February 16, 2016

Erik Jacobson
Director, Regulatory Relations
Pacific Gas and Electric Company
77 Beale Street, Mail Code B10C
P.O. Box 770000
San Francisco, CA  94177

Subject: Smart Grid Short Term Demand Forecasting Pilot Project – Phase 2 Status Report, Pursuant to D.13-03-032

Dear Mr. Jacobson:

Advice Letter 4770-E is effective February 9, 2016.

Sincerely,

Edward Randolph
Director, Energy Division
December 29, 2015

Advice 4770-E
(Pacific Gas and Electric Company ID U 39 E)

Public Utilities Commission of the State of California

Subject: Smart Grid Short Term Demand Forecasting Pilot Project – Phase 2 Status Report, Pursuant to Decision 13-03-032

Purpose

The purpose of this advice letter is to comply with Ordering Paragraph (OP) 9 of Decision (D.) 13-03-032, which directs Pacific Gas and Electric Company (PG&E) to submit a status report via a Tier 2 Advice Letter within 14 days of the completion of each phase of each approved Smart Grid pilot. The Smart Grid Short Term Demand Forecasting Pilot Project (STDF Pilot) has completed the objectives and successfully met the Phase 2 milestones as described in Advice Letter 4227-E\(^1\). Therefore, PG&E submits this status report for review and approval to commence Phase 3 of the STDF Pilot. PG&E would appreciate the California Public Utilities Commission’s (Commission or CPUC) review and approval of this advice letter by January 28, 2016 to allow the maximum study period as part of the proposed Phase 3 deliverables.

The filing would not increase any current rate or charge, cause the withdrawal of service, or conflict with any rate schedule or rule.

Background

On November 21, 2011, PG&E filed Application (A.) 11-11-017 requesting authorization to recover costs for implementing six Smart Grid Deployment Pilot Projects over four years. The Smart Grid Deployment Pilot Projects seek to advance the modernization of PG&E’s electric grid consistent with California’s energy policies as described in Senate Bill (SB) 17 and PG&E’s Smart Grid Deployment Plan, which was filed on June 30, 2011 and approved on July 25, 2013.

\(^1\) PG&E’s Advice Letter 4227-E, Smart Grid Pilot Deployment Projects Implementation Plan, Pursuant to D.13-03-032, submitted for filing on May 22, 2013 and approved effective June 21, 2013 by the CPUC’s Energy Division.
On March 27, 2013, in D.13-03-032, the Commission approved four of the Smart Grid Pilot projects proposed by PG&E in its November 2011 application: the Smart Grid Line Sensor Pilot Project, the Smart Grid Voltage and Reactive Power (Volt/VAR) Optimization Pilot Project, the Smart Grid Detect and Locate Distribution Line Outages and Faulted Circuit Conditions Pilot Project, and the Smart Grid Short Term Demand Forecast Pilot Project. OP 9 of D.13-03-032 states:

“Within 14 days of the completion of each phase of each approved pilot, PG&E shall submit a status report via a Tier 2 Advice Letter to Commission staff. Each status report must include a) details of the activities occurring in the phase; b) a detailed breakdown of the costs of those activities; c) the results of the phase including evaluation and measurements of pre-selected metrics to portray the success or failure of the pilot phase; and d) a recommendation and rationalization of whether the pilot should advance to its next phase. PG&E should ensure that status reports are detailed, both quantitatively and qualitatively. Funding for subsequent phases, although approved in this decision, may not be spent by PG&E until the Advice Letter for the current phase is submitted and approved.”

**Discussion**

**Overview of the Short Term Demand Forecasting Pilot Project**

PG&E procures short-term electricity on behalf of its bundled customer demand in the California Independent System Operator (CAISO) markets. PG&E’s current short-term forecast model for its bundled customer demand is driven by actual load, actual weather, and forecasted weather.

PG&E currently utilizes a “top-down” methodology for forecasting its bundled customer demand. The total load in PG&E’s service area is based on the sum of in-area generation and net flows on transmission lines that interconnect PG&E with other service areas. The load forecast is primarily driven by a weighted-average temperature forecast from across the service territory. PG&E makes adjustments to account for transmission losses and to account for unbundled and wholesale customer load in order to convert the forecasted service area load to its forecasted bundled customer demand.

