and budgets into 2015 to allow the original scope of work proposed to be achieved in a reasonable manner. PG&E has attached the updated pilot plans to reflect the revised timeline request.

In addition to the use cases where EV batteries inside the vehicle provide demand response, PG&E also supplies additional plans regarding how the EV Pilot's scope will include the use case of providing demand response from EV batteries outside of the vehicle (EV second life batteries). This addition is consistent with the original focus of the EV Pilot and includes most of the potential value from the grid services that EVs can provide to the utility.

PG&E has two primary goals for an EV second life battery pilot: (1) evaluate the benefits and costs of utilizing EV batteries on the electric grid, and (2) evaluate different marketing, education, and incentive mechanisms to obtain demand response from EV second life batteries. PG&E currently envisions that a competitive solicitation be conducted to third-parties to engage customers and secure, operate, and maintain second-life EV batteries for the purposes of providing grid services. This will enable PG&E to evaluate different customer engagement models and technical integration challenges with different vendors and customer groups. More detailed descriptions of these plans are included in the answers below.

PG&E believes that the EV Pilot is reasonable and should be approved.

EV Pilot

PG&E's original EV pilot objectives are as follows:

- *Requirements Needed To Obtain Utility Benefits:* Determine the requirements needed for PG&E to incorporate DR from Plug-in Electric Vehicles (PEV) into its operational and planning groups and the associated benefits that would accrue to DR PEV providers.
- *Communication Capabilities:* Evaluate the technical capability to provide timely two way communication, such as price and Direct Load Control messages, to the

Electric Vehicle Supply Equipment (EVSE) and PEVs over the advanced metering infrastructure (AMI) network and/or broadband network using national standards.

- *DR Response Characteristics*: Evaluate how quickly and in what manner EVSEs and PEVs respond to signals to alter charging patterns based on the PEV battery's state of charge and user profiles, both on an individual basis and in aggregate.
- *Customer Response*: Evaluate customers' charging patterns, preferences, behavior, and reactions to utility interaction with PEV charging.

In addition, PG&E will add the following objectives ED had for EV second life batteries based on ED's data request:

- *Second Life Customer*: Evaluate and engage various automaker OEM and EV vendor channels through a competitive solicitation to explore what the best mechanism is to encourage demand response adoption by EV customers.
- *Second Life Battery Integration*: Evaluate the costs and benefits of utilizing EV second life batteries to provide various grid services.

PG&E has attached the November 5, 2012, ED data request and the corresponding PG&E data response, submitted on November 28, 2012.

Conclusion

PG&E requests that the Commission expeditiously approve Advice Letter 4077-E-A. As detailed above, PG&E can incorporate an EV second life battery demonstration that is consistent with its DR focus.

Protests

Anyone wishing to protest this filing may do so by letter sent via U.S. mail, facsimile or E-mail, no later than **January 10, 2013**, which is 20 days after the date of this filing. Any new protest shall be limited to the substance of the supplement or additional information (General Order 96-B, Rule 7.5.1). Protests must be submitted to:

CPUC Energy Division
ED Tariff Unit
505 Van Ness Avenue, 4th Floor
San Francisco, California 94102

Facsimile: (415) 703-2200
E-mail: EDTariffUnit@cpuc.ca.gov

Copies of protests also should be mailed to the attention of the Director, Energy Division, Room 4004, at the address shown above.

The protest shall also be sent to PG&E either via E-mail or U.S. mail (and by facsimile, if possible) at the address shown below on the same date it is mailed or delivered to the Commission:

Brian K. Cherry
Vice President, Regulatory Relations
Pacific Gas and Electric Company
77 Beale Street, Mail Code B10C
P.O. Box 770000
San Francisco, California 94177

Facsimile: (415) 973-7226
E-mail: PGETariffs@pge.com

Any person (including individuals, groups, or organizations) may protest or respond to an advice letter (General Order 96-B, Rule 7.4). The protest shall contain the following information: specification of the advice letter protested; grounds for the protest; supporting factual information or legal argument; name, telephone number, postal address, and (where appropriate) e-mail address of the protestant; and statement that the protest was sent to the utility no later than the day on which the protest was submitted to the reviewing Industry Division (General Order 96-B, Rule 3.11).

Effective Date

PG&E requests that the Commission expeditiously approve this advice filing.

Notice

In accordance with General Order 96-B, Rule 4, a copy of this advice letter is being sent electronically and via U.S. mail to parties shown on the attached list and the parties on the service list for A.11-03-001. Address changes to the General Order 96-B service list should be directed to PG&E at email address PGETariffs@pge.com. For changes to any other service list, please contact the Commission's Process Office at (415) 703-2021 or at Process_Office@cpuc.ca.gov. Send all electronic approvals to PGETariffs@pge.com. Advice letter filings can also be accessed electronically at: <http://www.pge.com/tariffs>.



Vice President, Regulatory Relations

Attachments:

Attachment 1: Commercial and Industrial Based Intermittent Resource Management
Pilot 2 (IRM2)

Attachment 2: Transmission and Distribution (T&D) Pilot

Attachment 3: Plug-in Electric Vehicle (PEV) Pilot

Attachment 4: November 5, 2012 – EV Pilot Data Request and PG&E Response

cc: Service List A.11-03-001
Karen Clopton, Chief ALJ
Noel Crisostomo, ED
Christopher Danforth, DRA
Sudheer Gokhale, DRA
Farzad Ghazzagh, DRA
Adam Langton, ED
Joanne Leung, ED
Frank Lindh, General Counsel
Edward Randolph, Director, ED
Nancy Ryan, Deputy Executive Director
Lisa-Marie Salvacion, General Counsel
Andrew Schwartz, ED
Christopher Ungson, DRA

CALIFORNIA PUBLIC UTILITIES COMMISSION

ADVICE LETTER FILING SUMMARY ENERGY UTILITY

MUST BE COMPLETED BY UTILITY (Attach additional pages as needed)

