

**PROGRAM YEAR 1994  
9<sup>TH</sup> YEAR RETENTION STUDY  
PACIFIC GAS AND ELECTRIC COMPANY  
POWERSAVING PARTNERS PROGRAM**

**PG&E Study ID Numbers**

**Commercial Lighting PSP I                      399 – R2**

**March 1, 2004**

Measurement and Evaluation  
Customer Energy Management  
Policy, Planning & Support Section  
Pacific Gas and Electric Company  
San Francisco, California

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**EVALUATION OF  
PACIFIC GAS AND ELECTRIC COMPANY'S  
1994 POWERSAVING PARTNERS PROGRAM  
MEASURE RETENTION STUDY**

*Pacific Gas and Electric Company Study ID numbers 399 R2*

**Purpose of Study**

This study was conducted in compliance with the requirements specified in "Protocols and Procedures for Verification of Costs, Benefits, and Shareholder Earnings from Demand Side Management programs," as adopted by the California Public Utilities Commission Decision 93-05-063, revised January 1997 pursuant to Decisions 94-05-063, 94-10-059, 94-12-021, 95-12-054, and 96-12-079.

This study evaluated the measure retention from the following energy efficient technologies for which rebates were paid in 1994 by Pacific Gas and Electric Company's PowerSaving Partners (PSP) program.

- Commercial Lighting PSP I

**Methodology**

The M&V plans are consistent with the Measurement and Evaluation (M&E) protocols adopted by the Commission if such protocols exist. The Commission emphasized in Decision 93-05-063, p. 75:

*Payments to winning bidders do not need to be linked to the completion of specific ex-post measurement studies in the same manner as utility earnings. The utilities are expected to apply the basic concepts....., but to allow reasonable differences between these protocols and bidders' measurement plans and payment schedules.*

Pacific Gas and Electric Company has fully complied with the Commission ruling and created a rigorous energy verification plan as accurate for site-specific savings measurement as the Protocols used for the Utility Programs.

Pacific Gas and Electric Company developed the PSP DSM Measurement and Verification Procedures Manual (Manual) following the directions in Appendix H of the Measurement Protocols adopted in D. 94-05-063. That is, the 1993 NAESCO protocols were adapted to California conditions (e.g., use of Title 24 baselines where appropriate) and made more rigorous.

The PSP contract specifies that participants submit the results of monitoring data for each site, this data is used to revise savings estimates and corresponding payments annually, and is submitted for review in this report.

For the retention study, representatives of Pacific Gas and Electric Company performed annual inspections for each customer type of all projects implemented in 1994. If an error was discovered that showed the equipment to be inoperable or less efficient, the original claim was corrected. The ratio of the total corrected savings to the total savings originally claimed was used to calculate the Realization Rate.

### Study Results

The results of the analyses are summarized below:

<b>PY1994 9th Year Retention Study</b> <b>PowerSaving Partners I</b> <b>Study ID # 399R2</b>	Realization Rates	
	Peak kW	Annual kWh
PY94 PowerSaving Partners I: Commercial Lighting	0.80	0.76

### Regulatory Waivers and Filing Variances

PG&E received a waiver for all its pre-1998 programs modifying the 3<sup>rd</sup> and 4<sup>th</sup> earnings claim methodology in 1999. All 3<sup>rd</sup> and 4<sup>th</sup> earnings claim impacts are to be calculated as the sum of the measure level AEAP values as adjusted by the appropriate ex post Technical Degradation Factors (TDF) and Effective Useful Life (EUL) values.

PG&E received a waiver when it filed its Third Earnings Claim for the PowerSaving Partners program in 2000, allowing it to use site specific M&V reports, supported by random verification, to support its 1995 PSP Program third earnings claim. This methodology has been used in the current report.

The Appendices of this report contain confidential customer information and are submitted as such under CPUC Code Section 583.

**PROGRAM YEAR 1994**  
**9<sup>TH</sup> YEAR RETENTION STUDY**  
**PACIFIC GAS AND ELECTRIC COMPANY**  
**POWERSAVING PARTNERS PROGRAM**

PG&E Study ID Numbers

Commercial Lighting PSP I = 399 – R2

March 1, 2004

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## **EXECUTIVE SUMMARY**

The following documents evaluate the electric energy savings measured for Pacific Gas and Electric Company's PowerSaving Partners (PSP) Program for program year 1994. The PSP program is designed to provide Pacific Gas and Electric Company customers with an opportunity to purchase "turnkey" energy efficiency services supplied by privately-owned energy services companies.