PG&E proposes to determine through the STDF Pilot whether using new granular sources of data improves the accuracy of PG&E’s short term electricity forecasts for its bundled customer demand. PG&E intends in this pilot to forecast bundled customer demand by using the data from the total local area load on distribution level load taken from the Supervisory Control and Data Acquisition (SCADA) system on PG&E’s lower voltage distribution network, as well as SCADA data from load connected directly to the transmission system. PG&E will use the data as input to a local area forecast model. PG&E will then apply adjustment factors to exclude PG&E’s unbundled electric
customers (e.g., wholesale customers, municipalities who supply or acquire their own electric power, or Direct Access / CCA customers) from the total local area load. Within this new approach, PG&E will also utilize local area weather data in the forecast model to capture the impact of micro-climates on load forecasts.

The Smart Grid STDF Pilot tests this new granular data driven process in two local areas in PG&E’s service territory, and the results of the pilot will inform any recommendations for broader or full deployment of this new forecasting methodology for the entire PG&E service area. In the planned three phases of the Smart Grid STDF Pilot, PG&E will analyze, build, and pilot the new forecasting methodology by incorporating granular sources of data to forecast PG&E’s local area demand. If the pilot is successful, this same methodology may be deployed across the PG&E service area by leveraging and scaling the developed pilot systems. A future challenge to enhancing the STDF model is the need for increased visibility of behind-the-meter solar generation, wind generation, and electric vehicles. While the forecasting model will inherently self-learn based on SCADA data, the model will be enhanced as additional behind-the-meter data of irradiance and behind-the-meter generation data become available and can be incorporated.

*Short Term Demand Forecasting Pilot – Analysis (Phase 1)*

The key objectives and milestones associated with Phase 1 of the STDF Pilot were to select the areas for the Pilot and evaluate the granular sources of data to be used in the new forecasting methodology. PG&E achieved these objectives as of May 1, 2014 by identifying DeAnza and the Peninsula as the local areas for the Pilot (electrically isolated, sufficient penetration of interval meters, etc.), and demonstrating that the initial set of data meets the data quality criteria. Based on the success of the Analysis Phase, the Commission approved proceeding to the Build Phase (Phase 2) in AL 4429-E.

*Short Term Demand Forecasting Pilot – Build Phase (Phase 2)*

In the Build Phase (Phase 2), PG&E designed and built the infrastructure to process and store the granular data for the two pilot areas of DeAnza and Peninsula. The objectives of Phase 2 were the following:

- Acquire the granular data sources for the new demand forecasting methodology
- Process and house the new granular data sources for DeAnza and Peninsula into a central repository
- Develop models that correlate historical local load data to the historical local temperature to capture the impact of micro-climates on load
- Provide a recommendation regarding whether or not to proceed with Phase 3 of the Pilot

Attachment 1 describes the successful completion of these objectives and milestones.
Based on the success of the Build Phase (Phase 2) as shown in Attachment 1, PG&E recommends proceeding to the Pilot Phase (Phase 3). In the Pilot Phase, PG&E will execute the new demand forecasting methodology, utilizing the infrastructure built in Phase 2 to forecast hourly local area demand for Peninsula and DeAnza. PG&E will then evaluate whether the new forecasting methodology is suitable for broader deployment. By submitting this Advice Letter upon completion of its major Phase 2 milestones and key project continuation success criteria, PG&E allows for timely evaluation of the Phase 2 work and a smooth transition to Phase 3.

**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 19, 2016, which is 21 days after the date of this filing. 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:

Erik Jacobson  
Director, Regulatory Relations  
c/o Megan Lawson  
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

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The 20-day protest period concludes on a holiday. PG&E is hereby moving this date to the following business day.
Any person (including individuals, groups, or organizations) may protest or respond to an advice letter (General Order 96-B, Section 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, Section 3.11).

Effective Date

PG&E requests that this Tier 2 advice filing become effective on regular notice, January 28, 2016, which is 30 calendar days after the date of filing.

Notice

In accordance with General Order 96-B, Section IV, 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.11-11-017. 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/.