Company name/CPUC Utility No. **Pacific Gas and Electric Company (ID U39 E)**

Utility type:

ELC GAS
 PLC HEAT WATER

Contact Person: **Shirley Wong**

Phone #: **(415) 972-5505**

E-mail: **slwb@pge.com**

EXPLANATION OF UTILITY TYPE

ELC = Electric GAS = Gas
PLC = Pipeline HEAT = Heat WATER = Water

(Date Filed/ Received Stamp by CPUC)

Advice Letter (AL) #: **4077-E-A**

Tier: **2**

Subject of AL: **Reply to Energy Divisions Request to Pacific Gas and Electric Company Regarding Advice Letter 4077-E, Demand Response 2012-2014 Pilot Projects in Compliance with Decision 12-04-045**

Keywords (choose from CPUC listing): **Compliance**

AL filing type: Monthly Quarterly Annual One-Time Other _____

If AL filed in compliance with a Commission order, indicate relevant Decision/Resolution #: **D.12-04-045**

Does AL replace a withdrawn or rejected AL? If so, identify the prior AL: **No**

Summarize differences between the AL and the prior withdrawn or rejected AL:

Is AL requesting confidential treatment? If so, what information is the utility seeking confidential treatment for: **No**

Confidential information will be made available to those who have executed a nondisclosure agreement: **N/A**

Name(s) and contact information of the person(s) who will provide the nondisclosure agreement and access to the confidential information: _____

Resolution Required? Yes No

Requested effective date: **As expeditiously as possible.**

No. of tariff sheets: **N/A**

Estimated system annual revenue effect (%): **N/A**

Estimated system average rate effect (%): **N/A**

When rates are affected by AL, include attachment in AL showing average rate effects on customer classes (residential, small commercial, large C/I, agricultural, lighting).

Tariff schedules affected:

Service affected and changes proposed:

Protests, dispositions, and all other correspondence regarding this AL are due no later than 20 days after the date of this filing, unless otherwise authorized by the Commission, and shall be sent to:

CPUC, Energy Division
ED Tariff Unit
505 Van Ness Ave., 4th Floor
San Francisco, CA 94102
EDTariffUnit@cpuc.ca.gov

Pacific Gas and Electric Company
Attn: Brian K. Cherry, Vice President, Regulatory Relations
77 Beale Street, Mail Code B10C
P.O. Box 770000
San Francisco, CA 94177
E-mail: PGETariffs@pge.com

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Attachment 1

Commercial and Industrial Based
Intermittent Resource Management Pilot 2 (IRM2)

Commercial and Industrial Based Intermittent Resource Management Pilot 2 (IRM2)

Problem Statement

A specific statement of the concern, gap, or problem that the pilot seeks to address and the likelihood that the issue can be addressed cost-effectively through utility programs

The California electricity grid is changing rapidly due to the 33% Renewable Portfolio Standard mandate, which is resulting in a dramatic influx of intermittent renewable resources. The intermittency of these renewable resources increases the difficulty of balancing supply and demand. It is expected that there will be increased need for flexible resources by the California Independent System Operator (CAISO) to manage the increased intermittency. Based on current studies by the CAISO, California may need roughly 4,600 MW¹ of additional flexible resources to manage the grid by 2020. Demand Response (DR) resources can potentially provide flexible resources to the CAISO, but a complete end-to-end demonstration of the use of DR resources must be conducted to validate processes, procedures, and systems of all parties.

PG&E believes that there is insufficient information to estimate the likelihood that utility programs will cost-effectively be able to provide the flexibility services that the CAISO requires. The purpose of the IRM2 pilot is to validate the requirements needed to provide these services and PG&E plans to examine the capabilities of third parties to provide these flexibility services.

How the pilot will address DR goal or strategy

Whether and how the pilot will address a DR goal or strategy

The 2009-2011 IRM pilot demonstrated some of the capabilities, processes, procedures, and systems needed to provide flexible DR resources to the CAISO. However, the 2009-2011 IRM pilot did not demonstrate all of the capabilities required by the CAISO of flexible DR resources, which will be assessed in the current IRM2 pilot. The IRM2 pilot is planned to address the remaining technical issues that were not addressed in the IRM pilot.

Objectives and goals for the pilot

Specific objectives and goals for the pilot

The key objective of the pilot is to help develop the processes, procedures, and systems required to have demand side resources provide flexibility services to the CAISO. This includes:

- *CAISO Model Development* – Development of the fundamentals for the models used by the CAISO to characterize demand-side resources, such as DR and batteries, for use in the CAISO's market and energy management systems;

¹ CAISO 2013 Flexible Capacity Procurement Requirement – March 2, 2012

<http://www.caiso.com/Documents/2013FlexibleCapacityProcurementRequirementProposalSupplement.pdf>

- *Visibility Development* – Development of the standard and methodologies used to provide visibility to the CAISO of the operation of demand-side resources;
- *Technology Evaluation and Validation* – Evaluation and validation of the technology types that must be deployed to enable demand-side resources to be a flexible resource for the CAISO; and
- *Extremely Short Term Demand Response Forecasts* – Development of accurate customer load control strategies and forecast of available load consumption or curtailment.

It is PG&E’s intent to have the IRM2 pilot assist in the design of any current or future DR program that PG&E decides to offer. The IRM2 pilot will also form the basis to allow third parties the ability to provide flexibility services that the CAISO requires.

Budget and timeframe

A clear budget and timeframe to complete the pilot and obtain results within a portfolio cycle. Pilots that are continuations of pilots from previous portfolios should clearly state how the continuation differs from the previous phase

Pilot is requesting \$2,458,336 million over the course of three year; 2013 – 2015.