The PSP program consists of two phases; the original PSP I program, and PSP II, the Integrated Bid pilot program. This study verifies peak kW and annual kWh savings for the measures installed in PY1994. The savings were originally claimed in the 1995 AEAP Earnings Claim, and updated in the 1996 and 1999 AEAP Earnings Claims. The measures evaluated include:

- Power Saving Partners I: Commercial Lighting

The study documents the ninth year of performance of PY1994 projects, and provides the results of a thorough and rigorous monitoring study made by each of the PowerSaving Partners and evaluated by Pacific Gas and Electric Company. PowerSaving Partners are required to sample and meter all sites where measures are installed in order to receive payments for energy savings. This study tabulates the results of the Partner's findings. These findings are the basis for each realization rate claim.

For PSP PY1994 third earnings claim program accomplishments (filed in the 1999 AEAP Proceedings), Pacific Gas and Electric Company claimed 941 kW and 6,336 MWh of gross annual energy savings. These accomplishments were derived from the commercial market sectors. Table One lists the results of the Measurement and Verification (M&V) for these contracts by program end use.

## PSP REALIZATION RATES

TABLE ONE

PY1994 9th Year Retention Study PowerSaving Partners I Study ID # 399R2	3rd Earnings Claim		4th Earning Claim		Realization Rates (4th EC/3rd EC)	
	Peak kW	Annual kWh	Peak kW	Annual kWh	Peak kW	Annual kWh
PY94 PowerSaving Partners I: Commercial Lighting	941	6,336,384	757	4,794,215	0.80	0.76
<b>Total</b>	<b>941</b>	<b>6,336,384</b>	<b>757</b>	<b>4,794,215</b>	<b>0.80</b>	<b>0.76</b>

## PROGRAM BACKGROUND

### PowerSaving Partners I

In March 1992, the CPUC mandated that Pacific Gas and Electric Company implement a pilot bidding program for DSM resources (D.92-03-038). In good faith, Pacific Gas and Electric Company conducted a bid auction, and announced the list of winning bidders in April 1993. The CPUC found the winning DSM contracts to be reasonable in Decision(s) 93-11-067, 94-04-039 and 95-10-037.

All PSP contracts are based on pay-for-performance over a contract life ranging from eight to ten years. The PowerSaving Partners perform Measurement and Verification (M&V) of energy savings each contract year before reporting program results.

Payments are based on initial savings projections and then reconciled according to actual verified energy savings after one year. If savings are not achieved as projected, payments are modified and future savings projections are adjusted. A method for collecting overpayments, should they occur, is contained in each contract. This reconciliation process occurs annually throughout the duration of the contracts.

The M&V plans are consistent with the Measurement and Evaluation (M&E) protocols adopted by the Commission in all instances where such protocols exist. The Commission emphasized in Decision 93-05-063, p. 75:

*Payments to winning bidders do not need to be linked to the completion of specific ex-post measurement studies in the same manner as utility earnings. The utilities are expected to apply the basic concepts....., but to allow reasonable differences between these protocols and bidders' measurement plans and payment schedules.*



Pacific Gas and Electric Company has fully complied with the Commission ruling and created a rigorous energy verification plan as accurate for site-specific savings measurement as the Protocols used for the Utility Programs.

### **MEASUREMENT & VERIFICATION METHODOLOGY**

A short discussion of existing M&V requirement for each of the PowerSaving Partners will assist in explaining the methodology for this realization report.

Pacific Gas and Electric Company developed the PSP DSM Measurement and Verification Procedures Manual (Manual) following the directions in Appendix H of the Measurement Protocols adopted in Decision 94-05-063. That is, the 1993 NAESCO protocols were adapted to California conditions (for example, use of Title 24 baselines where appropriate) and made more rigorous. The Manual was reviewed and, in its final form, accepted by all PowerSaving Partners. The Manual was adopted in its entirety for the PSP contract with the State of California (now UC Davis) partly due to the fact that it covers all aspects of M&V electric savings.

The following list outlines the topics covered the M&V Procedures Manual:

- Common requirements and definitions
- Submittal requirements for each project
- M&V procedures for lighting efficiency and lighting controls measures
- M&V procedures for constant load motors
- M&V procedures for variable load motors and HVAC measures
- Maintenance and management plans
- Sample forms and report outlines

Following is a summary of the measurement strategy based on the lighting efficiency end-use group.