/S/
Erik Jacobson
Director, Regulatory Relations

Attachments

cc: Service List A.11-11-017
Company name/CPUC Utility No. Pacific Gas and Electric Company (ID U39 E)

<table>
<thead>
<tr>
<th>Utility type:</th>
<th>Contact Person: Kingsley Cheng</th>
</tr>
</thead>
<tbody>
<tr>
<td>☑ ELC</td>
<td>Phone #: (415) 973-5265</td>
</tr>
<tr>
<td>□ GAS</td>
<td></td>
</tr>
<tr>
<td>□ PLC</td>
<td>E-mail: <a href="mailto:k2c0@pge.com">k2c0@pge.com</a> and <a href="mailto:PGETariffs@pge.com">PGETariffs@pge.com</a></td>
</tr>
<tr>
<td>□ HEAT</td>
<td></td>
</tr>
<tr>
<td>□ WATER</td>
<td></td>
</tr>
</tbody>
</table>

EXPLANATION OF UTILITY TYPE
ELC = Electric
GAS = Gas
PLC = Pipeline
HEAT = Heat
WATER = Water

Advice Letter (AL) #: 4770-E
Tier: 2
Subject of AL: Smart Grid Short Term Demand Forecasting Pilot Project - Phase 2 Status Report, Pursuant to Decision 13-03-032

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.13-03-032
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: January 28, 2016
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: N/A
Service affected and changes proposed: N/A
Pending advice letters that revise the same tariff sheets: N/A

California Public Utilities Commission
Energy Division
EDTariffUnit
505 Van Ness Ave., 4th Flr.
San Francisco, CA 94102
E-mail: EDTariffUnit@cpuc.ca.gov

Pacific Gas and Electric Company
Attn: Erik Jacobson
Director, Regulatory Relations
c/o Megan Lawson
77 Beale Street, Mail Code B10C
P.O. Box 770000
San Francisco, CA 94177
E-mail: PGETariffs@pge.com

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1 The 20-day protest period concludes on a holiday. PG&E is hereby moving this date to the following business day.
This report presents the work completed in Phase 2 (Build Phase) of the Smart Grid Short Term Demand Forecasting Pilot Project (STDF). In this phase, PG&E designed and built an infrastructure to process and store the granular data for the two pilot areas of DeAnza and Peninsula. The infrastructure became operational and ready for Phase 3 on December 15, 2015.

Based on the successful completion of the Phase 2 key objectives, PG&E recommends CPUC approval to proceed with Phase 3 (Pilot Phase) of STDF. In Phase 3, PG&E will utilize the infrastructure built in Phase 2 to forecast hourly loads for the pilot areas using the granular data sources and then evaluate the new forecasting methodology for broader deployment.

**STDF Pilot Goals**

The STDF Pilot goal is to investigate a new demand forecasting methodology using more granular sources of data as inputs to the short term forecast model for PG&E’s bundled customer demand. The short term forecast model is a 6-day hourly load forecast, continually updated on an hourly basis. Broader deployment decisions will be based on an assessment during Phase 3 of the Pilot as to whether or not it is feasible and cost-effective to use granular sources of data and location-specific information to be equal or improve the accuracy of PG&E’s system-wide short-term electricity demand forecast used for procurement purposes.

**Background**

PG&E procures short-term electricity on behalf of its bundled customer demand in the California Independent System Operator (CAISO) markets. PG&E’s current short-term forecast model for its bundled customer demand is driven by actual load, actual weather, and forecasted weather.

PG&E currently utilizes a “top-down” methodology for forecasting its bundled customer demand. The total load in PG&E’s service area is based on the sum of in-area generation and net flows on transmission lines that interconnect PG&E with other service areas. The load forecast is primarily driven by a weighted-average temperature forecast for the service territory. PG&E makes adjustments to account for transmission losses and to account for unbundled and wholesale customer load in order to convert the forecasted service area load to its forecasted bundled customer demand.

**Description of the Pilot New Demand Forecasting Methodology**

The new demand forecasting methodology will use load data from the Supervisory Control and Data Acquisition (SCADA) system on PG&E’s lower voltage distribution network, as well as SCADA data from load connected
directly to the transmission system in the local areas. These SCADA data sources, SCADA_New, is a measurement of the load of all customers served in the local area by various energy service providers (ESPs), including PG&E as well as other ESPs that serve wholesale entities, direct access and community choice aggregation customers. On an hourly basis, the historical SCADA_New load and the local historical/forecast temperature data are input into a model to forecast the area load. The area load forecast is then adjusted to exclude unbundled customers who are supplied electric power from an ESP other than PG&E. The adjustment factors are based on historical customer usage data (this was known as “interval meter” data in the Phase 1 Advice Letter 4229-E, but has been renamed to “customer usage” data to encompass profiled usage data and wholesale customer data). The remaining load after the adjustment is the forecast for PG&E’s bundled customers.