(in millions)	2013	2014	2015
IRM2 Pilot	\$.458	\$1.250	\$.750

Budget	\$ 2,458,336.00
Program Administrator	\$ 300,000.00
Customer Care Services (Metering, billing, EDS, etc..)	\$ 150,000.00
Procurement (end to end - scheduling, bidding, etc...)	
Front (Scheduling - Bidding)	\$ 300,000.00
Back (Settlements)	\$ 300,000.00
Policy and Integrated Planning	\$ 108,336.00
Marketing	
Internal	\$ 75,000.00
Vendor	
Consultant + Research	\$ 225,000.00
System (Hosted Solution)	
Platform	\$ 150,000.00
Telemetry	\$ 150,000.00
Forecasting	\$ 100,000.00
Enabling Technologies (Equipment)	\$ 100,000.00
Incentives	\$ 500,000.00

Field Pilot

Id #	Task Name	Start	Finish
1	Develop Project Implementation Plan	February 2013	March 2013
2	Finalize technical scope, test approach, and processes; define the CAISO technical requirements and capabilities to support use cases.	April 2013	May 2013
3	Project kick off –specific services (regulation and flexible ramping services) and enabling technologies	June 2013	September 2013
4	Set up resources with proper equipment (telemetry and enabling technology)	September 2013	December 2013
5	Model resources in CAISO EMS	September 2013	January 2014
6	Set up CAISO agreement and file pilot exemption to FERC	August 2013	January 2014
7	Run and certify resources	January 2014	February 2014
8	Conduct and evaluate field testing – bid-settle	March 2014	September 2015
9	Gather customer feedback and customer behavior assessment.	October 2015	November 2015
10	Finalize data collection and post-evaluation assessment process. Develop report.	October 2015	December 2015
11	Publish findings	December 2015	December 2015

Standards and metrics

Information on relevant standards or metrics or a plan to develop a standard against which the pilot outcomes can be measured

PG&E will benchmark relevant programs by other utilities and program administrators on their efforts on flexible ramping and regulation services. PG&E will keep track of the following as it relates to this initiative:

- Customer satisfaction with the different types of DR used for different flexibility services
- Performance of DR resources versus expected response
- forecasted versus actual budgets
- enabling technologies evaluated and deployed
- load reduction, by interval-by hour
- number and duration of events

As the IRM2 pilot proceeds, new standards and metrics may be developed and the ones proposed herein may no longer be relevant. Any changes to the standards and metrics will be communicated with Energy Division as part of the quarterly meeting.

Methodologies to test the cost-effectiveness of the pilot

Where appropriate, propose methodologies to test the cost- effectiveness of the pilot

PG&E believes that evaluating the pilot’s cost-effectiveness is not appropriate at this time. One of the main goals of the IRM2 pilot is to determine the costs and benefits of having DR resources provide flexibility services to the CAISO. The IRM2 pilot will be developing the needed integration with the

CAISO processes, procedures, and systems and will be performing field tests with new equipment, much of this work will be new and PG&E expects that the results will not be indicative of a full program.

A cost-effectiveness analysis, after the pilot is completed, on the expected costs and benefits of a full program that offers these flexibility services would be meaningful to explore the necessary program attributes needed for future DR programs. PG&E intends to work with Energy Division and the DR Measurement and Evaluation Committee (DRMEC) on this potential program cost-effectiveness at the conclusion of the pilot.

Evaluation, Measurement and Verification plan

A proposed EM&V plan

PG&E will work with DRMEC to properly prepare and conduct a plan to evaluate the performance of some aspects of the IRM2 pilot. PG&E expects that the evaluation will include, but not be limited to, the following:

- An evaluation of any forecasting and baseline tools developed or used in the IRM2 pilot
- An evaluation of the impact and satisfaction of customers participating in the field test
- An evaluation of what type of loads that can meet flexible products/services
 - Study and further evaluation of the type of enabling technologies needed to facilitate load as a flexible resource
- An evaluation of an end to end communication and latency

Strategy to identify and disseminate best practices and lessons learned

A concrete strategy to identify and disseminate best practices and lessons learned from the pilot to all California utilities and to transfer those practices to resource programs, as well as a schedule and plan to expand the pilot to utility and hopefully statewide usage. Pilot results shall be reported at the public DRMEC spring or fall meeting on load impact or process evaluation results

PG&E will conduct quarterly meetings with the Energy Division throughout the pilot period. The meetings will include current work, budgets and foreseeable next steps to ensure parties are well informed.

At the conclusion of the field demonstration, PG&E will provide the Energy Division a report highlighting the lessons learned from this pilot. Any key lessons that can be extracted from this pilot will be used to enhance existing or new DR programs in the 2015 – 2017 DR Program & Budget Cycle.

This report will be published and be made publicly available on a designated public internet site by PG&E.

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Attachment 2

Transmission and Distribution (T&D) Pilot

Transmission and Distribution (T&D) Pilot

Problem Statement

A specific statement of the concern, gap, or problem that the pilot seeks to address and the likelihood that the issue can be addressed cost-effectively through utility programs

The Transmission & Distribution (T&D) Pilot is a study and demonstration that will provide significant new information for integrating demand response (DR) resources into the electric T&D organizations planning and operation systems and processes.

Currently, a limited amount of DR resources, such as the Base Interruptible Program (BIP) and the SmartAC program, are able to provide electric load relief when called upon during events to address a local or system wide emergency. However, these DR programs are called through manual procedures. Any responses from these resources are not transparent in real time operations and the ability to dispatch relies on manual processes instead of automation. While limited operational integration between DR and Transmission Operations has occurred, current and future T&D operational needs and processes must be understood to be able to construct DR resources that can be useful to these organizations and increase the value of existing and future DR resources.

How the pilot will address DR goal or strategy

Whether and how the pilot will address a DR goal or strategy

Increasing the value that new and existing DR resources can provide, and be compensated, for is critical to improving their cost-effectiveness, size, and usefulness. To unlock the value streams inherent in potential transmission and distribution improvement deferral, the developers of DR resources must understand the needs of T&D operators and planners and work to have DR resources incorporated into the transmission and distribution operations and plans.

This pilot will undertake a study and demonstration to explicitly develop a resource that can meet the needs of the T&D operators and planners under different scenarios and assist in unlocking potential value stream of DR resources.