### Lighting Efficiency Measures

1. The Partner surveys and records the existing condition (baseline) and new (post-installation) conditions to include exact fixture and lamp counts, ballast types, and usage areas. Usage areas *must* be defined in a way that combines areas with similar operating characteristics. For example, areas where comparable average operating hours are determined by the proportion of lights in operation during each of the five Pacific Gas and Electric Company costing periods would be grouped together. Pacific Gas and Electric Company independently verifies the reported baseline and post-installation conditions.
2. Approved lighting project wattages are listed in the *Table of Standard Wattages* and used to determine the kW per fixture for pre- and post-installation conditions. Operating hours are derived by short term metering of fixture 'on-time' within the various Time of Use costing periods. The short term metering duration is determined by market segment and typically ranges from 30 to 120 days. The required sample size for metering is calculated to achieve 90% confidence at 10% precision. The majority of measures installed by PSP in PY2000 were lighting efficiency retrofits and the M&V followed by each and every Partner conforms to the above statements.

### **REALIZATION STUDY METHODOLOGY**

The PY1994 Pacific Gas and Electric Company savings claim was comprised of savings from a total of 39 Project Codes<sup>1</sup>. The Project Codes were aggregated by end use or sector and reported in the 1994 E tables, and updated in the second and third earnings claim studies. The following tables document the realization rate that is derived by comparing the current measured savings and the measured savings claimed in the third earnings claim for each Project Code.

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<sup>1</sup> Project Code identifies each site and each end use.

### 2003 Realization Rate Study by End Use

Table 2, "Realization Rate Study by End Use" lists a Project Code, the kW and kWh savings associated with that code and reported in the third earnings claim, and the current year measured kW and kWh savings as determined by analyzing metering and monitoring data. The gross realization rate is equal to the savings measured in 2003 divided by the savings claimed in the third earnings claim.

### 2003 Realization Rate by Partner

Table 3, "Realization Rate by Partner," lists the same information as table 2; however, each of the Project Codes is sorted by participating Partner.

### Protocol Table 6

Protocol Table 6 lists the kW and kWh savings as reported in the 1999 AEAP claim, and currently measured kW and kWh savings as determined by analyzing metering and monitoring data for 2003 performance.

The **gross** realization rate is equal to the current savings measured in 2003 divided by the 1998 savings (as claimed in the 1999 AEAP).

The **net** realization rate is equal to the current savings measured in 2003 (weighted by the appropriate Net-to-Gross ratio) divided by the 1998 savings (as claimed in the 1999 AEAP).

The Net-to-Gross ratios were defined in the original PSP contracts. Each end use or study has a separate Protocol Table 6.

## Appendix

The Appendix contains three sets of documents for each Partner. There are 5 Partners that installed projects in 1994.

The first set of documents, the Annual Reports, are comprised of site-specific information and submitted, as required, by the specific Measurement and Verification Plan, as prescribed by the M&V Manual. The information is the tabulation of actual monitored data from data loggers installed at each site, or at a representative sample of similar sites. The data was analyzed for Pacific Gas and Electric Company by a third party, Nexant, Inc. The approved hours of operation for each usage group were used, in part, to determine contract payments and incorporated into the invoices for the following year.

The second set of documents for each Partner includes the forms that describe the approved hours of operation, and the kW and kWh savings that determine payment levels.

The third set of documents for each Partner consists of forms that describe the baseline equipment, the retrofit equipment, and all usage group designations. For non-lighting projects, the equipment tables, hours of operation and kW and kWh savings are consolidated on one form and found in the second tabbed section of that Partner's data. In all cases, after an installation is approved, the tables are loaded into the PSP database and a kW savings (connected load reduction) is calculated and recorded for each usage group. Savings are reported as maximum kW savings (connected load reductions). The forms are stored on a compact diskette and included with this report.

Kilowatt savings (connected load reductions) are reported as average, on-peak kW savings. That is, the total maximum kW savings (connected load reductions) are multiplied by a ratio of the hours of operation in the on-peak period, divided by 774, the maximum on-peak hours in the 1993 baseline calendar year. The energy savings (kWh) reported are a product of the maximum kW reduction multiplied by the total hours of operation.

Per the Manual, the first year savings claim is based on engineering estimates. Each successive year savings claim is based on metered data gathered during the previous year.

## **SUMMARY**

Pacific Gas and Electric Company has adhered to or exceeded the basic concepts of ex-post measurement protocols by implementing the adjusted NAESCO standards for the first and second set of DSM bidding contracts. The kW and kWh realization rates in this study link the savings measured at 39 sites to the values reported in the third earnings claim filed in the 1999 AEAP in support of the original Pacific Gas and Electric Company PY1994 earnings claim.

