STATE OF CALIFORNIA Edmund G. Brown Jr., *Governor*

PUBLIC UTILITIES COMMISSION
505 VAN NESS AVENUE
SAN FRANCISCO, CA 94102-3298

Revised

May 21, 2013

Advice Letter 4177-E

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

Subject: Statewide Permanent Load Shifting Program Design Proposal with Revised Cost-Effectiveness Analysis

Dear Mr. Cherry:

Advice Letter 4177-E is effective January 14, 2013 per Resolution E-4586.

Sincerely,

Edward Randolph

Edward F. Randolph, Director
Energy Division

SOUTHERN CALIFORNIA EDISON
An EDISON INTERNATIONAL Company

Akbar Jazayeri
Vice President of Regulatory Operations

January 14, 2013

ADVICE 2837-E
(Southern California Edison Company – U 338-E)

ADVICE 4177-E
(Pacific Gas and Electric Company – U 39-E)

ADVICE 2445-E
(San Diego Gas & Electric Company – U 902-E)

PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA
ENERGY DIVISION

SUBJECT: Statewide Permanent Load Shifting Program Design Proposal With Revised Cost-Effectiveness Analysis

In compliance with Decision (D.)12-04-045, Pacific Gas and Electric Company (PG&E), San Diego Gas & Electric Company (SDG&E), and Southern California Edison Company (SCE) (jointly, "the Utilities") hereby submit for filing the Joint Permanent Load Shifting (PLS) Program Design Proposal, program budget details and revised cost-effectiveness analysis.

PURPOSE

Pursuant to Ordering Paragraph (OP) 63 of California Public Utilities Commission (Commission) D.12-04-045, the Utilities submit their statewide PLS program design proposal. The statewide program design is described in Attachment A, the program budget by each utility is detailed in Attachment B and the revised cost-effectiveness analysis is provided in Attachment C. All three are attached hereto.

BACKGROUND ON PLS AND COST-EFFECTIVENESS

PLS can help reduce system peak load by shifting electricity use from on-peak to off-peak periods on a recurring basis. Shifting daily loads benefits the electricity grid and distribution systems. PLS often involves storing energy produced during off-peak hours to support load during peak periods when energy use is typically high.

P.O. Box 800 8631 Rush Street Rosemead, California 91770 (626) 302-3630 Fax (626) 302-4829

The Commission, on November 30, 2007, issued D.06-11-049, Order Adopting Changes to 2007 Utility Demand Response (DR) Programs, on the Utilities' 2006-2008 Demand Response Applications (A.)05-06-006, et. al. This Decision, among other things, ordered the Utilities to pursue Request for Proposals and bilateral arrangements for PLS to promote system reliability during the summer peak demand periods. A 4-year (2008-2011) PLS pilot was approved for all the Utilities. As the Utilities ran their pilots, the Commission issued D.09-08-027 in 2009 directing the Utilities to work with parties to examine ways of expanding the availability of PLS. The Utilities were to consider other ways of encouraging PLS, as well as an evaluation of what incentive payment would be appropriate for a future standard offer. In November 2010, a Statewide PLS Study, authored by Energy + Environmental Economics (E3) and StrateGen, provided information to the Utilities for use in developing a proposed PLS program.

On April 30, 2012, D.12-04-045 ordered the Utilities to work collaboratively to develop and propose a standardized, statewide PLS program. As part of the PLS program design process, the Utilities incorporated the findings from the Statewide PLS Study into the 2012-2014 PLS program design.

On December 16, 2010, D.10-12-024 ordered the Utilities to adopt the 2010 DR Cost-Effectivenes Protocols in all future cost-effectiveness analyses of their DR activities, unless otherwise directed. D.12-04-045 considers PLS to be different from other DR programs because PLS shifts energy usage on a permanent basis instead of merely decreasing energy usage during certain times. Because of this difference, the Commission found it necessary and reasonable to review PLS and its cost-effectiveness analyses differently from the other DR programs. The Utilities jointly hired E3 to develop a PLS-specific cost-effectiveness section in the Commission's DR Reporting Template in order to better evaluate cost-effectiveness of PLS.

On July 30, 2012, the Utilities submitted a joint PLS program design proposal to the Commission Staff. The Commission Staff sought feedback from interested parties by facilitating a PLS Workshop that was held on September 18, 2012. As a result of the PLS Workshop and comments received from interested parties, Energy Division (ED) provided the Utilities program design feedback on November 13, 2012. The Utilities have incorporated ED's feedback in their final version of the program design proposal which is being submitted herein.

THE UTILITIES' PROPOSAL TO CREATE A PLS PROGRAM

a. Program Overview

This statewide PLS program is designed to help customers shift electricity usage by offering a one-time upfront incentive, based on designed kW shift to offset initial investments in a mature thermal energy storage (TES) system. Customers will be required to shift energy usage during the summer peak hours, as defined by each Utility. Providing an incentive to invest in a PLS technology helps the Utilities reduce the

need for peak generation investments, reduce the likelihood of shortages during peak periods, and lower system costs overall by reducing the need for peaking units.

b. Customer and Equipment Eligibility

The program is being made available to all customers including industrial, commercial, agricultural, residential, Community Choice Aggregation (CCA), and Direct Access (DA) customers. Customers who receive incentives under this program will be required to be on a time-of-use (TOU) rate during the duration of their contract. TOU rates provide incentive to reduce on-peak electrical demand and usage through the utilization of a TES system during peak hours. Bill savings through TOU rates will allow customers to recover the remaining project costs not recouped through the one-time incentive provided under this program.

c. Feasibility Study Requirements

An engineering-quality feasibility study will be required for all customers applying for the PLS program. This study is to provide an evaluation of the technical feasibility and economic viability of installing a new TES system at the customer site. The study is to be completed by a professional licensed mechanical engineer designated by the customer and can be included as an eligible project cost for incentive purposes. Refer to Section 6.2 of Attachment A for a list of eligible project costs.

d. Incentives

Upon meeting all customer and equipment eligibility requirements, the customer or the customer's designee shall be eligible for a one-time incentive per designed kW shift.

Refer to Section 7.4 of the PLS design proposal (Attachment A) for details on how the incentive reservation is calculated.

