VOLUME I:
IMPACT EVALUATION OF THE 2000 STATEWIDE LOW-INCOME ENERGY EFFICIENCY (LIEE) PROGRAM

FINAL REPORT

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Southern California Edison
Southern California Gas Company
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Prepared by

XENERGY Inc.
Oakland, California

and

Business Economic Analysis & Research
Lemon Grove, California

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E

EXECUTIVE SUMMARY

This report documents the impact evaluation of the statewide Low Income Energy Efficiency (LIEE) Program for Program Year (PY) 2000. The participating utilities are Southern California Edison Company (SCE), Pacific Gas and Electric Company (PG&E), San Diego Gas and Electric Company (SDGE), and Southern California Gas Company (SoCalGas).

E.1 PROGRAM BACKGROUND

The LIEE program provides assistance to low-income customer groups throughout the state. The assistance consists of free installation of energy-efficiency measures, energy education, and repair and/or replacement of space heating and evaporative cooling equipment. The program serves an important equity objective in assisting customers who are highly unlikely or unable to participate in other residential conservation programs because of income constraints. This program allows income-eligible customers to receive the benefits of energy conservation without the hardship of making cash investments.

Measures included in the LIEE program (across all service territories but not by all utilities) include:

- Evaporative cooler installation (permanent or portable)
- Relamping
- Weatherization
- Energy education
- Refrigerator replacement
- Porch lamp fixture replacement
- Furnace repair and replacement.

E.2 EVALUATION OVERVIEW

Objective

The primary objective of the impact evaluation was to determine first-year gas and electric impacts resulting from the program.

Evaluation Approach

The impact evaluation utilizes a billing analysis approach. Monthly household electricity and natural gas consumption, both before and after program intervention, are modeled in regression equations as a function of program participation variables and other explanatory variables such as weather, dwelling type, and survey variables. Engineering-based program savings variables were incorporated into the analysis for some measures to develop more detailed measure-specific

results than could be obtained from a simple billing analysis. For the LIEE program, net savings are assumed to be equal to gross savings.

Data

Data used to support the evaluation came from a variety of sources, including:

- Program tracking system data for PY 2000 from each of the utilities;
- Utility billing data—monthly electricity and natural gas use for the January 1999 to October 2001 period;
- Weather data from multiple weather stations in each utility service area; and
- Telephone survey data for a sample of 1000 customers, split evenly between each utility.

E.3 KEY FINDINGS

E.3.1 Total Program Impacts

Table E-1 provides a summary of PY2000 LIEE program impacts. Overall, the program is estimated to be saving 17.5 GWh per year and 1.8 Mth per year. SCE accounts for 39 percent of the program participants and 43 percent on the statewide electric savings. PG&E accounts for 29 percent of the program participants, 50 percent of the electric savings, and 55 percent of the gas savings. SDG&E accounts for 12 percent of the participants, 8 percent of the electric savings, and 11 percent of the gas savings. SoCalGas accounts for 19 percent of the participants and 34 percent of the gas savings.

Table E-1
Summary of PY2000 LIEE Program Annual Impacts

Utility	Participants	Total Impacts		Average Impact per Participant	
		kWh	Therms	kWh	Therms
SCE	48,977	7,504,085		153.2	
PG&E	36,467	8,758,693	1,002,435	240.2	27.5
SDG&E	14,973	1,326,092	191,694	88.6	12.8
SoCalGas	24,271		618,765		25.5
Total	124,688	17,588,871	1,812,894	175.2*	23.9*

* kWh averages exclude SoCalGas and therm averages exclude SCE.

E.3.2 Per Unit Measure Impacts

Per-unit measure savings for non-weather-sensitive measures are presented in Table E-2. These savings were not found to vary significantly by utility. Unit savings are expressed on a per-home basis, except for CFLs, which are expressed on a per-bulb basis. Measure savings vary by dwelling type, with the exception of refrigerators in the PG&E and SDG&E service areas.

Table E-2
Annual Per-Unit Savings – Non-Weather-Sensitive Measures

Measure	Dwelling Type	kWh per Year	Therms per Year
Faucet Aerators	Multifamily	41.2	0.9
	Single Family	48.4	1.4
Low Flow Showerheads	Multifamily	203.3	6.1
	Single Family	239.2	9.1
Water Heater Blankets	Multifamily	163.0	4.9
	Single Family	191.8	7.3
Water Heater Pipe Wrap	Multifamily	115.3	1.8
	Single Family	135.6	2.7
Lighting - CFLs SCE	Multifamily	22.8	
	Single Family	22.4	
Lighting - CFLs PG&E	Multifamily	22.5	
	Single Family	22.3	
Lighting - CFLs SDG&E	Multifamily	29.3	
	Single Family	26.1	
Refrigerators SCE	Multifamily	695.4	
	Single Family	711.6	
Refrigerators PG&E and SDG&E	Multifamily	644.7	
	Single Family	644.7	