Objectives and goals for the pilot

Specific objectives and goals for the pilot

The key objectives of the pilot would be to explore and demonstrate the feasibility and the viability of applying current and future DR resource capabilities to provide services to help the T&D organizations with ongoing planning and operations.

The study will identify the characteristics of the resources needed for the T&D organizations' operations and attempt to create and/or modify DR resources to fulfill these needs. Possible DR resources that may be able to meet these needs include SmartAC program and Large Commercial and Industrial Auto-DR enabled customers. Other possibilities include Home Area Network (HAN) customers and Plug-in Electric Vehicles (PEV) customers, which PG&E will investigate if those technology spaces become mature enough to be incorporated into this pilot.

PG&E is proposing to use a two-step method to execute the T&D Pilot. The first step will be to conduct a paper study in order to document the operational and planning needs of the T&D operations and planning organizations. Specifically, a focus will be on documenting the services these organizations provide and their associated values. This requires an examination of several key questions and tasks, including, but not limited to:

- Timing and duration of the need for services by T&D planning and operations for different types of equipment
- Analyze the T&D organizations' planning and operational processes to identify opportunities, challenges, and potential solutions for integrating DR resources

- Develop test plans for DR resource integration into the T&D organizations’ planning and operations processes
- Model the impact on T&D assets if large amounts of DR resources are utilized by T&D operations
- Develop forecasting methodology for extremely locational DR to deliver an accurate forecast of the quantity and speed of the DR resources to T&D operations
- Determine if DR resources can be a reliable resource to possibly defer or postpone T&D upgrades
- Document the aspects of an area that cause them to be categorized as constrained

The second step of the T&D Pilot would be based on the first step’s study findings and include field demonstrations. The following DR enabling technologies and resources may be investigated:

- Examination of PG&E’s existing enabling and retail programs, such as the SmartAC and AutoDR enabled customers
- Examination of electric vehicles and new residential mass market DR technologies. The T&D Pilot may also consider what, if any, integrated demand side resources beyond DR could provide the services required by T&D operations and planning

Budget and timeframe

A clear budget and timeframe to complete the pilot and obtain results within a portfolio cycle. Pilots that are continuations of pilots from previous portfolios should clearly state how the continuation differs from the previous phase

Pilot is requesting \$2,458,336 million over the course of three year; 2013 – 2015.

(in millions)	2013	2014	2015
T&D Pilot	\$.500	\$.980	\$.979

Budget	\$ 2,458,336.00
Program Administrator	\$ 300,000.00
Metering, billing, data pulling (SCADA+AMI), etc..	\$ 150,000.00
Transmission/Distribution Planning and Operators	\$ 300,000.00
Policy and Integrated Planning	\$ 133,336.00
Marketing	
Internal	\$ 75,000.00
External - Vendor	\$ 400,000.00
Technical Vendors	
Consultant + Research	\$ 400,000.00
System (Hosted Solution)	
Platform	\$ 100,000.00
Telemetry	\$ 75,000.00
Forecasting	\$ 50,000.00
Enabling Technologies (Equipment)	\$ 75,000.00
Incentives	\$ 400,000.00

Phase 1: Needs Assessment

Id #	Task Name	Start	Finish
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Id #	Task Name	Start	Finish
1	Develop phase 1 business and technical definition, project scope, timeline, test requirements prior to going into field; develop dependencies.	January 2013	February 2013
2	Develop and procure consultant to conduct phase 1 paper assessment	February 2013	April 2013
3	Interview various levels of Transmission and Distribution planners and operations.	April 2013	July 2013
4	Lay out all the findings and talk to Transmission and Distribution planners and operators to validate study & assessments	July 2013	August 2013
5	Finalize Needs Assessment Report	September 2013	November 2013

Phase 2: Field Demonstration

Id #	Task Name	Start	Finish
1	Based on the Phase 1 needs assessment study, work with both Transmission and Distribution to agree on a particular course of action to demonstrate the use of DR for operations – creation of use cases	December 2013	February 2014
2	Along with Transmission and Distribution, finalize technical scope, test approach and processes; define technical requirements to support use cases.	February 2014	March 2014
3	Conduct continuous customer recruitment based on selected and targeted areas for the demonstration – could use a third party model to demonstrate customer acquisition	November 2013	December 2014
4	Development of platforms and conduct field demonstration	January 2014	September 2015
5	Develop report	October 2015	December 2015
6	Publish findings	December 2015	December 2015

Standards and metrics

Information on relevant standards or metrics or a plan to develop a standard against which the pilot outcomes can be measured

PG&E will benchmark relevant programs by other utilities and program administrators on their efforts to integrate DR resources and T&D planning and operations. PG&E will keep track of the following as it relates to this initiative:

- forecasted versus actual budgets
- enabling technologies evaluated and deployed
- program design iterations & triggers
- load reduction, by hour
- number and duration of test events

As the pilot progresses, new standards and metrics may be developed and the proposed metrics may not be relevant. Changes will be communicated with Energy Division as part of the quarterly meeting.

Methodologies to test the cost-effectiveness of the pilot

Where appropriate, propose methodologies to test the cost-effectiveness of the pilot

A methodology to test the cost-effectiveness of this pilot is premature at this point. PG&E fully intends to engage and work with the Energy Division, Demand Response Measurement Evaluation Council (DRMEC), Lawrence Berkeley National Laboratory (LBNL) and any other relevant parties to develop the proper criteria to assess the benefits and costs associated with this pilot.

Evaluation, Measurement and Verification plan

A proposed EM&V plan

PG&E will work with DRMEC to properly prepare and implement a plan to evaluate the T&D Pilot. The base evaluation will identify and include, but not limited to, the following:

- Evaluate SmartMeter data from each of the customers that participates in the field demonstration and assess the load reduction. Data will also be compared against any available SCADA data and/or other data sets to quantify the load reduction
- Evaluation of the accuracy of any forecasting tools developed and used

Strategy to identify and disseminate best practices and lessons learned

A concrete strategy to identify and disseminate best practices and lessons learned from the pilot to all California utilities and to transfer those practices to resource programs, as well as a schedule and plan to expand the pilot to utility and hopefully statewide usage. Pilot results shall be reported at the public DRMEC spring or fall meeting on load impact or process evaluation results

PG&E will conduct quarterly meetings with the Energy Division throughout the pilot period. The meetings will include current work, budgets, and foreseeable next steps to ensure parties are well informed.