The incentive levels proposed by SCE and PG&E are based on ED's recommended incentives for the Utilities' PLS program proposal. ED's recommended levels give preference to market adoption over cost-effectiveness considerations. SDG&E's incentive proposal is based on the anticipated substantial reduction in capacity and energy value of permanent load shift programs as early as 2017, due to the addition of large amounts of solar generation. The table below provides the proposed incentive amounts by Utility:

	PG&E ($/kW)	SCE ($/kW)	SDG&E ($/kW)
Thermal Energy Storage	$875	$875	$475

e. Project Cost Cap

The PLS incentive is subject to a cap of 50 percent of the total eligible project cost. The customer's incentive amount will be the lesser of the incentive reservation amount calculated based on the system design and 50 percent of the actual final installed total project cost. Refer to Section 6.2 of Attachment A for a list of eligible project costs.

f. Monitoring Requirements for Measurement and Verification

Customers will be required to install measurement and verification (M&V) instrumentation as part of their TES system installation. This requirement will allow the Utilities to conduct data analysis on cooling-load-shift performance and provide data for load impact evaluation. These monitoring devices will also enable customers to optimize operation of their TES system.

g. *Program Modification*

A PLS Working Team will be established with representation from the Utilities and the Commission to develop the necessary program modification guidelines which prescribe the requirements, process and schedule for evaluation of modification requests. The Working Team will meet at least twice a year once the program has been implemented. These efforts will continue through 2013. The program modification process will mirror the current Self-Generation Incentive Program Modification process with the steps outlined below:

1. Applicant Contacts Program Administrator
2. Proposal Distribution to Working Group
3. Proposal Presentation to Working Group
4. Working Group Recommendations
5. Applicant Comments on Recommendations
6. Submission of Working Group Recommendations to Commission
7. Public Comment and Commission Decision
8. Program Modification Implementation

FUTURE PROGRAM EFFORTS

As part of the integrated demand side management efforts, the Utilities will work on the viability of including PLS in future integrated energy audits and include such efforts in their 2015-2017 DR Applications.

In order to provide PLS customers with more financing options, the Utilities will look into establishing On-Bill Financing in the next program cycle for customers interested in participating in the PLS program.

COST-EFFECTIVENESS

D.12-04-045 found it necessary and reasonable to review PLS and its cost-effectiveness analyses differently from the other DR programs. As a result, the Utilities hired E3 to update the DR Reporting Template for PLS. The following table shows the revised benefit to cost ratio results for PLS:

	PG&E	SCE	SDG&E
Incentive Level ($/kW)	$875	$875	$475
Megawatts (MW)	15.43	14.50	2.89
Total Resource Cost (TRC)	0.80	0.69	0.82
Program Administrator Cost (PAC)	1.79	1.68	2.78
Ratepayer Impact Measure (RIM)	0.69	0.68	1.28
Participant Cost Test (PCT)	1.18	1.02	0.60

Refer to Attachment C for details of the Utilities' proposed input assumptions for cost-effectiveness evaluations.

PROGRAM IMPLEMENTATION TIMELINE

The Utilities request that the Commission allow at least 90 days from the approval date of this Advice Letter to implement the PLS program. Ongoing implementation efforts such as marketing, request for proposal, and program documents cannot be finalized until the program design has been approved. The 90 days from the date of approval will provide the Utilities reasonable time to implement the PLS program.

BUDGET TO ADMINISTER THE PROPOSAL

Pursuant to OP 60 of D.12-04-045, the following PLS program budgets have been approved: PG&E $15,000,000; SDG&E $3,000,000; and SCE $14,000,000. The table below provides the incentive and administrative budget to administer the PLS proposal by Utility:

Budget Category	PG&E	SCE	SDG&E
Incentives	$13,500,000	$12,690,000	$2,235,000
Administration (does not include allocated amounts)	$1,500,000	$1,310,000	$765,000
Approved 2012-2014 Budget	**$15,000,000**	**$14,000,000**	**$3,000,000**

Refer to Attachment B for a breakdown of the administrative budget by each Utility.

TIER DESIGNATION

Pursuant to OP 63 of D.12-04-045, this Advice Letter is submitted with a Tier 2 designation.

EFFECTIVE DATE

This advice filing will become effective on February 13, 2013, the 30th calendar day after the date filed.

NOTICE

Anyone wishing to protest this advice filing may do so by letter via U.S. Mail, facsimile, or electronically, any of which must be received no later than 20 days after the date of this advice filing. Protests should be mailed to:

CPUC, Energy Division
Attention: Tariff Unit
505 Van Ness Avenue
San Francisco, California 94102
E-mail: EDTariffUnit@cpuc.ca.gov

Copies should also be mailed to the attention of the Director, Energy Division, Room 4004 (same address above).

In addition, protests and all other correspondence regarding this advie letter should also be sent by letter and transmitted via facsimile or electronically to the attention of:

Akbar Jazayeri
Vice President of Regulatory Operations
Southern California Edison Company
8631 Rush Street
Rosemead, California 91770
Facsimile: (626) 302-4829
E-mail: AdviceTariffManager@sce.com

Leslie E. Starck
Senior Vice President
c/o Karyn Gansecki
Southern California Edison Company
601 Van Ness Avenue, Suite 2030
San Francisco, California 94102
Facsimile: (415) 929-5540
E-mail: Karyn.Gansecki@sce.com

There are no restrictions on who may file a protest, but the protest shall set forth specifically the grounds upon which it is based and shall be submitted expeditiously.

In accordance with Section 4 of GO 96-B, SCE is serving copies of this advice filing to the interested parties shown on the attached GO 96-B service list and A.11-03-001 et al. Address change requests to the GO 96-B service list should be directed by electronic mail to AdviceTariffManager@sce.com or at (626) 302-2930. For changes to all other service lists, please contact the Commission's Process Office at (415) 703-2021 or by electronic mail at Process_Office@cpuc.ca.gov.

Further, in accordance with Public Utilities Code Section 491, notice to the public is hereby given by filing and keeping the advice filing at SCE's corporate headquarters. To view other SCE advice letters filed with the Commission, log on to SCE's web site at http://www.sce.com/AboutSCE/Regulatory/adviceletters.

For questions, please contact Amy Liu at (626) 302-4019 or by electronic mail at Amy.Liu@sce.com.

Southern California Edison Company

Akbar Jazayeri

AJ:al:sq
Enclosures

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.: Southern California Edison Company (U 338-E)

Utility type:
☑ ELC ☐ GAS
☐ PLC ☐ HEAT ☐ WATER

Contact Person: Darrah Morgan
Phone #: (626) 302-2086
E-mail: Darrah.Morgan@sce.com
E-mail Disposition Notice to: AdviceTariffManager@sce.com

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

(Date Filed/ Received Stamp by CPUC)

Advice Letter (AL) #: 2837-E et al. Tier Designation: 2

Subject of AL: Statewide Permanent Load Shifting Program Design Proposal With Revised Cost-Effectiveness Analysis

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:

Summarize differences between the AL and the prior withdrawn or rejected AL[1]:

Confidential treatment requested? ☐ Yes ☑ No

If yes, specification of confidential information:
Confidential information will be made available to appropriate parties who execute a nondisclosure agreement.
Name and contact information to request nondisclosure agreement/access to confidential information:

Resolution Required? ☐ Yes ☑ No

Requested effective date: 2/13/13 No. of tariff sheets: -0-

Estimated system annual revenue effect: (%):

Estimated system average rate effect (%):

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: None

Service affected and changes proposed[1]:

Pending advice letters that revise the same tariff sheets:

[1] Discuss in AL if more space is needed.