Per-unit savings for measures affecting electric weather-sensitive end uses are presented in Table E-3. Impacts are higher for single-family dwellings, except for the SCE evaporative cooler measure, where more multifamily dwellings are located in warmer climate zones. Heating savings are highest for PG&E, which has the coldest climate, followed by SCE, and then SDG&E. (SDG&E ceiling insulation values were used for SCE because SCE had too few participants receiving ceiling insulation [six dwellings] to develop independent estimates.) Cooling savings tend to be highest again for PG&E, followed generally by SDG&E, and then SCE. Again impacts are driven by location of participants in the various climate zones in California.

Table E-3
Annual Per-Unit Savings – Weather-Sensitive Electric Measures – kWh per Year

Measure	Dwelling Type	SCE		PG&E		SDG&E	
		Heating	Cooling	Heating	Cooling	Heating	Cooling
Caulking	Multifamily	4.7	2.6	6.0	4.5	3.7	2.3
	Single Family	6.9		8.5	8.2	5.1	2.7
Ceiling Insulation	Multifamily	34.4		59.0	70.2	34.4	
	Single Family	50.1		81.6	110.7	50.1	43.5
Duct Sealing	Multifamily						
	Single Family					13.4	7.3
Evaporative Cooler Covers	Multifamily			18.7			
	Single Family			24.0		15.8	
Building Envelope Repair	Multifamily	14.8	5.1	20.8	14.1	12.9	7.0
	Single Family	21.6		29.3	25.1	18.0	8.1
Weather stripping	Multifamily	4.2	1.7	6.1	4.5	3.7	2.4
	Single Family	6.2		8.5	8.2	5.2	2.8
Evaporative Coolers	Multifamily		618.1		384.2		
	Single Family		397.2		446.2		

Table E-4 shows per-unit savings for measures affecting gas heating. As with weather-sensitive electric measures, impacts are largest for single-family dwellings. PG&E, with the coldest climate, shows the largest per-unit savings. SDG&E and SoCalGas impacts are fairly similar, but vary based on the location of participants who received particular measures.

Table E-4
Annual Per-Unit Savings – Weather-Sensitive Natural Gas Measures – Therms per Year

Measure	Dwelling Type	PG&E	SDG&E	SoCalGas
Caulking	Multifamily	1.6	2.0	0.7
	Single Family	3.3	2.5	1.5
Ceiling Insulation	Multifamily	18.7	11.0	9.6
	Single Family	34.2	16.9	18.7
Duct Sealing	Multifamily			
	Single Family		1.8	
Evaporative Cooler Covers	Multifamily	4.0		4.1
	Single Family	7.2	4.3	8.1
Building Envelope Repair	Multifamily	4.6	3.8	2.2
	Single Family	8.8	5.5	4.4
Weather stripping	Multifamily	1.6	2.0	0.7
	Single Family	3.3	2.7	1.4
Furnace Filters	Multifamily	2.3		
	Single Family	4.7		
Furnace Repair	Multifamily	42.9	16.0	
	Single Family	42.9	23.0	24.4
Furnace Replacement	Multifamily	147.2		
	Single Family	147.2	84.3	110.1

1 INTRODUCTION

This report documents the impact evaluation of the statewide Low Income Energy Efficiency (LIEE) Program for Program Year (PY) 2000. The participating utilities are Southern California Edison Company (SCE), Pacific Gas and Electric Company (PG&E), San Diego Gas and Electric Company (SDGE), and Southern California Gas Company (SoCalGas). Southern California Edison Company (SCE) managed this project on behalf of all the California investor-owned utilities in accordance with the Joint Recommendation on the Program Year 2000 (PY2000) LIEE Program Shareholder Incentive Mechanism.

1.1 PROGRAM DESCRIPTION

Since the early 1980s, California's investor-owned natural gas and electricity utilities have offered programs designed to support energy services to the low-income community. These programs have taken a number of forms. At this time, all four utilities administer both California Alternate Rates for Energy (CARE) and LIEE programs. The LIEE program consists of weatherization, energy-efficiency, and energy education components.

The LIEE program provides assistance to low-income customer groups throughout the state. The assistance consists of free installation of energy-efficiency measures, energy education, and repair and/or replacement of space heating and evaporative cooling equipment. The program serves an important equity objective in assisting customers who are highly unlikely or unable to participate in other residential conservation programs because of income constraints. This program allows income-eligible customers to receive the benefits of energy conservation without the hardship of making cash investments.