At the conclusion of Phase 2, PG&E will provide the Energy Division a report highlighting the lessons learned from this pilot. Any key lessons that can be extracted from this pilot will be used to enhance existing or new DR programs in the 2015 – 2017 DR Program & Budget Cycle.

This report will be published and be made publicly available on a designated public internet site by PG&E.

Advice 4077-E-A
December 21, 2012

Attachment 3

Plug-in Electric Vehicle (PEV) Pilot

Plug-in Electric Vehicle (PEV) Pilot

Problem Statement

A specific statement of the concern, gap, or problem that the pilot seeks to address and the likelihood that the issue can be addressed cost-effectively through utility programs

PEVs can theoretically provide significant amounts of high quality DR to the electricity grid, both at an extremely local (distribution) level and at the California Independent System Operator (CAISO) level. However, at this time, PG&E and the other Investor Owned Utilities (IOUs) do not have a plug-in electric vehicle (PEV) demand response (DR) program. This is due to the unique nature of PEVs, as they are local significant sources of load and potential demand response, but also mobile in nature.

It is currently unknown whether utility programs will be able to offer a cost-effective DR program for PEVs. However, to fully harness the value of PEVs for customers and ratepayers, PG&E will be central in the value creation, as the DR resources that any PEV DR provider would offer must be integrated in the planning and operations of PG&E.

How the pilot will address DR goal or strategy

Whether and how the pilot will address a DR goal or strategy

PG&E intends for the 2012-2014 PEV pilot work to concentrate on evaluating the specific requirements for PEVs and how their unique attributes can be incorporated in both CAISO and distribution level operations and planning. This would pave the way to allow any PEV DR provider to offer valuable services to PG&E's planning and operations groups.

PG&E also intends to study and assess cases of providing demand response from EV batteries outside of the vehicle (secondary use of EV batteries). Second life EV batteries aligns with the Governor's ZEV Action Plan and will help PG&E understand the life cycle of the technology and the relationship to customer acceptance.

Objectives and goals for the pilot

Specific objectives and goals for the pilot

The 2012-2014 PEV pilot will concentrate on determining:

- *Requirements Needed To Obtain Utility Benefits:* Determine the requirements needed for PG&E to incorporate DR from PEVs into its operational and planning groups and the associated benefits that would accrue to DR PEV providers.
- *Communication Capabilities:* Evaluate the technical capability to provide timely two way communication, such as price and Direct Load Control messages, to the Electric Vehicle Supply Equipment (EVSE) and PEVs over the advanced metering infrastructure (AMI) network and/or broadband network using national standards
- *DR Response Characteristics:* Evaluate how quickly and in what manner EVSEs and PEVs respond to signals to alter charging patterns based on the PEV battery's state of charge and user profiles, both on an individual basis and in aggregate.
- *Customer Response:* Evaluate customers' charging patterns, preferences, behavior, and reactions to utility interaction with PEV charging.

- *Second Life Customer*: Evaluate and engage various automaker OEM and EV vendor channels to explore what the best mechanism is to encourage demand response adoption by EV customers is.
- *Second Life Battery Integration*: Evaluate the costs and benefits of utilizing second life EV batteries to provide various grid services.

Budget and timeframe

A clear budget and timeframe to complete the pilot and obtain results within a portfolio cycle. Pilots that are continuations of pilots from previous portfolios should clearly state how the continuation differs from the previous phase

The 2009-2011 PG&E PEV pilot authorized by the California Public Utilities Commission (Commission) in D.09-08-027 allowed PG&E to perform early stage proof of concept testing for: (1) Smart Charging over the existing advanced meter infrastructure (AMI) network, (2) basic communication signals to Electric Vehicle Supply Equipment (EVSE); and (3) identification of the factors that will hinder the implementation of a charging program for residential customers.

In contrast, the 2012-2014 PG&E PEV pilot is concentrated on proving the value streams that can be gained through the incorporation of DR from PEVs in PG&E's planning and operations and the requirements the DR PEV providers need to be able to meet to realize these benefits.

Pilot is requesting \$3 million over the course of the next 3 years; 2013 - 2015.

PG&E	Justification	Budgeted Expense
<i>Project Management</i>	For 1 full time employee (FTE) to manage the EV pilot.	\$225,000
<i>Transmission & Distribution Planning and Operations</i>	For 0.75 FTE from transmission and distribution planning and operations to participate in the EV pilot and provide the expertise needed.	\$150,000
<i>Energy Procurement</i>	For 0.3 FTE from energy procurement to bid the EVs into the CAISO market.	\$60,000
<i>Policy and Integrated Planning</i>	For 0.3 FTE to support the regulatory functions required for the EV pilot.	\$90,000
<i>Marketing & Incentives</i>	For PG&E to enroll up to 100 customers into the EV pilot.	\$600,000
<i>Customer Care Services Operations</i>	For PG&E to install the required revenue quality metering, perform the manual billing and metering processes required for any settlements on this pilot,	\$500,000

Vendor or PG&E		
<i>Telemetry and Forecasting Service</i>	For PG&E to be able to provide real-time visibility of the EV charging to the CAISO and distribution operations.	\$150,000
<i>Enabling Technologies</i>	Allocated to install EV networked enabled smart chargers, if needed.	\$200,000
<i>Customer Engagement Option Provisioning</i>	For PG&E or partners to test and develop different financial and incentive structures to evaluate customer enrollment behavior.	\$100,000
<i>IT Development</i>	Allocated to allow vendors to develop new functionality as required to support the dynamic aggregations and new control strategies that PG&E will test to support both the local distribution grid and the CAISO market and for PG&E to build some of the basic functionality to interface with vendors providing the grid services.	\$600,000
<i>Battery Management and Integration Services</i>	Allocated to the expenses required to maintain and operate second life batteries and any battery integration challenges if more than one battery type is used.	\$150,000
<i>Customer Research</i>	Allocated to allow studies of customer response to different control strategies and payment options for providing different grid services.	\$173,000