Protests 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
Attention: Tariff Unit
505 Van Ness Ave.,
San Francisco, CA 94102
E-mail: EDTariffUnit@cpuc.ca.gov

Akbar Jazayeri
Vice President of Regulatory Operations
Southern California Edison Company
8631 Rush Street
Rosemead, California 91770
Facsimile: (626) 302-4829
E-mail: AdviceTariffManager@sce.com

Leslie E. Starck
Senior Vice President
c/o Karyn Gansecki
Southern California Edison Company
601 Van Ness Avenue, Suite 2030
San Francisco, California 94102
Facsimile: (415) 929-5540
E-mail: Karyn.Gansecki@sce.com

Attachment A

2012-2014 Permanent Load Shifting Program Design Proposal

Jointly proposed by: Pacific Gas and Electric (PG&E), San Diego Gas & Electric (SDG&E), and Southern California Edison Company (SCE)

Table of Contents

1. Purpose

In compliance with Ordering Paragraph 62 of Decision 12-04-045, Pacific Gas and Electric Company (PG&E), San Diego Gas & Electric Company (SDG&E), and Southern California Edison Company (SCE) (jointly, "the Utilities") submit this joint Permanent Load Shifting program design and updated cost-effectiveness analysis to the California Public Utilities Commission (CPUC).

2. Background

Permanent Load Shifting (PLS) can help reduce system peak load by shifting electricity use from on-peak to off-peak periods on a recurring basis. Shifting daily loads benefits the grid and distribution systems. PLS often involves storing energy produced during off-peak hours to support load during peak periods when energy use is typically high.

As part of the 2006-2008 Demand Response Application (A.) 05-06-006, et. al. the Commission, on November 30, 2007, issued Decision (D.) 06-11-049, Order Adopting Changes to 2007 Utility Demand Response Programs. This Decision, among other things, ordered the Utilities to pursue Request for Proposals and bilateral arrangements for PLS to promote system reliability during the summer peak demand periods. A four-year PLS pilot was approved for all the Utilities from 2008-2011. As the Utilities ran their pilots, the Commission issued D.09-08-027 in 2009 directing the Utilities to work with parties to examine ways of expanding the availability of PLS. The study was to consider other ways of encouraging PLS, as well as an evaluation of what incentive payment would be appropriate for a future standard offer. In November 2010, a Statewide PLS Study, authored by Energy + Environmental Economics and StrateGen, provided information to the Joint Utilities for use in preparing a proposed PLS program.

In compliance with D.12-04-045, the Utilities worked collaboratively to develop and propose a standardized, statewide PLS program. As part of the PLS program design process, the Utilities incorporated the findings from the Statewide PLS Study into the program design of the 2012-2014 PLS Program.

On July 30, 2012, the Utilities submitted a joint PLS program design proposal to Commission Staff. The Commission Staff sought feedback from interested parties by facilitating a PLS Workshop that was held on September 18, 2012 at the CPUC. As a result of the PLS Workshop and comments received from interested parties, Energy Division provided the IOUs program design feedback on November 13, 2012. The IOUs have incorporated Energy Division's feedback into their final version of the program design proposal which is being submitted in a Tier 2 Advice Letter in January 2012.

3. Program Overview

This Statewide PLS Program is designed to help customers shift electricity use by offering a one-time upfront incentive, based on designed kW shift to offset initial investments in a mature thermal energy storage (TES) system. Customers will be required to shift energy usage during the summer peak hours as defined by each utility. Providing an incentive to invest in a PLS technology helps the utilities reduce the need

for peak generation investments, reduce the likelihood of shortages during peak periods, and lower system costs overall by reducing the need for peaking units.

Time-of-use (TOU) rates further encourage PLS because customers can reduce their energy bills by shifting cooling load from peak periods when rates are higher to off-peak periods when rates are lower. Transferring demand and energy consumptions out of the most costly periods of the day can help achieve large bill savings.

4. Eligibility Requirements

Eligibility for participation in the 2012-2014 PLS program will be based on the customer meeting all the following customer eligibility and equipment requirements.

4.1 Customer Eligibility Requirements

a. All customers of the Utilities, including industrial, commercial, agriculture, residential, Community Choice Aggregation (CCA), and Direct Access (DA) customers, are eligible to apply for the PLS Program.

b. TOU rates provide incentive to reduce on-peak electrical demand and peak usage through the utilization of a TES system during peak hours. Customers who receive incentives under this program will be required to be on a TOU rate for a minimum of 5 years (starting once the customer receives the incentive). PLS customers will be allowed to change TOU rates if a better rate becomes available within the 5 year commitment period so long as they are in compliance with Rule 12. Refer to Table 1 for defined summer months and peak hours by utility.

c. This program requires that the customer operate the TES system during the summer on-peak hours on a weekday basis. It is expected for some customers to see benefits of running the system outside the summer months and will be encouraged to do so if customer savings can be realized.

Table 1
PLS Summer Months and Peak Hours by Utility

Utility	Summer Months	Peak Hours
PG&E	May 1 – October 31	12pm - 6pm
SCE	June 1 – September 30	12pm - 6pm
SDG&E	May 1 – October 31	11am – 6pm

d. There is no minimum shift requirement set for this program.

e. To allow for different types of technologies and customer types to participate in this program, each project will be subjected to an incentive cap. These caps are

represented by each utility in Table 2. A customer is eligible to receive PLS incentives from multiple utilities, subject to the respective utilities' per project incentive cap, but a project/premises can only receive a PLS incentive from only one utility.