The utilities use a variety of community-based organizations (CBOs) and local contractors to locate and recruit households that qualify for program participation, i.e., households whose annual incomes are less than the low-income weatherization income limits established by the California Public Utilities Commission. Staff from these entities receive training by each utility or utility representatives in the installation of ceiling insulation and other conservation measures.

Measures included in the LIEE program (across all service territories but not by all utilities) include:

- Evaporative cooler installation (permanent or portable)
- Relamping
- Weatherization
- Energy education
- Refrigerator replacement
- Porch lamp fixture replacement
- Furnace repair and replacement.

Table 1-1 lists the PY2000 LIEE measures that are applicable for one or more of the utilities, and Table 1-2 summarizes PY2000 LIEE Program accomplishments.

Table 1-1
PY2000 LIEE Program Installed Measures

Attic access install	Door weatherstrip	Glazing compound	Thresholds installed
Attic access weatherstrip	Eave/soffit vents	HWD lights	Thresholds repaired
Attic insulation	Energy education	Low-flow showerheads	Turbine vents
Attic venting	Evaporative cooler cover	Miscellaneous (nails, tape)	Utility gaskets
MHR	Evaporative cooler	Mobile home repairs	Wall repairs
Caulking	Exterior CFL fixtures	Pipe insulation	Water heater blankets
CFLs	Faucet aerators	Plumbing repair	Weatherization
Cover plates replaced	Furnace filters	Refrigerator replacement	Weatherstrip
CVA	Furnace repair	Roof jack vents	Window area repair
Doors repaired	Furnace replacement	Shower adapters	Window pane replacement
Doors replaced	Glass replacement	Switch/outlet gaskets	Window repair

Table 1-2
PY2000 LIEE Program Reported Accomplishments

Units	Measure	PG&E	SDG&E	SCE	SCG	Total
# of households	In-Home Energy Education	42,038	13,896	46,032	22,617	[1]<101,966
	Energy Education Workshops	n/a	26,575	n/a	11,621	38,196
	Weatherization	32,730	9,893	1,347	22,617	66,587
# of units	Gas Furnace	494	7,893[2]	-	2,996	11,383
	Refrigerator	4,317	714	2,613	-	7,644
	Evaporative Cooler	1,623	21	2,083	-	3,727
	CFLs	141,774	27,413	200,341	-	369,528

Notes:
[1] The total number of households that received energy education in PY2000 and are budgeted to receive energy education in PY2001 do not include SoCalGas energy education, because there may be overlap between homes in SoCalGas/SCE overlap territory that received energy education from both utilities. The extent of the overlap was not examined as part of this effort.
[2] SDG&E performs furnace services on all gas furnaces assessed; both minor repairs and major repairs are provided.

1.2 EVALUATION OBJECTIVES

The impact evaluation is intended to quantify first-year load impacts by developing savings estimates for PY2000 installed measures based on billing analysis. These savings estimates will be used to assess energy savings and update forecasting assumptions. In addition, the billing analysis of PY2000 installed measures is a formal part of the filing requirements of the PY2000 earnings assessment.

1.3 EVALUATION APPROACH

The impact evaluation utilizes a billing analysis approach. Monthly household electricity and natural gas consumption, both before and after program intervention, are modeled in regression equations as a function of program participation variables and other explanatory variables such as weather, dwelling type, and survey variables. Engineering-based program savings variables were incorporated into the analysis for some measures to develop more detailed measure-specific results than could be obtained from a simple billing analysis.

Two types of billing analysis models were developed and integrated to assess impacts:

- Models using all PY2000 program participants with adequate billing data plus a control group consisting of all PY1998 participants with adequate billing data; and
- Models using a subset of PY2000 program participants who were administered a telephone survey.

The primary reason for collecting telephone survey data for a subset of participants is to remove uncertainty about end-use fuel types present in the home and to assess non-program changes at the home that could affect energy consumption and mask program savings.

1.4 REPORT ORGANIZATION

The remainder of this report is organized as follows:

- Section 2, Methodology, provides a description of the research methods and data used in the study
- Section 3, Analysis and Results, presents the study findings and results
- Appendix A provides a copy of the telephone survey instrument and response frequencies
- Appendix B contains M&E Protocols Table 6 and Table 7.

2 METHODOLOGY

2.1 OVERVIEW

This section presents the study methodology. First, the study sample design is presented, followed by a discussion of the data collection activities. Finally, the analysis approach is presented.

A billing analysis approach was used to develop savings estimates for the LIEE program. Two sets of electric and gas regression models were developed and integrated to provide program impact results: models based on all program participants who had adequate billing data, and models utilizing a subset of 1,000 participants who were administered a telephone survey.

2.2 SAMPLE DESIGN

The impact evaluation sample design was used to select program participants for telephone surveys that were used to augment the billing analysis. In the sample design, each utility was allocated 250 sample points. These points were spread among various measure types and dwelling types.