Phase 1: Evaluation and Selection of Third Parties to Meet Objectives of EV Pilot

Id #	Task Name	Start	Finish
1	Develop operating requirements for third parties to provide grid services.	January 2013	February 2013
2	Develop third party selection criteria to meet objectives of the EV Pilot	February 2013	March 2013
3	Perform an evaluation of the technical and operational capabilities of third parties to be able to complete the	April 2013	June 2013

Id #	Task Name	Start	Finish
	objectives of the pilot.		
4	Enter into contracts with third parties, resulting from a competitive solicitation, to provide DR and grid services from vehicle batteries during and after the time that the battery is in the vehicle, in order to meet objectives of the EV pilot. The contacts will also include, but not be limited to: <ul style="list-style-type: none"> • Specific performance requirements for the third party • Agreement on the communication protocol for the demand response signals to be used • Agreement on the data to be gathered and an assessment process. • Agreement on the customer engagement method • Agreement on the size of the resource to be provided 	July 2013	October 2013

Phase 2: Field Demonstration

Id #	Task Name	Start	Finish
1	Perform communication testing for demand response signals	November 2013	December 2013
2	Recruit, qualify, and set-up customers and second life batteries to engage in EV pilot.	January 2013	December 2014
3	Conduct pilot and test use cases.	March 2013	June 2015
4	Gather customer feedback and customer behavior assessment.	June 2013	June 2015
5	Assess charging capabilities and IT requirements to scale up to a mass-market program using both retail and commercial process.	June 2015	August 2015
11	Evaluate concept and future viability of program.	June 2015	August 2015
12	Develop report.	September 2015	December 2015
13	Publish findings.	December 2015	December 2015

Standards and metrics

Information on relevant standards or metrics or a plan to develop a standard against which the pilot outcomes can be measured

PG&E will benchmark relevant programs by other utilities and program administrators on their efforts to integrate and value PEVs into their planning and operations planning. PG&E will keep track of the following as it relates to this initiative:

- Customer satisfaction with the different types of PEV DR strategies used
- Performance of PEV DR resources versus expected response
- Forecasted versus actual budgets
- Enabling technologies evaluated and deployed
- Load response and speed of response, by interval-by hour

As the pilot progresses, new standards and metrics may be developed and the proposed metrics may not be relevant. Changes will be communicated with Energy Division as part of the quarterly meeting.

Methodologies to test the cost-effectiveness of the pilot

Where appropriate, propose methodologies to test the cost- effectiveness of the pilot

A methodology to test the cost-effectiveness of this pilot is premature at this point. PG&E fully intends to engage and work with the Energy Division, Demand Response Measurement Evaluation Council (DRMEC), Lawrence Berkeley National Laboratory (LBNL) and any other relevant parties to develop the proper criteria to assess the benefits and costs associated with this pilot.

Evaluation, Measurement and Verification plan

A proposed EM&V plan

PG&E will work with DRMEC to properly prepare and implement a plan to evaluate the PEV Pilot. The base evaluation will identify and include, but not limited to, the following:

- A thorough evaluation of customer impact and satisfaction must be undertaken to evaluate future programs
- Evaluate SmartMeter data from each of the customers that participates in the field demonstration and assess the load reduction. Data will also be compared against any available SCADA data and/or other data sets to quantify the load reduction provided by the PEV
- Evaluation of the accuracy of any forecasting tools developed and used to assist on the Distribution Operation side
- Test and analyze various communications and their latencies
- Any emerging technologies (ET) used for this PEV Pilot will be coordinated alongside PG&E DR's ET group

Strategy to identify and disseminate best practices and lessons learned

A concrete strategy to identify and disseminate best practices and lessons learned from the pilot to all California utilities and to transfer those practices to resource programs, as well as a schedule and plan to expand the pilot to utility and hopefully statewide usage. Pilot results shall be reported at the public DRMEC spring or fall meeting on load impact or process evaluation results

PG&E will conduct quarterly meetings with the Energy Division throughout the pilot period. The meetings will include current work, budgets, and foreseeable next steps to ensure parties are well informed.

At the conclusion of Phase 2, PG&E will provide the Energy Division a report highlighting the lessons learned from this pilot. Any key lessons that can be extracted from this pilot will be used to enhance existing or new DR programs in the 2015 – 2017 DR Program and Budget Application.

This report will be published and be made publicly available on a designated public internet site by PG&E.

Advice 4077-E-A
December 21, 2012

Attachment 4

November 5, 2012 – EV Pilot Data Request and PG&E Response

November 5, 2012 – EV Pilot Data Request and PG&E Response

Q1. *Please indicate the goals of your battery financing DR pilot project?*

A1. As discussed previously, the EV pilot is not specific to battery financing. PG&E's primary focus for the EV pilot is on the utilization of EVs and the engagement with the EV owners to provide useful demand response resources. However, it is consistent with this focus to include in the EV pilot a demonstration of what the potential benefits EV batteries could provide to the utility and how best to encourage consumer acceptance to provide the utility with EV batteries when they are past the stage of being "automotive grade."

Q2. *How will this project help us better understand the residual value of batteries?*

How will this project help support the Governor's Electric Vehicle adoption goals?

A2. The value of an EV battery when removed from an EV will depend on many things, including, but not limited to: the services that the EV batteries can provide to the utility, the estimated future values of those services, which services are mutually exclusive and when, the useful service life, the cost of operation and maintenance, the ability to be transported, the degradation patterns, and the cost of the power electronics. Through the incorporation of second life EV batteries into the EV pilot, the EV pilot would be able to demonstrate the services that a second life EV battery could provide, which services may be mutually exclusive and in what conditions, the cost of operation and maintenance, the ability for the second life EV batteries to be transported, and the cost of the power electronics.