Table 2
Incentive Cap per Project by Utility

Utility	Incentive Budget	Maximum Single-Customer Incentive*
PG&E	$13,500,000	$1,500,000
SCE	$12,690,000	$1,500,000
SDG&E	$2,235,000	$500,000

**Each utility has the right to exceed their incentive cap on a case by case basis*

4.2 Equipment Eligibility Requirements

The utilities will only provide incentives for mature TES technology under the PLS program. Eligible mature TES technologies will be required to have a proven track record within the marketplace. The following equipment requirements must be met for eligibility purposes:

a. TES control system shall be fully automated providing integrated operation of the TES and site normal cooling system.
b. The following types of mature TES systems are eligible for this program:
    - Chilled water or other fluid;
    - Ice-on-coil (external melt);
    - Ice-on-coil (internal melt);
    - Encapsulated Ice or Phase Change Material;
    - Ice Harvester/Chiller;
    - Ice Slurry; and
    - Integrated Direct Expansion Packaged Units with Ice-on-Coil
    - TES system types not listed above will be reviewed on a case by case basis during the application process.
c. All equipment must be installed within 18 months of reservation of the customer's incentive. Extensions may be provided on a case by case basis.
d. All equipment eligible for incentives must be new with the exception of refurbished TES tanks.
e. The TES system must be installed at the customer premises.
f. All TES equipment receiving incentives must be installed and functioning for a minimum of 5 years post-installation.

g. All installed equipment applying for incentives must pass Title 24 standards, if applicable.
h. Vendor must provide their customer with a 5-year warranty of the installed TES system. This includes replacement of equipment for manufacturer defects or breakdown of the equipment with proper usage of the system.
i. TES equipment eligibility for this program is subject to the approval of the Utilities.

4.3 Ineligible for PLS Incentives

Fuel switching, adjustment of controls, retro commissioning and shifting achieved by best practices commissioning will not be considered for PLS incentives. The Utilities may, at any time, determine project eligibility and requirements for PLS incentives on a case by case basis.

5. Energy Efficiency Requirements

Customers investing in a TES system can benefit from transferring demand and energy consumptions out of the most costly periods of the day to help achieve large bill savings. Customers can increase their savings through the installation of energy efficient TES equipment. The PLS program supports customers addressing energy efficiency benefits as part of their TES system design, where applicable. Customers will be required to address the following energy efficiency requirements in their feasibility study:

a. For existing facilities, we require that customers use no more than 110% of the energy they currently use (pre-TES installation) to meet the same cooling load in the course of a full charge-discharge cycle. Customers will be required to address energy efficiency savings during the TES design phase.
b. For new construction, customers will be required that their chilled water system use no more than 110% of the annual energy of a minimally compliant chilled water system without a TES.

6. Incentives

Upon meeting all customer and equipment eligibility requirements, the customer or the customer's designee shall be eligible for a one-time incentive per designed kW shift. Full payment of the approved incentives for each project will be made once the TES system installation is complete. A TES system is considered "complete" when it is completely installed, interconnected, and capable of shifting cooling load in the manner and in the amounts for which it was designed. A Commissioning Report, as described in Section 8.1 of this proposal, must be submitted by the customer and approved by the utility before installation is considered complete.

Customers will be able to reserve incentives for PLS projects on a first-come, first served basis, as long as funding is available. The incentive levels proposed by SCE and PG&E are based on Energy Division's Feedback on Recommended Changes to Joint-IOU Proposal for PLS Program document sent to the Utilities on November 13, 2012. Their

recommended levels give preference to market adoption over cost-effectiveness considerations. SDG&E's incentive proposal is based on the anticipated substantial reduction in capacity and energy value of permanent load shift programs as early as 2017, due to the addition of large amounts of solar generation. Table 3 below shows the incentive levels per designed kW shift from each utility:

Table 3
Incentive Amounts by Utility

	PG&E ($/kW)	SCE ($/kW)	SDG&E ($/kW)
Thermal Energy Storage	$875	$875	$475

6.1 Project Cost Cap

The PLS incentive will not exceed 50% of the total eligible project cost and is also subject to the incentive cap per project as shown in Table 2. The customer's incentive amount will be the lesser of the incentive reservation amount calculated from the system-design (refer to Section 7.4) or 50% of the actual final installed total equipment cost.

Eligible project costs may be reduced for incentives or rebates received through other programs available from the utility. For example, if a customer receives energy efficiency credit/rebates for the install of a new chiller, the 50% cap will apply to project costs net of the other program credits/rebates.

A project cost cap has been put in place in order to allow customers to recover their remaining project costs through the TOU rates as they run their systems. The cap will also prevent customers from designing an oversized system, assuming that there is no need for the extra capacity. Holding the customer responsible for some costs of the project will make them more inclined to run their system and be involved in the overall design stage of their TES.

6.2 Eligible Project Costs

All equipment, labor and services directly related to providing the permanent load shift are eligible for incentives under the PLS program. The following items may be included as part of the project costs towards installing a TES system:

a. Labor Costs
   - Commissioning report costs
   - Installation costs

b. Feasibility Study Cost

c. Equipment Costs
   - Thermal Energy Storage and all materials directly related to the installation of a TES system

- Instrumentation Costs (i.e. Energy Management System, Monitoring Devices)

d. Training costs for operating the TES system and monitoring devices as described in Section 7 of this proposal.
e. Miscellaneous (i.e. tractor rental, earthquake cement)
f. Ultimately, the utility will maintain the discretion to determine which costs are eligible to receive incentives
g. Sales tax, freight and travel are not eligible for incentives and should not be included as part of the project costs.

Incentives will only be paid out for qualifying completed projects.

6.3 Incentive Payout

Customers will be issued qualified incentive payout after the TES system has been installed and has passed all the necessary commissioning requirements and receives final approval from the utility. (Refer to Section 8.1 for commissioning report requirements).

Customers will have the option to receive a portion of their incentives for approved projects ahead of installation. Customers can receive 25% of the cost of a feasibility study, to a maximum of $10,000, once the project has been approved by the utility and the customer commits to proceed with the proposed project. Customers will be able to recover the remaining cost of their feasibility study (subject to the 50% project cap) and other project costs post-installation. Post-installation payment will be the balance of the qualifying incentive amount, net of payments already distributed.

7. Incentive Calculations and Requirements

7.1 PLS TES Technology Incentive Process

Applicants will be eligible for incentive payment once they have met all of the programs requirements and have completed the high-level incentive/application process described below. The IOUs may determine the applicability of any program requirement for any application:

1. Complete and submit a PLS incentive application
2. Submit project Feasibility Study within 4 months of applying for the program incentive (minimum requirements for study provided in section 7.2)
3. Utility–commissioned engineer reviews application and the feasibility study
4. Incentive reservation amount is determined based on designed shift (see Table 3)
5. Customer commits to incentive program through a contract
6. [Optional] Customer eligible to receive some incentive payment for feasibility study costs (see section 6.3)
7. Customer installs all necessary equipment for PLS
8. Customer submits commissioning report and final project invoices

9. Post-install verification completed by Utility-commissioned engineer
10. Remaining program incentives are paid

7.2 Feasibility Study Requirements

An engineering-quality feasibility study will be required for all customers applying for this program. This study is to provide an evaluation of the technical feasibility and economic viability of installing a new TES system at the customer site. The study is to be completed by a professional mechanical engineer, licensed and registered in the State of California.