The goal of the sample design was to include enough observations for each different measure type and dwelling type for a successful billing analysis. Therefore, sample cells are set up in a way to increase the likelihood that all relevant measures are included in the analysis, and minimum cell quotas are set to ensure that enough observations for each measure-type/dwelling-type combination are covered.

The following subsections present the sample design for each utility. In each subsection, we first show counts of dwellings where each different measure type was installed. We then show results aggregated into more manageable segments for the sample design. Dwelling types were aggregated into two or three groups for each utility—single family (including mobile homes), multi-family, and "unknown." Finally, we show target sample counts of dwellings in the aggregated segments. Finally, we compare dwelling counts, by segment, for the total program population, the portion of the population that had sufficient billing data for our analysis, and the portion of the population that were surveyed.

2.2.1 SCE

Table 2-1 presents counts of SCE dwellings that received measures as part of the PY2000 LIEE program, based on tracking system data. Counts are presented by each dwelling type provided in the tracking system. For SCE, there were a total of 51,263 participating homes in the PY2000 program. The most common measures were lighting measures, installed in over 45,000 homes. Evaporative coolers and refrigerators were installed in over 2,000 homes each. The

weatherization measures were installed in 1,347 homes. About 60 percent of the homes participating in the SCE program were multifamily dwellings (condominiums and apartments).

Table 2-1 also shows the aggregate measure and dwelling type categories that were used to facilitate the sample design.

Table 2-1
SCE PY2000 LIEE Program Accomplishments
Tracking System Counts of Dwellings that Received Different Measures

Aggregate Measure Segment	Detailed Measure Category	Dwelling Type					Total
		Single Family Segment		Multifamily Segment			
		Single Family	Mobile Home	Condo-minium	Apartment (2-4 units)	Apartment (5+ units)	
Water Heating	Water Heater Blanket			1	8	41	50
	Pipe Insulation				7	11	18
	Faucet Aerators	5	1	2	44	209	261
Other Weatherization	Low Flow Showers	11	2	91	111	971	1,186
	Caulking	6	1	105	82	883	1,077
	Weather stripping	11	2	107	127	1100	1,347
	Building Envelope Repair	8	1	103	112	1062	1,286
	Switch/Outlet Gaskets	11	2	107	124	1083	1,327
	Ceiling Insulation	1				5	6
	Sun Screen	4		43	18	342	407
Evap Coolers	Evaporative Coolers	1,639	394	23	3	24	2,083
Refrigerators	Refrigerators	732	214	321	136	1,210	2,613
Lighting	Relamping	4,281	1,556	3,499	1,048	7,060	17,444
	Program=7000 (lighting)	6,179	3,174	3,693	1,696	13,034	27,776
Total Dwellings*		11,759	5,089	7,552	2,972	21,635	48,977

* Reflects unique homes in the program. Columns do not sum to the total because multiple measures may be installed in the same home.

Table 2-2 shows dwelling counts for the aggregate SCE segments, and Table 2-3 shows the SCE sample design. For the sample design, each segment was initially allocated 20 sample points. Then the remaining sample points were allocated proportionately, based on the number of dwellings that received a particular measure.

Table 2-2
SCE: Dwelling Counts by Aggregate Segments

Measure Type	Dwelling Type		
	Single Family	Multiple Family	Total
Water Heating	6	259	265
Other Weatherization	13	1,333	1,346
Evaporative Coolers	2,033	50	2,083
Refrigerators	946	1,667	2,613
Lighting	15,190	30,030	45,220
Total Dwellings*	16,848	32,129	48,977

* Reflects unique homes in the program. Columns do not sum to the total because multiple measures may be installed in the same home.

Table 2-3
SCE: Sample Design

Measure Type	Dwelling Type		
	Single Family	Multiple Family	Total
Water Heating	29		29
Other Weatherization	31		31
Evaporative Coolers	44		44
Refrigerators	26	32	58
Lighting	37	51	88
Total			250

Segment Assignment, Bill Screening, and Completed Surveys

To select the sample for telephone surveys, each dwelling participating in the LIEE program had to be assigned to a unique sampling segment. (Recall in Tables 2-1 and 2-2, many dwellings received multiple measures; this is why the columns in these tables do not sum to the total number of dwellings.) Assignment of each dwelling to a unique segment avoids the potential for sampling a given dwelling more than once.

To accomplish this assignment, dwellings that received measures from the least populous measure group were allocated to the first segment. Thus, all SCE program participants who received water heating measures (see Table 2-2) were allocated to the water heating segment. Then the remaining dwellings that received measures from the next least populous measure group were assigned to the next segment. Thus, all SCE participants who received "other weatherization" measures but who did not receive any water heating measures were assigned to the "other weatherization" segment. This process continued until all the dwellings were assigned to a unique segment.