Table 2  
 PY1994 Realization Study for 4th Earning Claim  
 Study 399 R2: Commercial Lighting PSPI

CODE	Sector	End Use Measure	3rd Earning Claim		4th Earning Claim		4th EC/3rd EC	
			Measured Peak kW Savings	Measured kWh Savings	Measured Peak kW Savings	Measured kWh Savings	Peak kW Realization Rate	kWh Realization Rate
PALAALAARD	Commercial	Lighting	94.86	466,023.08	87.18	423,889.57	0.92	0.91
PALAALADEN	Commercial	Lighting	20.22	106,121.65	18.29	100,117.41	0.90	0.94
PALAALAEOC	Commercial	Lighting	9.75	60,402.13	9.89	59,172.08	1.01	0.98
PALAALARKS	Commercial	Lighting	20.30	110,549.25	22.88	123,511.76	1.13	1.12
PALAALATIC	Commercial	Lighting	52.41	262,472.62	51.84	246,446.17	0.99	0.94
PALAALATON	Commercial	Lighting	39.69	195,775.20	32.07	150,042.18	0.81	0.77
PALACON03	Commercial	Lighting	7.03	51,309.33	5.63	40,898.71	0.80	0.80
PALACON04	Commercial	Lighting	6.60	47,626.82	5.51	39,749.81	0.83	0.83
PALACON06	Commercial	Lighting	7.40	54,179.50	6.02	43,847.69	0.81	0.81
PALACON08	Commercial	Lighting	7.51	55,160.21	5.90	42,796.49	0.79	0.78
PALACON09	Commercial	Lighting	2.90	19,950.09	2.16	14,921.28	0.74	0.75
PALACON21	Commercial	Lighting	7.61	54,690.50	6.25	44,897.24	0.82	0.82
PALACON22	Commercial	Lighting	2.41	16,178.95	1.03	7,977.31	0.43	0.49
PALACON25	Commercial	Lighting	10.57	73,147.68	10.27	71,632.85	0.97	0.98
PALACON31	Commercial	Lighting	11.81	77,932.27	10.31	71,570.76	0.87	0.92
PALACON32	Commercial	Lighting	12.17	81,280.73	10.56	73,942.63	0.87	0.91
PALACON33	Commercial	Lighting	12.05	80,166.87	10.38	72,347.21	0.86	0.90
PALAHOSR21	Commercial	Lighting	1.64	5,562.42	1.32	5,112.41	0.80	0.92
PALAHOSR22	Commercial	Lighting	2.12	7,552.78	1.79	7,036.65	0.84	0.93
PALAHOSR26	Commercial	Lighting	0.06	340.23	0.05	329.71	0.83	0.97
PCCCCCLKE	Commercial	Lighting	9.60	80,644.11	10.07	82,161.24	1.05	1.02
PCCCCCLKW	Commercial	Lighting	24.49	195,914.19	24.83	194,026.80	1.01	0.99
PNORNOBB22	Commercial	Lighting	43.59	341,763.45	35.64	294,707.76	0.82	0.86
PNORSAF196	Commercial	Lighting	53.88	476,363.60	40.55	316,051.37	0.75	0.66
PNORSAF304	Commercial	Lighting	38.68	355,581.37	10.96	82,973.91	0.28	0.23
PNORSAF316	Commercial	Lighting	43.74	388,379.37	0.00	0.00	0.00	0.00
PNORSAF618	Commercial	Lighting	51.19	455,681.32	23.23	175,889.06	0.45	0.39
PNORSAF781	Commercial	Lighting	55.25	512,409.88	42.21	373,033.73	0.76	0.73
PNORSAF915	Commercial	Lighting	41.46	382,397.69	24.59	218,960.67	0.59	0.57
PPROKAIANR	Commercial	Lighting	15.40	85,079.59	14.67	87,235.08	0.95	1.03
PPROKAIAPA	Commercial	Lighting	22.48	113,670.57	22.19	128,511.97	0.99	1.13
PPROKAIICH	Commercial	Lighting	39.97	195,574.40	38.54	210,639.90	0.96	1.08
PPROKAIIEW	Commercial	Lighting	16.35	83,384.33	15.80	88,770.49	0.97	1.06
PPROKAIILP	Commercial	Lighting	26.98	139,334.91	26.99	153,560.19	1.00	1.10
PPROKAIILR	Commercial	Lighting	18.02	92,571.05	16.88	93,424.33	0.94	1.01
PPROKAINOV	Commercial	Lighting	19.77	95,118.53	18.78	96,001.58	0.95	1.01
PPROKAIOCK	Commercial	Lighting	52.78	289,676.81	51.84	307,408.01	0.98	1.06
PPROKAITUL	Commercial	Lighting	13.38	72,366.84	13.20	75,899.47	0.99	1.05
PSANPSANLC	Commercial	Lighting	24.65	154,050.00	26.55	174,720.00	1.08	1.13
<b>Total</b>			<b>941</b>	<b>6,336,384</b>	<b>757</b>	<b>4,794,215</b>	<b>0.80</b>	<b>0.76</b>