Submitting a feasibility study does not guarantee a customer incentives under the PLS program.

The following are the Utilities' minimum requirements that should be included in each feasibility study:

1. *Engineering Requirements and Administration (provided by the engineering firm completing the feasibility study)*
   a. Study must be completed by a Licensed California Professional Engineer (PE)
   b. The engineer will need to certify all design calculations and sign and stamp the study (PE stamp)
   c. Engineer contact information
   d. Site map and review
   e. Executive summary to be provided by engineering firm. Must include the following:
      - Evaluation of customer's ability to maintain system
      - Engineers recommendation of the best course of action and feasibility of the customer investing in a TES system

2. *Customer Site Information*
   a. Business description
   b. Customer information
      - Service account address
      - Utility electric rate schedule
      - Listing of existing affected buildings and a description of its usage
      - Site map

3. *Energy Models*
   a. Energy models of a customer's cooling load for an entire year will be required, which will include the hourly thermal cooling load profile for a 24 hour period for January through December based on expected operating schedule. Actual sub-metered cooling load data can be submitted if available, subject to approval by the

Utility. Customers can work with their utility on a case by case basis to determine if the 12 month cooling load requirement can be reduced if it is not necessary for the design and use of their TES system.

b. Energy models must come from a program that is:
    - Compliant with ASHRAE Standard 140
    - Non-proprietary
    - Acceptable to the Utility-commissioned engineer approving the feasibility study
    - Examples of acceptable energy model programs include eQuest and EnergyPro
c. The models must include:
    - Cooling load in tons without the TES system
    - Outdoor air temperature
    - Site Utility load (by the meter)
    - Total chiller plant power
    - List of all equipment in the chiller plant pre-installation of any new cooling equipment

4. *TES System Design*
    a. System description – this includes on-peak max power load for the plant by operating equipment. Load should be included for all equipment that will be turned on and off for on-peak load shifting
    b. Estimate of kW to be shifted on design day
    c. Proposed operating strategies
    d. Itemized equipment listing
    e. Designed system capacity in ton-hours
    f. Maintenance strategy plan
    g. Commissioning plan of the TES system
    h. Energy Efficiency analysis (refer to section 3)

5. *Monitoring Plan*
    a. Instrument list to complete functional tests and M&V with point names and specs
    b. One line schematic diagram with sensor placement
    c. Strategy for developing the baseline chilled water plant energy use

6. *Costs and Paybacks*
    a. Estimated itemized costs of equipment, labor, training, feasibility study and other miscellaneous costs
        - Provide guidelines for estimated costs
    b. TOU rate benefit analysis

c. Economic analysis
   - Net cost
   - Annual operating costs
   - Costs and benefit analysis
   - Payback period
   - Cash flow
   - Rate of return
   - Incentive calculations - PLS and other applicable incentives

7.3 Maximum Incentive Reservation

Customers will not be allowed to reserve incentives beyond their before-installation summer maximum on-peak cooling demand as determined by computer simulation/energy modeling-software programs such as eQuest or EnergyPro. The summer max on-peak cooling demand will be determined by the maximum on-peak cooling need simulated by an approved energy model program. This will prevent incentivizing over-sized TES system designs.

7.4 Calculating the Incentive Reservation

Energy simulation models, provided by software programs such as eQuest and/or EnergyPro, will be required to model a customer's cooling load for an entire year without a load-shifting system. Both retrofit and new construction customers will be subjected to the energy modeling process unless utility approved usage data is available.

The load reduction calculation will be based on approved simulated software energy models used for the system design rather than actual performance of the TES system post-installation.

Energy models will be used to determine a customer's cooling load profile over a year (8,760 hours). From the profile, the day with the greatest total cooling load in the summer on-peak hours will be identified. The capacity of the TES system will be applied to the on-peak period for that maximum cooling load day. The incentive will be based on the cooling tonnage (ton) shifted from the peak hour on that day. A conversion factor will be used to convert the cooling load shift tons to electricity load shift (kW). This methodology will be adopted for both full and partial storage systems.

The conversion factor is based on Title 24 average efficiency of water and air cooling chillers (including reciprocating, rotary screw and centrifugal type chillers). Refer to Table 112-D of the 2008 California Building Energy Efficiency Standards for the Coefficient of Performance (COP) efficiency levels by equipment type.[1] A conversion factor of 0.7kW/ton will be applied to water cooling chillers and 1.2kW/ton will be

[1] http://www.energy.ca.gov/2008publications/CEC-400-2008-001/CEC-400-2008-001-CMF.PDF

applied to air cooling chillers. Note that the 0.7 kW/ton and 1.2kW/ton conversion factors are an average calculation of the chiller types converted to an average kw/ton using the following recognized conversion equation:

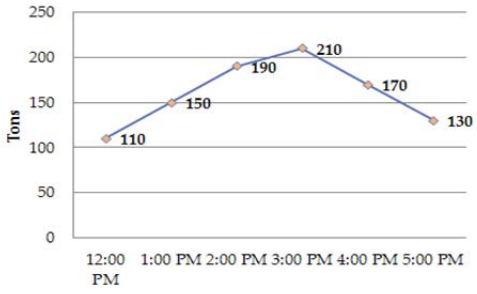
kW/ton = 12/(Coefficient of Performance x 3.412)

Upon completion of all requirements, customers will be entitled to the *lesser* of their calculated reserved kW shifted incentive or 50% of their verified total project cost. A customer's incentive reservation will not incorporate the 50% project cost cap, but the cap will be enforced to the invoice amount provided to the utility subject to approval.