The new methodology will be tested in two pilot areas known as Peninsula and DeAnza. These pilot areas were defined and selected based on the criteria described in the Advice Letter 4429-E for Phase 1 of the Pilot. During Phase 2, PG&E designed and built the infrastructure to acquire, process, and store the granular data for the two pilot areas.

**Phase 2 Objectives**

In the Build Phase (Phase 2), PG&E designed and built the infrastructure to process and store the granular data for the two pilot areas of DeAnza and Peninsula. The objectives of Phase 2 were the following:

- Acquire the granular data sources for the new demand forecasting methodology
- Build the infrastructure to process and house the new granular data sources for DeAnza and Peninsula into a central repository
- Develop models that correlate historical local load data to the historical local temperature to capture the impact of micro-climates on load
- Provide a recommendation regarding whether or not to proceed with Phase 3 of the Pilot

The Phase 2 objectives were successfully tested and completed.

**Description of the Infrastructure**

The STDF infrastructure was built to automate the extraction, processing, integration, and storage of the granular data for the pilot areas. The items built for the STDF infrastructure during Phase 2 are:

- SCADA load data and customer usage data extracted and processed into hourly values
- An operational database that is updated hourly with SCADA load and PRT forecast data
- A central repository that stores the detailed data (SCADA load, PRT forecast, customer usage, supporting data)
- Data for calibration factors
- Demand forecasting models for the pilot areas
- Logic, algorithms, interfaces, and controls of the processes and systems
- Graphical User Interfaces (GUI)
Performance Test Results

1. Data Sources

Many data sources and supporting data need to be accurate for the new methodology to be successful. In Phase 2, the consistency between SCADA_New and customer usage data were key indicators of data quality. As discussed in the Phase 1 advice letter, PG&E determined that there was a difference in SCADA_New and customer usage data and PG&E recommended further analysis to determine the cause of the difference. In Phase 2, PG&E reduced the difference to a satisfactory level in the following manner:

- Load for customers in the pilot areas without an interval meter (i.e., Smart Meters and MV90 meters) was not included in the interval meter dataset extracted in Phase 1. In Phase 2, PG&E developed a process to extract the billing segment usage for those non-interval meter customers and then profiled that usage to hourly values. This process was also used for those customers that have interval meters but whose interval meter is not available in the source database due to reporting issues.

The acquired granular data sources in Phase 2 successfully passed the performance criteria for data quality as described in the table below.

Table 1: Data Source Performance

<table>
<thead>
<tr>
<th>Data Quality Criteria</th>
<th>Test Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCADA_New data should be comparable to customer usage data</td>
<td>- Datasets have similar profiles</td>
</tr>
<tr>
<td></td>
<td>- Average difference between the two datasets was better than the data quality target of +/-5%</td>
</tr>
<tr>
<td>SCADA_New data should have a reasonable profile</td>
<td>- SCADA_New data has a profile comparable to other data sources. There were outliers in SCADA_New where the data was replaced with values using the other data sources.</td>
</tr>
</tbody>
</table>
| Support Data is available to process data                                           | - Mapping of customer usage data at distribution feeders and transmission circuits for local area is consistent to the defined local area  
   - Customer usage data is available for a historical period in order to develop load adjustment factors to convert the forecasted total local area load to PG&E bundled load for the area |
2. STDF Infrastructure Performance

Each item of the STDF infrastructure successfully passed the performance testing by producing the results that were expected.

The second level test was an end-to-end test in which the infrastructure was tested from the beginning of extracting the raw data to producing an hourly bundled load forecast for the pilot areas. Additional testing in this level included performance measurements and security. The User Acceptance Test (UAT) focused on verifying accuracy, consistency, usability, functionality, and the ability to meet the STDF requirements.

The STDF performance tests demonstrated that the infrastructure built to support the new demand forecasting methodology met the functionality and business requirements. The performance tests verified that the infrastructure is ready for the execution of the Pilot in Phase 3.

3. Developing New Demand Forecasting Models

In Phase 2, PG&E worked with Pattern Recognition Technologies (PRT) to develop the new local demand forecasting model for each local area. PG&E provided scrubbed historical SCADA_New load data for each pilot area to PRT. PRT analyzed the weather stations in the pilot area and built a correlation of the historical SCADA_New data to local temperature data for each of the local areas to utilize in their proprietary forecasting model. PRT’s e-LoadForecast is a 24/7 online load forecasting service for electric load data run by an engine made up of multiple intelligent system-based models that employ artificial neural networks, fuzzy logic and evolutionary computing/genetic algorithms technologies.