Next, each dwelling was screened for adequate billing data. The screening criteria included the following:

- The dwelling could be matched to the billing system
- The dwelling had an individually metered account
- There were all nonnegative bill reads associated with the account
- The account had adequate pre-installation and post-installation billing data (12 months pre, and 9 months post).

Finally, the telephone survey house attempted to attain the targeted sample sizes for each segment. In several cases, the target sample size could not be attained and the remaining surveys were reallocated to other segments.

Table 2-4 summarizes the segment assignment, bill screening, and surveying process. The target sample is also included in the table for cross-reference to Table 2-2.

Table 2-4
Segment Assignment, Bill Screening, and Completed Surveys

Measure Type	Dwelling Type	Total Dwellings	Screened Dwellings	Target Sample Size	Completed Surveys
Water Heating	All	265	107	29	29
Other Weatherization	All	1,082	362	31	32
Evaporative Coolers	All	2,083	1,041	44	45
Refrigerators	Single Family	946	542	26	26
Refrigerators	Multifamily	1,667	801	32	32
Lighting	Single Family	13,856	6,441	37	37
Lighting	Multifamily	29,078	10,239	51	49
Total		48,977	19,533	250	250

2.2.2 PG&E

Table 2-5 presents counts of PG&E dwellings that received measures as part of the PY2000 LIEE program, based on tracking system data. Counts are presented by each dwelling type provided in the tracking system.

For PG&E, there were 36,259 participating homes in the PY2000 program. Predominant measures installed in over 80 percent of the PG&E participants' homes are low-flow showerheads, faucet aerators, caulking, weatherstripping, building envelope repair, switch outlet gaskets, and CFLs. Dwelling type was not indicated by PG&E's PY2000 program administrator for about half of the PG&E participants. The remaining homes were split about evenly between single-family and multi-family dwellings.

Table 2-5 also shows the aggregate measure and dwelling-type categories that were used to facilitate the sample design.

Table 2-5
PG&E PY2000 LIEE Program Accomplishments
Tracking System Counts of Dwellings that Received Different Measures

Aggregate Measure Segment	Detailed Measure Category	Dwelling Type				Total
		Single Family Segment		MF Segment	Unknown Segment	
		Single Family	Mobile Home	Multi family	Unknown	
Furnace Repair/Replace	Furnace Replace	8	1	1	41	51
	Furnace Repair	127	7	4	342	480
Evaporative Coolers	Evaporative Coolers	934	66	59	1,463	2,522
Refrigerators	Refrigerators	296	42	57	3,981	4,376
Evap Cool Cover	Evap Cooler Cover	2,404	271	553	3,050	6,278
Ceiling Insul	Ceiling Insulation	3,195	2	779	3,542	7,518
Furnace Filters	Furnace Filters	4,243	472	2,441	7,746	14,902
Water Heating	Water Heater Blanket	5,111	363	1,388	7,785	14,647
	Pipe Insulation	3,569	297	1,193	5,519	10,578
Other Measures	Faucet Aerators	8,878	584	6,976	14,527	30,965
	Caulking	8,993	590	7,110	15,075	31,768
	Weather stripping	8,973	590	6,499	14,744	30,806
	Switch/Outlet Gaskets	8,976	592	7,069	15,012	31,649
	CFLs	8,444	565	7,092	14,099	30,200
	Low-Flow Showers	8,344	514	6,536	13,908	29,302
	Envelope Repair	7,923	448	5,308	12,069	25,748
Total Dwellings*		9,301	656	7,747	18,763	36,467

* Reflects unique homes in the program. Columns do not sum to the total because multiple measures may be installed in the same home.

Table 2-6 shows dwelling counts for the aggregate PG&E segments, and Table 2-8 shows the PG&E sample design. Because of the large number of PG&E segments resulting from the large "unknown" dwelling type category, each segment was initially allocated 9 sample points. Then the remaining sample points were allocated proportionately, based on the number of dwellings that received a particular measure. Finally, the "Furnace Repair/Replace," "Refrigerator," and "Evaporative Cooler" segments were augmented and sample was reduced for the other segments to ensure each measure received adequate sample points for the billing analysis.

Table 2-6
PG&E: Dwelling Counts by Aggregate Segments

Measure Type	Dwelling Type			
	Single Family	Multiple Family	Unknown	Total
WH Blanket / Pipe Insulation	6,366	1,650	8,918	16,934
Ceiling Insulation	3,197	779	3,542	7,518
Evaporative Cooler Cover	2,675	553	3,050	6,278
Furnace Filter	4,715	2,441	7,746	14,902
Furnace Repair/Replace	143	5	383	531
Evaporative Coolers	1,000	59	1,463	2,522
Refrigerators	338	57	3,981	4,376
Others	9,825	7,734	15,904	33,463
Total Dwellings*	9,957	7,747	18,763	36,467

* Reflects unique homes in the program. Columns do not sum to the total because multiple measures may be installed in the same home.