Incentive Reservation Calculation Example *(for illustration purposes only):*

Example:

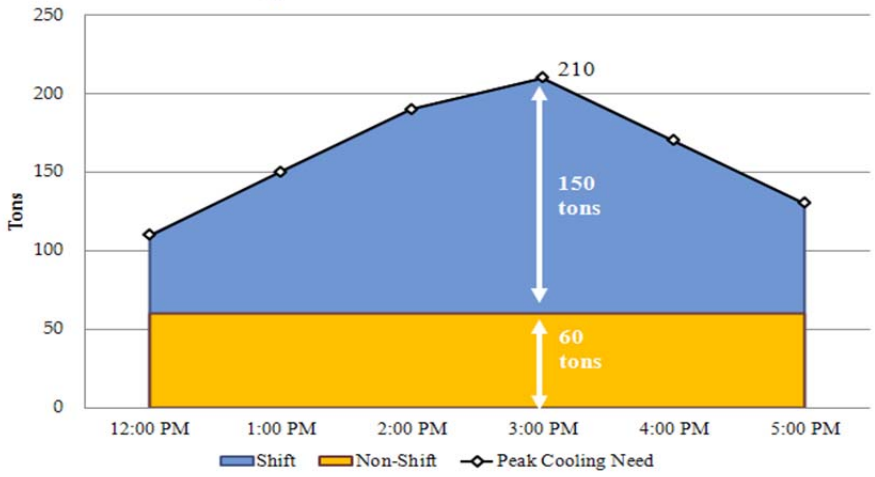
- TES Storage Tank Capacity = **600 ton-hours**
- Projected System Cost = **$120,000**
- Modeled Peak Cooling Need:

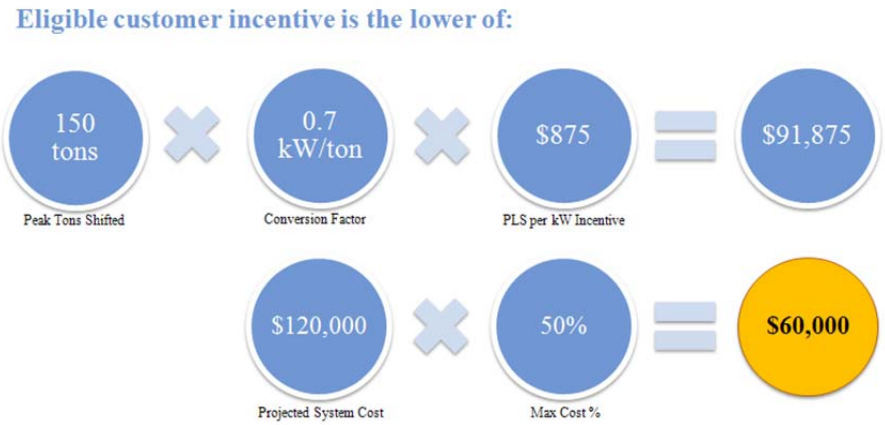


Inferred from the model:

- Max Summer On-Peak Cooling Demand = **210 tons**
- Total Peak Cooling Demand = **960 ton-hours**

Total Peak Cooling Demand





In the above example the customer would be eligible for a $60,000 incentive.

8. Post-Install Verification

Once the customer has installed the TES system, the customer will be required to submit all project invoices to be reviewed by a utility-commissioned engineer. The engineer will perform a post-install verification which will include a general site inspection, review of a commissioning report of the TES system, and verification of eligible project costs.

8.1 Comparison and Commissioning Report Requirements

The customer is required to submit to their utility a commissioning report that affirms all necessary equipment, piping, controls and measurement and verification instrumentation has been installed properly, functionally tested and ready for operation. This report is to be provided to the utility before a site inspection. Incentives will not be released to the customer until a site inspection and commissioning report has been approved by the utility.

Below are the minimum commissioning report requirements:

1. Documentation of installed system equipment. This includes schematic diagrams of equipment configurations and pictures of existing chillers, cooling towers and valve actuators and new TES tank, charge/discharge piping and valve actuators
2. Delivery of design intent documentation as demonstrated in the feasibility study
3. Documentation of actual installed plant sequence of operations
4. Modes of operation – control sequences such as charge, charge and chill, discharge, discharge and chill, off, and any seasonal changes
5. Documentation of adequate thermal capacity
6. Complete and submit CEC T24 Thermal Energy Storage functional test results (Functional Test Requirements to be provided during implementation of program).

7. TES entering temperature at which it reaches full charge. TES leaving fluid temperature set point
8. Documentation that M&V instrumentation (temperature sensors, flow meters and watt-hour meters) are installed and working properly and data is being gathered at the proper intervals.

A customer installing different equipment than what was originally proposed in the feasibility study will be required to provide an addendum to the feasibility study with the corrected installed equipment. Final incentive calculations will be based on the cooling capacity of installed equipment.

8.2 Penalty Structure

A customer that receives a PLS incentive will be contractually obligated to operate the TES load shifting equipment for 5 years from the date of installation signoff by the utility.

The customer agrees that the IOU can request a refund of the incentive if for any reason the customer removes the equipment during the first 5 years of operation, terminates service prematurely or does not operate the system as contracted.

9. Monitoring for Measurement and Verification

Customers will be required to install measurement and verification (M&V) instrumentation. This requirement will allow the utilities to conduct data analysis on cooling-load-shift performance and provide data for load impact evaluation. These monitoring devices also enable customers to optimize operation of their TES system.

The devices will monitor and record at least 3 months of the following data pre-install and continue post-install for the duration of the customer's PLS contract:

- Outdoor ambient temperature
- Electric demand (kW) of all chilled water plant equipment (all plant chillers, pumps and cooling tower fans)
- Chilled water return temperature
- Chilled water supply temperature
- Chilled water flow rate

Utilities may waive the pre-install monitoring requirements on a case by case basis.

Customers will be required to confirm functionality of their M&V devices in their commissioning report.

Approved monitoring equipment devices can be included in the overall project cost. Customers will be required to submit quarterly data to the utility providing the above requirements in this section.

10. Evaluation Measurement and Verification

D.08-04-050 requires annual ex ante load impact evaluation for all programs that have been adopted by the Commission and annual ex post evaluations of all programs that were in operation during the prior year. Statewide ex ante evaluations of the PLS program will be first filed on April 1, 2013 and each year thereafter. Ex post annual statewide Evaluation Measurement and Verification (EM&V) studies will commence once a full summer season of performance and usage data is available for a sufficient installation base of participating customers. Effective and efficient EM&V is dependent upon approval of the proposed collection of performance data from the M&V instrumentation (see section 9 above). This data will be analyzed to create customer-specific cooling demand models. These models will be compared to reference load models of alternate (non-TES) systems to determine peak load shift and total energy shifted from on-peak periods. Load impact evaluations will be overseen by the Statewide Demand Response Measurement and Evaluation Committee and the Load Impact Estimation Protocols for Demand Response will inform and provide guidance for PLS EM&V methodology.

As part of the Demand Response Measurement and Evaluation Committee (DRMEC) Process Evaluation Plan PY 2012-2014, DRMEC recommends conducting a statewide process evaluation of the PLS program to understand the efficacy of the newly redesigned program (from the original pilot programs during 2008-2011). While it is clear that a process evaluation will be both appropriate and necessary, a more detailed research plan for this evaluation cannot be developed until the program design is finalized.