PG&E’s connectivity with PRT was successfully tested to securely send and receive data based on the local area models. PG&E’s infrastructure to process and store PRT data performed as expected.

In Phase 3, PG&E plans to test the new methodology with the new models to forecast load for each pilot area. On an hourly basis, PG&E will provide the historical granular SCADA_New data to PRT and PRT’s local weather forecast will be used as input into PRT’s model to forecast the total area load for the two local areas.

**Technical and Market Barriers**

A technical challenge for the Pilot in Phase 2 was that STDF relies on granular data sources that are in disparate systems in PG&E. These disparate systems that contain the source data were designed for purposes other than STDF. The STDF team had to understand the unique characteristics and requirements of each system and needed to modify the Pilot design to acquire and process the data based on that system architecture.

A second challenge for the Pilot was that the impact of behind-the-meter solar generation, wind generation, and electric vehicles are embedded in the SCADA data load, but this generation data is not available on a real-time basis as input into the load forecast model. However, PG&E’s STDF model will inherently self-learn based on this
SCADA data. PRT may be able to enhance the model as additional data of irradiance and behind-the-meter generation data become available and can be incorporated.

**Significant knowledge gained**

One key lesson learned was that load sensitivity to temperature varies even within the Pilot area. Through analyzing the data, PG&E saw that there were days when the local area load profile was not consistent with that of other similar temperature days. A deep dive of the customer load profiles showed that some customers’ load was less sensitive to temperature compared to other customers in the area. It is critical to understand the usage profiles of individual large customers as a forecast area becomes more granular.

**Recommendations for pilot program changes or course corrections**

None

**Project Phases, Milestones, Expected Timelines**

Table 2 provides an update of the project phases, milestones, and expected timelines for the STDF Pilot. The completion of Phase 3 and the completion of the Pilot are estimated to be December 2016 contingent on timely response and approval of this advice letter by the Commission.

**Table 2: Project Phases and Expected Completion Dates**

<table>
<thead>
<tr>
<th>Phase</th>
<th>Description</th>
<th>Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase 1 – Analysis Phase</td>
<td>PG&amp;E selected two appropriate local areas and has extracted, collected, and evaluated granular data for data quality. Key milestones associated with Phase 1 were met as of May 1, 2014 to inform PG&amp;E’s recommendation to proceed to Phase 2.</td>
<td>September 2013 – Summer 2014 Advice Letter approved July 2014</td>
</tr>
<tr>
<td>Phase 2 – Build Phase</td>
<td>PG&amp;E built the infrastructure to process and house the integrated granular data sources, including local weather data, into a central repository for input into a demand forecasting model for Peninsula and DeAnza.</td>
<td>Summer 2014 – December 2015 Advice Letter submitted in Dec 2015</td>
</tr>
<tr>
<td>Phase 3 – Pilot Phase</td>
<td>PG&amp;E will execute and evaluate the new Short-Term Demand Forecasting process by forecasting daily loads for Peninsula and DeAnza using the granular sources. Processes will be in place to send/receive local area load. During the course of Phase 3 the model should automatically re-learn and be adjusted based on actual loads that are provided on an hourly basis.</td>
<td>January 2016 – December 2016 Pending approval of the Phase 2 advice letter</td>
</tr>
</tbody>
</table>
**Project Costs**

The actual/forecast of the STDF project costs have been updated below and compared to previous cost estimates. The total realized expenditure for Phase 1 was $0.32 million, below the $0.47 million estimated in the previous advice letter. Total expenditure for Phase 2 is estimated to be $3.8 million, which is under the forecasted budget of $7.5 million. This is primarily due to careful sequencing of activities by which PG&E sought to minimize spending in planning, analyzing, and building the infrastructure. As a result of cost savings achieved, the entire project is expected to come in under the approved budget of $12.98 million.