Table 2-7
PG&E Sample Design

Measure Type	Dwelling Type			
	Single Family	Multiple Family	Unknown	Total
WH Blanket / Pipe Insulation	13	10	13	36
Ceiling Insulation	11	10	11	32
Evaporative Cooler Cover	11	9	11	31
Furnace Filter	12	11	14	37
Furnace Repair/Replace	25			25
Evaporative Coolers	13		11	24
Refrigerators	14		15	29
Others	12	11	13	36
Total				250

Segment Assignment, Bill Screening, and Completed Surveys

Similar to SCE, the PG&E dwellings had to be assigned to unique segments. Then bill screening was conducted. Finally, surveys were completed. Table 2-8 summarizes the segment assignment, bill screening, and surveying process for PG&E.

Table 2-8
PG&E Segment Assignment, Bill Screening, and Completed Surveys

Measure Type	Dwelling Type	Total Dwellings	Screened Dwellings	Target Sample Size	Completed Surveys
WH Blanket / Pipe Insulation	Single Family	1,008	594	13	13
WH Blanket / Pipe Insulation	Multifamily	440	197	10	10
WH Blanket / Pipe Insulation	Unknown	1,462	955	13	13
Ceiling Insulation	Single Family	1,833	1,070	11	11
Ceiling Insulation	Multifamily	586	188	10	10
Ceiling Insulation	Unknown	1,850	1,151	11	11
Evaporative Cooler Cover	Single Family	2,387	1,342	11	11
Evaporative Cooler Cover	Multifamily	538	224	9	9
Evaporative Cooler Cover	Unknown	2,417	1,500	11	11
Furnace Filter	Single Family	2,216	1,373	12	12
Furnace Filter	Multifamily	1,885	694	11	11
Furnace Filter	Unknown	4,101	2,271	14	14
Furnace Repair/Replace	All	531	264	25	25
Evaporative Coolers	Single/Multi Family	1,023	733	13	13
Evaporative Coolers	Unknown	1,416	1,014	11	11
Refrigerators	Single/Multi Family	219	159	14	14
Refrigerators	Unknown	3,784	637	15	15
Others	Single Family	1,120	663	12	12
Others	Multifamily	4,185	2,215	11	11
Others	Unknown	3,466	2,088	13	13
Total		36,467	19,332	250	250

2.2.3 SDG&E

Table 2-9 presents counts of SDG&E dwellings that received measures as part of the PY2000 LIEE program, based on tracking system data. Counts are presented by each dwelling type provided in the tracking system.

For SDG&E, there were a total of 14,973 participating homes in the PY2000 program. Predominant measures installed in over 80 percent of the SG&E participants' homes are building envelope repair measures and CFLs. Most of the participating dwellings were mobile homes and multi-family units.

Table 2-9 also shows the aggregate measure and dwelling type categories that were used to facilitate the sample design.

Table 2-9
SDG&E PY2000 LIEE Program Accomplishments
Tracking System Counts of Dwellings that Received Different Measures

Aggregate Measure Segment	Detailed Measure Category	Dwelling Type			Total
		Single Family Segment		MF Segment	
		Single Family	Mobile Home	Multi Family	
Evaporative Cooler Cover	Evaporative Cooler Cover	2	613	0	615
Refrigerators	Refrigerators	57	655	1	713
Water Heating Insulation	Water Heater Blanket	133	842	121	1,096
	Pipe Insulation	51	1,109	16	1,176
Duct Sealing	Duct Sealing	2	3,906	0	3,908
Furnace Replacement	Furnace Replacement	38	213	0	251
Furnace Repair	Furnace Repair	148	244	111	503
Other Water Heating Measures	Low Flow Showers	509	3,452	2,559	6,520
	Faucet Aerators	503	4,670	2,515	7,688
Other Weatherization Measures	Caulking	692	5,330	3,475	9,497
	Weather stripping	696	3,375	3,500	7,571
	Envelope Repair	1,206	5,464	3,536	10,206
	Switch/Outlet Gaskets	586	3,494	2,662	6,742
	Ceiling Insulation	107	0	9	116
Lighting	CFLs	1,005	8,175	3,467	12,647
Total Dwellings*		1,206	8,681	5,086	14,973

* Reflects unique homes in the program. Columns do not sum to the total because multiple measures may be installed in the same home.