The IOUs have agreed that after this program has launched, there will be opportunities to gain a better understanding of what aspects of the program design work and which do not work to make changes to future phases of program implementation.

11. Program Modification Process

A PLS Working Team will be established with representation from the IOUs and the Commission to develop the necessary program modification guidelines which prescribes the requirements, process and schedule for evaluation of modification requests. The working team will meet at least twice a year once the program has been implemented. These efforts will continue through 2013.

The program modification process will mirror the current Self-Generation Incentive Program Modification process with the steps outlined below:

1. Applicant Contacts Program Administrator
2. Proposal Distribution to Working Group
3. Proposal Presentation to Working Group
4. Working Group Recommendations
5. Applicant Comments to Recommendations
6. Submission of Working Group Recommendations to CPUC
7. Public Comment and CPUC Decision
8. Program Modification Implementation

ATTACHMENT B

Permanent Load Shifting Program Budget Breakdown by Utility

SCE Permanent Load Shifting Program Budget

Per D.12-04-045, $14,000,000 was approved for SCE's 2012-2014 PLS Program. Table 1 below provides a breakdown of the approved SCE PLS budget. Table 2 provides a breakdown of the budget that was used for cost-effectiveness purposes. This includes $250,000 that was approved for marketing under Demand Response Local Marketing and any allocated amounts ($83,195) to the PLS program that were approved through other funding sources. These allocated amounts ($83,195 for SCE) were included in the total administrative cost of the program when calculating for cost-effectiveness.

Table 1

SCE's Approved Permanent Load Shifting Program Budget

Category Description	2012-2014 Budget
Incentives Budget	**$12,690,000**
Direct PLS Program Administration	**$1,310,000**
Total Approved PLS Budget per D.12-45-045	***$14,000,000***

Table 2

SCE's Total Administration Budget Breakdown Including Marketing (Used for Cost-Effectiveness)

Category Description	2012-2014 Budget
Incentives Budget	**$12,690,000**
Direct PLS Program Administration	**$1,310,000**
Program Management - Indirect Program Support	$132,554
Program Management - Direct Program Support	$450,862
Non-Labor Program Support	$49,244
Engineering (Professional Services)	$677,340
DR Local Marketing - PLS	**$250,000**
Marketing (ME&O)	$250,000
Other Program Administration Allocations	**$83,195**
EM&V and Other Allocated Amounts	$83,195
Total PLS Budget for Cost-Effectiveness Purposes	***$14,333,195***

PG&E Permanent Load Shifting Program Budget

Per D.12-04-045, $15,000,000 was approved for PG&E's 2012-2014 PLS Program. Table 3 below provides a breakdown of the approved PG&E PLS budget. Table 4 provides a breakdown of the budget and allocations that was used for calculating the cost-effectiveness.

Table 3

PG&E's Approved Permanent Load Shifting Program Budget

Category Description	2012-2014 Budget
Incentives Budget (revised after Decision)	$13,500,000
Direct PLS Program Administration (revised after Decision)	$1,500,000
Total Approved PLS Budget per D.12-45-045	***$15,000,000***

Table 4

PG&E's Total Administration Budget Breakdown Including Marketing (Used for Cost-Effectiveness)

Category Description	2012-2014 Budget
Incentives Budget	**$13,500,000**
Direct PLS Program Administration	**$1,500,000**
Program Management - Indirect Program Support	-
Program Management - Direct Program Support	$300,000
Non-Labor Program Support	-
Engineering (Professional Services)	$1,200,000
DR Marketing - PLS	**$300,000**
Marketing (ME&O)	$300,000
Other Program Administration Allocations	**$610,000**
EM&V	$610,000
Total PLS Budget for Cost-Effectiveness Purposes	***$15,910,000***

SDG&E Permanent Load Shifting Program Budget

Per D.12-04-045, $3,000,000 was approved for SDG&E's 2012-2014 PLS Program. Table 5 below provides a breakdown of the approved SDG&E PLS budget. Table 6 provides a breakdown of the budget that was used for cost-effectiveness purposes. This includes $616,155 in allocated amounts that were included in the cost effectiveness calculations.

Table 5

SDG&E's Approved Permanent Load Shifting Program Budget

Category Description	2012-2014 Budget
Incentives Budget	$2,235,000
Direct PLS Program Administration	$765,000
Total Approved PLS Budget per D.12-45-045	***$3,000,000***

Table 6

SDG&E Total Administration Budget Breakdown Including Marketing (Used for Cost-Effectiveness)

Category Description	2012-2014 Budget
Incentives Budget	**$2,235,000**
Direct PLS Program Administration	**$765,000**
Program Management - Indirect Program Support	$85,651
Program Management - Direct Program Support	$338,099
Non-Labor Program Support	$25,800
Engineering (Professional Services)	$315,450
DR Local Marketing - PLS	
Marketing (ME&O)	-
Other Program Administration Allocations	**$616,155**
EM&V and Other Allocated Amounts	$616,155
Total PLS Budget for Cost-Effectiveness Purposes	***$3,616,155***

ATTACHMENT C

Statewide Permanent Load Shifting Cost-Effectiveness Evaluation

[Copies of the Excel files are available upon request by e-mail (advicetariffmanager@sce.com) or by telephone (626)-302-2930]

PLS Cost Effectiveness Evaluation

D.12-04-045 considers PLS to be different from other DR programs because PLS shifts energy usage on a permanent basis instead of merely decreasing energy usage during certain times. Because of this difference, the Commission finds it necessary and reasonable to review PLS and its cost-effectiveness analyses differently from the other DR programs. The Utilities jointly hired Energy and Environmental Economics (E3) to develop a PLS-specific cost-effectiveness section in the Commission's DR Reporting Template. Here are the cost-effectiveness results:

Table 1
Cost-Effectiveness Summary by Utility

	PG&E	SCE	SDG&E
Incentive Level ($/kW)	$875	$875	$475
Total Resource Cost (TRC)	0.80	0.69	0.82
Program Administrator Cost (PAC)	1.79	1.68	2.78
Ratepayer Impact Measure (RIM)	0.69	0.68	1.28
Participant Cost Test (PCT)	1.18	1.02	0.60

The Utilities met with ED several times to discuss the inputs to the cost-effectiveness model. The following are the input assumptions for the Utilities' PLS Reporting Template:

a. Lifecycle Amortization – All PLS benefits and costs are evaluated over the entire lifecycle, which is assumed to be 20 years for all Utilities. We assume that program administration costs end after the three-year program cycle, 2012-2014.

b. Load Impact – For PG&E and SCE, the annual maximum PLS megawatt (MW) load impact forecast is based on the Utilities jointly PLS incentive budgets. The monthly load impact is adjusted using an approximate load shape, as shown in the following table. SDG&E will be using its load impact forecast filed on June 1, 2012 in the cost-effectiveness analysis of PLS.