**Table 3: STDF Project Costs**

<table>
<thead>
<tr>
<th>Forecast Vintage ($’000)</th>
<th>Phase 1</th>
<th>Phase 2</th>
<th>Phase 3</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forecasted Budget as of May 2013</td>
<td>$2,476</td>
<td>$6,771</td>
<td>$3,737</td>
<td>$12,984</td>
</tr>
<tr>
<td>Forecasted as of May 2014 in AL 4429_E</td>
<td>$466</td>
<td>$7,470</td>
<td>$3,602</td>
<td>$11,539</td>
</tr>
<tr>
<td>Actuals/Forecast</td>
<td>$316</td>
<td>$3,827 estimated</td>
<td>$3,500</td>
<td>$7,643</td>
</tr>
</tbody>
</table>

The key objectives in Phase 2 have been achieved but there is remaining work that will continue to complete the phase while this Advice Letter is in review. The remaining work is:

- Work to stabilize the infrastructure which is typically 2-3 months for IT related projects
- Continue PRT’s Load forecasting model service to maintain an uninterrupted, continuous stream of historical data (forecast/actual) and correlation

If this advice letter is approved by the CPUC, the Phase 3 work will begin in 2016 at an estimated cost of $3.5 million. The work planned for Phase 3 encompasses the following:

- Authentication process (security protocol required for production systems)
- Automation of topology mapping (automatic configuration for customer meters to feeders and substations )
- Data error correction
- Utilize the infrastructure built in Phase 2 to forecast hourly loads for Peninsula and DeAnza using the granular data sources
- Evaluate the cost and benefits to deploy the new forecasting methodology to the broader PG&E system
**Recommendation to Proceed to Phase 3**

PG&E recommends proceeding to Phase 3, the execution of the new demand forecasting methodology for the two pilot areas. PG&E’s recommendation is based on the successful completion of the following objectives in Phase 2:

- Acquisition of the granular data that meets the data quality criteria
- Infrastructure has been built to efficiently and securely process the granular data into a local demand forecast, including a central repository to store the data
- The local demand forecasting models for the local areas are available

In Phase 3, PG&E will utilize the infrastructure built in Phase 2 to forecast hourly loads for Peninsula and DeAnza using the new granular sources. During the course of Phase 3, the model should automatically re-learn and be adjusted based on actuals loads that are provided on an hourly basis. Also in Phase 3, the customer usage data will be further analyzed to determine its use to enhance the adjustment of total local area load to bundled load forecast.
AT&T
Albion Power Company
Alcantar & Kahl LLP
Anderson & Poole
Atlas ReFuel
BART
Barkovich & Yap, Inc.
Bartle Wells Associates
Braun Blaising McLaughlin & Smith, P.C.
Braun Blaising McLaughlin, P.C.
CENERGY POWER
CPUC
California Cotton Ginters & Growers Assn
California Energy Commission
California Public Utilities Commission
California State Association of Counties
Calpine
Casner, Steve
Center for Biological Diversity
City of Palo Alto
City of San Jose
Clean Power
Coast Economic Consulting
Commercial Energy
Cool Earth Solar, Inc.
County of Tehama - Department of Public Works
Crossborder Energy
Davis Wright Tremaine LLP
Day Carter Murphy
Defense Energy Support Center
Dept of General Services
Division of Ratepayer Advocates
Don Pickett & Associates, Inc.
Douglas & Liddell
Downey & Brand
Ellison Schneider & Harris LLP
G. A. Krause & Assoc.
GenOn Energy Inc.
GenOn Energy, Inc.
Goodin, MacBride, Squeri, Schlotz & Ritchie
Green Power Institute
Hanna & Morton
International Power Technology
Intestate Gas Services, Inc.
Kelly Group
Ken Bohn Consulting
Leviton Manufacturing Co., Inc.
Linde
Los Angeles County Integrated Waste Management Task Force
Los Angeles Dept of Water & Power
MRW & Associates
Manatt Phelps Phillips
Marin Energy Authority
McKenna Long & Aldridge LLP
McKenzie & Associates
Modesto Irrigation District
Morgan Stanley
NLine Energy, Inc.
NRG Solar
Nexant, Inc.
ORA
Office of Ratepayer Advocates
OnGrid Solar
Pacific Gas and Electric Company
Praxair
Regulatory & Cogeneration Service, Inc.
SCD Energy Solutions
SCE
SDG&E and SoCalGas
SPURR
San Francisco Water Power and Sewer
Seattle City Light
Sempra Energy (Socal Gas)
Sempra Utilities
SoCalGas
Southern California Edison Company
Spark Energy
Sun Light & Power
Sunshine Design
Tecogen, Inc.
Tiger Natural Gas, Inc.
TransCanada
Troutman Sanders LLP
Utility Cost Management
Utility Power Solutions
Utility Specialists
Verizon
Water and Energy Consulting
Wellhead Electric Company
Western Manufactured Housing Communities Association (WMA)
YEP Energy