Table 2-11 shows dwelling counts for the aggregate SDG&E segments, and Table 2-12 shows the SDG&E sample design.

Table 2-10
SDG&E: Dwelling Counts by Aggregate Segments

Measure Type	Dwelling Type		
	Single Family	Multiple Family	Total
WH Blanket / Pipe Insul	1,809	128	1,937
LF Shower / Faucet Aerator	5,706	3,027	8,733
Evaporative Cooler Cover	615	0	615
Other Weatherization	6,195	3,543	9,738
Duct Sealing	3,908	0	3,908
Refrigerators	712	1	713
Furnace Replace	251	0	251
Furnace Repair	392	111	503
CFL	9,180	3,467	12,647
Total Dwellings*	9,887	5,086	14,973

* Reflects unique homes in the program. Columns do not sum to the total because multiple measures may be installed in the same home.

Table 2-11
SDG&E Sample Design

Measure Type	Dwelling Type		
	Single Family	Multi Family	Total
WH Blanket / Pipe Insul	20		20
LF Shower / Faucet Aerator	20	15	35
Evaporative Cooler Cover	20		20
Other Weatherization	23	18	41
Duct Sealing	25		25
Refrigerators	20		20
Furnace Replace	20		20
Furnace Repair	15	14	29
CFLs	25	15	40
Total			250

Segment Assignment, Bill Screening, and Completed Surveys

Similar to SCE, the SDG&E dwellings had to be assigned to unique segments. Then bill screening was conducted. Finally, surveys were completed. Table 2-8 summarizes the segment assignment, bill screening, and surveying process for SDG&E.

Table 2-12
SDG&E Segment Assignment, Bill Screening, and Completed Surveys

Measure Type	Dwelling Type	Total Dwellings	Screened Dwellings	Target Sample Size	Completed Surveys
WH Blanket / Pipe Insul	All	1,522	328	20	20
LF Shower / Faucet Aerator	Single Family	1,293	355	20	20
LF Shower / Faucet Aerator	Multifamily	2,858	889	15	15
Evaporative Cooler Cover	Single Family	539	46	20	19
Other Weatherization	Single Family	205	61	23	23
Other Weatherization	Multifamily	518	199	18	18
Duct Sealing	All	1,975	278	25	25
Refrigerators	All	574	79	20	23
Furnace Replace	All	251	53	20	22
Furnace Repair	Single Family	386	117	15	16
Furnace Repair	Multifamily	111	28	14	9
CFLs	Single Family	3,265	577	25	25
CFLs	Multifamily	1,476	339	15	15
Total		14,973	3,349	250	250

2.2.4 SoCalGas

Table 2-13 presents counts of SoCalGas dwellings that received measures as part of the PY2000 LIEE program, based on tracking system data. Counts are presented by each dwelling type

provided in the tracking system. For SoCalGas, there were a total of 23,842 participating homes in the PY2000 program. Predominant measures installed in over 75 percent of the SoCalGas participants' homes are caulking, weather stripping, building envelope repair, low-flow showerheads, faucet aerators, and switch/outlet gaskets. About two-thirds of the participating dwellings were single-family units.

Table 2-13 also shows the aggregate measure and dwelling type categories that were used to facilitate the sample design.

Table 2-13
SoCalGas PY2000 LIEE Program Accomplishments
Tracking System Counts of Dwellings that Received Different Measures

Aggregate Measure Segment	Detailed Measure Category	Dwelling Type			Total
		Single Family Segment		MF Segment	
		Single Family	Mobile Home	Multi Family	
Evaporative Cooler Cover	Evaporative Cooler Cover	352	155	28	535
Furnace Replacement	Furnace Replacement	2,283	0	0	2,283
Furnace Replace/Repair	Furnace Replace/Repair	300	0	0	300
Ceiling Insulation	Ceiling Insulation	1,478	0	834	2,312
Pipe Insulation	Pipe Insulation	1,521	392	740	2,653
Water Heater Blanket	Water Heater Blanket	2,223	121	1,207	3,551
Other Measures	Low Flow Showers	10,804	873	6,118	17,795
	Faucet Aerators	12,436	1,161	7,266	20,863
	Caulking	9,585	1,137	6,463	17,185
	Weatherstripping	13,407	1,255	7,754	22,416
	Building Envelope Repair	12,985	661	7,551	21,197
	Switch/Outlet Gaskets	11,152	1,200	5,774	18,126
Total Dwellings*		15,202	1,276	7,793	24,271

* Reflects unique homes in the program. Columns do not sum to the total because multiple measures may be installed in the same home.

Table 2-15 shows dwelling counts for the aggregate SoCalGas segments, and Table 2-16 shows the SoCalGas sample design. First, each segment was initially allocated 16 sample points. Then the remaining sample points were allocated proportionately, based on the number of dwellings that received a particular measure. Finally for SoCalGas, the "Furnace Replace and Repair" and "Evaporative Cooler Cover" segments were augmented and the sample was reduced for the other segments.