Table 2
PG&E and SCE's Monthly Load Shape Table

Month	May	Jun	Jul	Aug	Sep	Oct
% of MW	90%	96%	97%	100%	91%	91%

c. Roundtrip Efficiency – The Utilities jointly estimated the roundtrip efficiency to be 90% based on the calculations provided by Ice Bear in the 2012-2014 DR Programs and Budgets Application proceeding.

Adjustment Factors

Adjustment factors are used to adjust the avoided cost values or the benefits of a Demand Response program. In summary the five factors are as follows:

1. A-Factor (Availability Factor) – The A-factor represents the portion of capacity value that can be captured by the PLS program based on the frequency and duration of the energy shift from on-peak to off-peak. The Utilities jointly are basing the A-factor E3's top 250 hours for 2006-2009 historical loads. The Utilities also jointly assume that energy usage is shifted from on-peak to off-peak during TOU summer peak hours:
    - SCE TOU Summer Peak Hours: June-Sept, 12pm-6pm, weekdays only. This results in an A-factor of 72%.
    - PG&E TOU Summer Peak Hours: May-Oct, 12pm-6pm, weekdays only. This results in an A-factor of 75%.
    - SDG&E TOU Summer Peak Hours: May-Sept, 11pm-6pm, weekdays only. This results in an A-factor of 79%.

    The reason that the A-factors are less than 100% is because some of E3's hourly capacity allocators occur on the weekends, outside on-peak hours, and during the winter. Weekends have about 10% of the hourly load allocators. For PG&E and SCE the non on-peak hours account for about 6 percent of the hourly capacity allocation. For SCE the shorter summer season in accounts for an additional 1% reduction.

2. B-Factor (Notification time factor) – The B-Factor measures the relative value of Demand Response programs based on their notification times. Because the PLS technology is set to shift automatically on a set schedule, it requires no notification time. Therefore, the B-Factor is assumed to be 100%.

3. C-Factor (Trigger factor) measures the relative value of DR programs based on the flexibility of the program trigger. The C-Factor is assumed to be 100%.

4. D-Factor (Transmission & Distribution factor) – The D-Factor measures the extent to which a DR program avoids or defers Transmission and Distribution (T&D) system upgrades. The PLS D-Factor is assumed to be 50%. The D-factor can only be 100% if all customers are located on constrained circuits, which is not the case. Furthermore, SCE derates the D-factor to 25% to eliminate the O&M related to poles and wires which was included in the E3 calculator. This is also consistent with SCE's other DR programs in its DR Programs and Budgets Application.

5. E-Factor (Energy Price factor) – The E-Factor allows the IOUs adjust the avoided energy cost value in the DR Reporting Template. In the PLS Reporting Template, E3 had adjusted the energy avoided cost value to reflect that energy is shifted, not avoided, from the on-peak to the off-peak time period. Therefore, no further adjustments were needed for the energy avoided cost value, and the E-Factor is assumed to be 100%.

Sensitivities

The PLS Reporting Template includes a sensitivity analysis, showing how the benefit-cost ratios vary with changes in several key inputs. The cost-effectiveness analysis demonstrates the following variations in model inputs:

Equipment lifecycle - The base case for PLS equipment lifecycle is 20 years. The PLS section of the DR Reporting Template provides results for sensitivities for 10 years and 30 years.

Customer incentive - The base case for incentive is the ratepayer neutral incentive, which is $875/kW for PG&E, $875/kW for SCE, and $475/kW for SDG&E. The PLS Reporting Template provides results for sensitivities showing the lower bound of -50% and the upper bound of +50% for these incentive levels.

Qualitative Benefits

Energy Division published guidance for cost-effectiveness analyses in May 2012 pursuant to OP 83 of D.12-04-045. Item 7 of the guidance requires the utilities to provide qualitative descriptions of benefits to complement the quantitative inputs/outputs of the PLS Reporting Template. Below is a list of qualitative benefits that relate to the PLS program.

a. Spillover awareness effect – PLS can lead customers to be more aware of their energy usage. This can motivate them to enroll in other customer programs offered by the utility. Also, effective awareness encourages customers to promote

programs by word of mouth to their friends and neighbors (for residential programs) or business associates (for commercial), thus helping to widen the potential customer base.

b. Improved Choice - PLS gives customers more options for managing their electricity costs and improves the way they use energy.

c. Environmental and Societal benefits: Participation in PLS allows customers to lessen their impact on the environment. It also gives companies and corporations a better image of being environmentally friendly.

d. Local reliability – PLS installations may provide support for localized constraints.

e. Flexibility and versatility - PLS offers customers the ability to adjust their reduction commitments by blocks of hours to accommodate variations in their daily load and reduction capabilities.

f. Consistency of offering throughout the state - PLS is a statewide program with the ability to encourage participation in DR by businesses located in more than one service area.

PG&E Gas and Electric
Advice Filing List
General Order 96-B, Rule 4

1st Light Energy
AT&T
Alcantar & Kahl LLP
Ameresco
Anderson & Poole
BART
Barkovich & Yap, Inc.
Bartle Wells Associates
Bloomberg
Bloomberg New Energy Finance
Boston Properties
Braun Blaising McLaughlin, P.C.
Brookfield Renewable Power
CA Bldg Industry Association
CENERGY POWER
CLECA Law Office
California Cotton Ginners & Growers Assn
California Energy Commission
California League of Food Processors
California Public Utilities Commission
Calpine
Cardinal Cogen
Casner, Steve
Center for Biological Diversity
Chris, King
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City of Palo Alto Utilities
City of San Jose
City of Santa Rosa
Clean Energy Fuels
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Occidental Energy Marketing, Inc.
OnGrid Solar
PG&E
Praxair
R. W. Beck & Associates
RCS, Inc.
SCD Energy Solutions
SCE
SMUD
SPURR
San Francisco Public Utilities Commission
Seattle City Light
Sempra Utilities
Sierra Pacific Power Company
Silicon Valley Power
Silo Energy LLC
Southern California Edison Company
Spark Energy, L.P.
Sun Light & Power
Sunrun Inc.
Sunshine Design
Sutherland, Asbill & Brennan
Tecogen, Inc.
Tiger Natural Gas, Inc.
TransCanada
Turlock Irrigation District
United Cogen
Utility Cost Management
Utility Specialists
Verizon
Wellhead Electric Company
Western Manufactured Housing Communities Association (WMA)
eMeter Corporation