Table 3  
 PY1994 Realization Rates by Partner

CODE	Sector	End Use Measure	3rd Earning Claim		4th Earning Claim		4th EC/3rd EC	
			Measured Peak kW Savings	Measured kWh Savings	Measured Peak kW Savings	Measured kWh Savings	Peak kW Realization Rate	kWh Realization Rate
<b>County of Alameda</b>								
PALAALAARD	Commercial	Lighting	94.86	466,023.08	87.18	423,889.57	0.92	0.91
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<b>EUA/CCS</b>								
PCCCCCLKE	Commercial	Lighting	9.60	80,644.11	10.07	82,161.24	1.05	1.02
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<b>Noresco1</b>								
PNORNOBB22	Commercial	Lighting	43.59	341,763.45	35.64	294,707.76	0.82	0.86
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<b>Proven Alternatives/ ABB/GESF</b>								
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<b>City of San Jose</b>								
PSANPSANLC	Commercial	Lighting	24.65	154,050.00	26.55	174,720.00	1.08	1.13
<b>Total</b>			<b>941</b>	<b>6,336,384</b>	<b>757</b>	<b>4,794,215</b>	<b>0.80</b>	<b>0.76</b>

**Protocol Table 6 (items 1-4)**

**PG&E Realization Study of 1994 PowerSaving Partners I Program, Study I.D. 399 R-2 Commercial Lighting**

Number	Table Item Description	Estimate	Relative Precision	
			*	Confidence
1.A	Pre-installation usage, Base usage, and Base usage per designated unit of measurement.	N/A	N/A	N/A
1.B	Impact Year usage, Impact year usage per designated unit of measurement.	N/A	N/A	N/A
2.A	Claimed Peak kW (Demand) Impacts	941	100%	N/A
	Claimed kWh (Energy) Impacts	6,336,384	100%	N/A
	Claimed thm (Therm) Impacts	N/A	100%	N/A
	Measured Peak kW (Demand) Impacts	757	100%	N/A
	Measured kWh (Energy) Impacts	4,794,215	100%	N/A
	Measured thm (Therm) Impacts	N/A	100%	N/A
2.B	Per designated unit* Gross Demand Impacts	N/A	N/A	N/A
	Per designated unit* Gross Energy Impacts	N/A	N/A	N/A
	Per designated unit Gross Therm Impacts	N/A	N/A	N/A
	Per designated unit* Net Demand Impacts	N/A	N/A	N/A
	Per designated unit* Net Energy Impacts	N/A	N/A	N/A
	Per designated unit Net Therm Impacts	N/A	N/A	N/A
2.C	Percent change in usage (relative to base usage) of the participant group and comparison group.	N/A	N/A	N/A
2.D	Gross Demand Realization Rate	0.80	100%	N/A
	Gross Energy Realization Rate	0.76	100%	N/A
	Gross Therm Realization Rate	N/A	N/A	N/A
	Net Demand Realization Rate	0.80	100%	N/A
	Net Energy Realization Rate	0.76	100%	N/A
	Net Therm Realization Rate	N/A	N/A	N/A
3.A	Net-to-Gross ratio based on Avg. Load Impacts	1.00	100%	1%
3.B	Net-to-Gross ratio based on Avg. Load Impacts per designated unit* of measurement.	1.00	100%	1%
3.C	Net-to-Gross ratio based on Avg. Load Impacts as a percent change from base usage	N/A	N/A	N/A
4.A	Pre-installation Avg. (mean) Sq. Foot (participant group)	N/A	N/A	N/A
	Pre-installation Avg. (mean) Sq. Foot (comparison group)	N/A	N/A	N/A
	Pre-installation Avg. Hours of Operation (participant group)	N/A	N/A	N/A
	Pre-installation Avg. Hours of Operation (comparison group)	N/A	N/A	N/A
4.B	Post-installation Avg. (mean) Sq. Foot (participant group)	N/A	N/A	N/A
	Post-installation Avg. (mean) Sq. Foot (comparison group)	N/A	N/A	N/A
	Post-installation Avg. Hours of Operation (participant group)	N/A	N/A	N/A
	Post-installation Avg. Hours of Operation (comparison group)	N/A	N/A	N/A

\* The measurement standards used in PSP meet or exceed NAESCO standards which uphold the 90/10 requirement mandated by CPUC Protocols. Hence, all load impact estimates are at or above the 90% precision, 10% confidence interval.