As discussed previously, the EV pilot is not intended to directly support the Governor's EV adoption goals. However, to the extent that the pilot demonstrates that the value of the demand response resource offered by the EV and its owner, as well as the EV battery removed from the car, is substantial, then this would theoretically provide additional value streams that could be provided to EV purchasers and reduce the cost of owning an EV.

Q3. *Describe the different types of partners that will be required for this pilot and the role that each will play.*

A3. Given the context of the data request, PG&E interprets that this question is directed towards identifying the key actors involved in a second life battery portion of the EV pilot.

For a second life battery demonstration, the key goals that PG&E would have are: determine the best method to increase customer satisfaction, determine the best method to ensure customer adoption, determine the value streams that the second life EV batteries can provide, determine the costs to operate and maintain the second life EV batteries, and determine the best method to limit the risk exposure to the utility and its ratepayers. Given these goals, PG&E would need to engage the following key actors to ensure that these goals could be met: a group of customers willing to engage in this portion of the EV pilot,

intermediaries to facilitate and test different incentive structures that could best encourage customer adoption and satisfaction, internal resources in PG&E to integrate the second life EV batteries into grid operations and planning, and a contractor to manage the creation, operation, and maintenance of the second life battery.

Other actors may be required as the demonstration proceeds, but the ones listed are the bare minimum.

- Q4.** *Please describe the business model used in this pilot. What value streams exist, how are they generated, and which parties benefit or are put at risk in result? For example, what are the services that the utility is providing compensation for, what contractual arrangements are required to establish this compensation, which parties may be involved in the transaction?*
- A4.** Given the context of the data request, PG&E interprets that this question is directed towards identifying the business model, services, and value streams involved in a second life battery portion of the EV pilot.

The EV pilot with is not intended to demonstrate a “business model” for the utility, but instead is intended to help establish and quantify the value streams that are possible from DR services provided by EVs and second life batteries. The framework that PG&E would be utilizing for a second life battery demonstration would be identical to the existing DR framework, which was established by the Commission and which is generally consistent with other demand side management (DSM) programs that the Commission has established. For all DSM programs, the Commission has established an avoided cost model, that quantifies the cost of the utility operating in a traditional manner and establishes this cost as the reference cost that any DSM program needs to be at or below to be justified through a Commission program. The Commission has structured these programs in many ways, some with the utility leading and others where the utility utilizes third-parties to effectuate the program. In the case of DR, PG&E believes that the Commission is intent on establishing a third party market, but one where utility still play a crucial role.

There are many values streams identified by the Commission and enumerated in what are known as the E3 calculators for energy efficiency, distributed generation, and demand response. Generally, the major value streams that would be relevant for the EV pilot are: provision of ancillary services, avoided generation capacity and avoided or deferred transmission and distribution.

If a program is deemed cost-effective, there are many ways to direct the funding to different entities, either directly by the utility or through a third party.

- Q5.** *Describe the utility’s interaction with the customer’s vehicle during the duration of the service agreement. What is the nature of the relationship to the vehicle owner and the vehicle while the battery is being used for transportation? Are*

there special considerations related to customer ownership rights, privacy concerns, or obligations to.

- A5.** Given the context of the data request, PG&E interprets that this question is directed towards a second life battery portion of the EV pilot. PG&E also interprets that this question assumes that PG&E will engage in a contract with the owner of the EV to assume ownership of the EV's battery after it is no longer considered automotive grade before the EV's battery is in this condition.

However, PG&E believes that it is premature to answer this question. There are many ways that an arrangement with the EV customer could be structured through different intermediaries to ensure that ratepayer risk is mitigated and customer satisfaction is maintained. PG&E believes that one of the EV pilots main purposes would be to evaluate some of these different options to help determine what would stimulate the most customer adoption.

- Q6.** *Please describe how the utility will ensure that value will go to vehicle buyers/users. Please describe any effects, if any, on non-participating utility customers.*

- A6** PG&E believes that it is premature to answer this question. There are many ways that an arrangement with the EV customer could be structured through different intermediaries to ensure that ratepayer risk is mitigated and customer satisfaction is maintained. PG&E believes that one of the EV pilots main purposes would be to evaluate some of these different options to help determine what would stimulate the most customer adoption.

However, to the extent that a cost-effectiveness framework is adopted to help value the services provided by EV customers and their second life batteries, other ratepayers should be indifferent or better than otherwise.

- Q7.** *What assumptions are used to determine the point at which during the battery's life it is deemed economic to transition between a transportation energy storage device to a grid stationary storage device?*

- A7.** PG&E does not believe that it will be economic reasons to transition a transportation energy storage device to a grid stationary storage device. Instead, PG&E believes that customer usability concerns will be the primary driver of this transition.

EV Pilot Budget Breakdown

PG&E provides the EV pilot budget in response to ED's request, with justification for each line item i below. This has been adjusted to account for a second life EV battery demonstration that is consistent with the overall EV pilot focus in addition to the initial work proposed:

PG&E	Justification	Budgeted
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		Expense
<i>Project Management</i>	For 1 full time employee (FTE) to manage the EV pilot.	\$225,000
<i>Transmission & Distribution Planning and Operations</i>	For 0.75 FTE from transmission and distribution planning and operations to participate in the EV pilot and provide the expertise needed.	\$150,000
<i>Energy Procurement</i>	For 0.3 FTE from energy procurement to bid the EVs into the CAISO market.	\$60,000
<i>Policy and Integrated Planning</i>	For 0.3 FTE to support the regulatory functions required for the EV pilot.	\$90,000
<i>Marketing & Incentives</i>	For PG&E to enroll up to 100 customers into the EV pilot.	\$600,000
<i>Customer Care Services Operations</i>	For PG&E to install the required revenue quality metering, perform the manual billing and metering processes required for any settlements on this pilot	\$500,000
Vendor or PG&E		
<i>Telemetry and Forecasting Service</i>	For PG&E to be able to provide real-time visibility of the EV charging to the CAISO and distribution operations.	\$150,000
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<i>IT Development</i>	Allocated to allow vendors to develop new functionality as required to support the dynamic aggregations and new control strategies that PG&E will test to support both the local distribution grid and the CAISO market and for PG&E to build some of the basic functionality to interface with vendors providing the grid services.	\$600,000
<i>Battery Management and Integration Services</i>	Allocated to the expenses required to maintain and operate second life batteries and any battery integration challenges if more than one battery type is used.	\$150,000
<i>Customer Research</i>	Allocated to allow studies of customer response to different control strategies and payment options for providing different grid services.	\$173,000

EV Pilot Timeline

As ED has requested, the EV pilot timeline provided below. This has been adjusted to account for the delay in approving the Advice Letter and incorporates a second life EV

battery demonstration that is consistent with the overall EV pilot focus in addition to the initial work proposed. However, PG&E notes that this timeline is extremely aggressive given the delay in the initial approval of the 2012-2014 DR Budget Application and the subsequent delay in the approval of the advice letter. PG&E requests that the timeline and budget authorization (?) for this pilot and the other pilots filed in AL-4077-E be extended into 2015, to allow PG&E time to achieve the goals set out for the pilots. [Note: This timeline has been adjusted to reflect an authorization to 2015 of the EV Pilot.]

Phase 1: Evaluation and Selection of Third Parties to Meet Objectives of EV Pilot

Id #	Task Name	Start	Finish
1	Develop operating requirements for third parties to provide grid services.	January 2013	February 2013
2	Develop third party selection criteria to meet objectives of the EV Pilot	February 2013	March 2013
3	Perform an evaluation of the technical and operational capabilities of third parties to be able to complete the objectives of the pilot.	April 2013	June 2013
4	Enter into contracts with third parties, resulting from a competitive solicitation, to provide DR and grid services from vehicle batteries during and after the time that the battery is in the vehicle, in order to meet objectives of the EV pilot. The contacts will also include, but not be limited to: <ul style="list-style-type: none"> • Specific performance requirements for the third party • Agreement on the communication protocol for the demand response signals to be used • Agreement on the data to be gathered and an assessment process. • Agreement on the customer engagement method • Agreement on the size of the resource to be provided 	July 2013	October 2013

Phase 2: Field Demonstration

Id #	Task Name	Start	Finish
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2	Recruit, qualify, and set-up customers and second life batteries	January 2013	December 2014

Id #	Task Name	Start	Finish
	to engage in EV pilot.		
3	Conduct pilot and test use cases.	March 2013	June 2015
4	Gather customer feedback and customer behavior assessment.	June 2013	June 2015
5	Assess charging capabilities and IT requirements to scale up to a mass-market program using both retail and commercial process.	June 2015	August 2015
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12	Develop report.	September 2015	December 2015
13	Publish findings.	December 2015	December 2015

**PG&E Gas and Electric
Advice Filing List
General Order 96-B, Section IV**

1st Light Energy	Department of General Services	North America Power Partners
AT&T	Department of Water Resources	North Coast SolarResources
Alcantar & Kahl LLP	Dept of General Services	Northern California Power Association
Ameresco	Douglass & Liddell	Occidental Energy Marketing, Inc.
Anderson & Poole	Downey & Brand	OnGrid Solar
BART	Duke Energy	PG&E
Barkovich & Yap, Inc.	Economic Sciences Corporation	Praxair
Bartle Wells Associates	Ellison Schneider & Harris LLP	R. W. Beck & Associates
Bloomberg	Foster Farms	RCS, Inc.
Bloomberg New Energy Finance	G. A. Krause & Assoc.	SCD Energy Solutions
Boston Properties	GLJ Publications	SCE
Braun Blaising McLaughlin, P.C.	GenOn Energy Inc.	SMUD
Brookfield Renewable Power	GenOn Energy, Inc.	SPURR
CA Bldg Industry Association	Goodin, MacBride, Squeri, Schlotz & Ritchie	San Francisco Public Utilities Commission
CENERGY POWER	Green Power Institute	Seattle City Light
CLECA Law Office	Hanna & Morton	Sempra Utilities
California Cotton Ginners & Growers Assn	Hitachi	Sierra Pacific Power Company
California Energy Commission	In House Energy	Silicon Valley Power
California League of Food Processors	International Power Technology	Silo Energy LLC
California Public Utilities Commission	Intestate Gas Services, Inc.	Southern California Edison Company
Calpine	Lawrence Berkeley National Lab	Spark Energy, L.P.
Cardinal Cogen	Los Angeles County Office of Education	Sun Light & Power
Casner, Steve	Los Angeles Dept of Water & Power	Sunrun Inc.
Center for Biological Diversity	MAC Lighting Consulting	Sunshine Design
Chris, King	MRW & Associates	Sutherland, Asbill & Brennan
City of Palo Alto	Manatt Phelps Phillips	Tecogen, Inc.
City of Palo Alto Utilities	Marin Energy Authority	Tiger Natural Gas, Inc.
City of San Jose	McKenna Long & Aldridge LLP	TransCanada
City of Santa Rosa	McKenzie & Associates	Turlock Irrigation District
Clean Energy Fuels	Merced Irrigation District	United Cogen
Clean Power	Modesto Irrigation District	Utility Cost Management
Coast Economic Consulting	Morgan Stanley	Utility Specialists
Commercial Energy	Morrison & Foerster	Verizon
Consumer Federation of California	Morrison & Foerster LLP	Wellhead Electric Company
Crossborder Energy	NLine Energy, Inc.	Western Manufactured Housing Communities Association (WMA)
Davis Wright Tremaine LLP	NRG West	eMeter Corporation
Day Carter Murphy	NaturEner	
Defense Energy Support Center	Norris & Wong Associates	