Table 2-14
SoCalGas: Dwelling Counts by Aggregate Segments

Measure Type	Dwelling Type		
	Single Family	Multiple Family	Total
Water Heater Blankets	2,344	1,207	3,551
Pipe Insulation	1,913	740	2,653
Ceiling Insulation	1,478	834	2,312
Evaporative Cooler Cover	507	28	535
Furnace Replace	2,283	0	2,283
Furnace Replace/Repair	300	0	300
Others	14,767	7,790	22,557
Total Dwellings*	16,478	7,793	24,271

* Reflects unique homes in the program. Columns do not sum to the total because multiple measures may be installed in the same home.

Table 2-15
SoCalGas Sample Design

Measure Type	Dwelling Type		
	Single Family	Multiple Family	Total
Water Heater Blankets	21	17	38
Pipe Insulation	20	16	36
Ceiling Insulation	19	16	35
Evaporative Cooler Cover	30		30
Furnace Replace	35		35
Furnace Repair	30		30
Others	26	20	46
Total			250

Segment Assignment, Bill Screening, and Completed Surveys

Similar to SCE, the SoCalGas dwellings had to be assigned to unique segments. Then bill screening was conducted. Finally, surveys were completed. Table 2-8 summarizes the segment assignment, bill screening, and surveying process for SoCalGas.

Table 2-16
Segment Assignment, Bill Screening, and Completed Surveys

Measure Type	Dwelling Type	Total Dwellings	Screened Dwellings	Target Sample Size	Completed Surveys
Water Heater Blankets	Single Family	1,306	843	21	21
Water Heater Blankets	Multifamily	672	304	17	17
Pipe Insulation	Single Family	1,547	897	20	20
Pipe Insulation	Multifamily	645	326	16	16
Ceiling Insulation	Single Family	1,324	850	19	19
Ceiling Insulation	Multifamily	825	403	16	16
Evaporative Cooler Cover	All	528	215	30	30
Furnace Replace	Single Family	2,218	1,555	35	35
Furnace Repair	Single Family	361	234	30	30
Others	Single Family	9,233	5,843	26	26
Others	Multifamily	5,612	1,976	20	20
Total		24,271	13,446	250	250

2.3 DATA COLLECTION

This subsection outlines the data collection activities and data sources that were used for the project. A number of different data elements were used to support the billing analysis, including:

- Telephone survey data
- Program tracking system data
- Utility billing data
- Weather data.

Sources for these data are discussed next.

2.3.1 Telephone Surveys

Telephone surveys were conducted to support the impact analysis. The telephone surveys focused on four main categories:

1. Measure verification: whether or not the measures are installed
2. Household information: holdings of key appliances, number of residents, home size
3. Household changes: additions/removals of major appliances and changes in the number of residents, additional conservation
4. Process questions: satisfaction with the program and the measures.

A copy of the telephone survey instruments is provided in Appendix A.

Survey Process

Gilmore Research, an experienced survey research firm, was subcontracted to conduct telephone surveys of program participants. Gilmore has been used on previous evaluation projects and has demonstrated the capability to administer surveys in both English and Spanish, a requirement for this project given the relatively large number of Hispanic participants.

XENERGY provided the survey instrument and customer sample, in electronic form, to Gilmore. The survey instrument was programmed into a CATI (computer-assisted telephone interviewing) system. The CATI system ensures that the survey is filled out consistently and that complete survey contact records are retained.

The survey instrument was pretested on 20 participants prior to finalization. Minor adjustments were required to the instrument to improve the flow of the survey and to reduce overall length of the survey.

At the completion of the survey, Gilmore Research returned the completed survey databases (in dbase format) to XENERGY. XENERGY loaded the data into PC-SAS datasets for incorporation into the analyses.

2.3.2 Program Tracking System Data

The utilities each provided program tracking data for each of the their programs. These data included:

- Customer identification (name, address, phone number, account number, etc.);
- Measure installation dates;
- Measure descriptions and quantities;
- Customers demographics (age category, language type, income); and some
- Home and end-use information (home size, home type, presence of electric heating, electric water heating, and air conditioning).

All data were sufficiently documented and organized to facilitate incorporation into the analyses.

2.3.3 Billing Data

The utilities provided XENERGY with two separate extracts of billing data. First, an initial extract of data were provided for all program participants for use in the survey sample development. Second, a final extract of monthly billing data for the January 1999—October 2001 period were provided for all participants for use in the billing analysis. The data spanned a period sufficient to comply with the M&E Protocols.

Billing data consisted of kWh and therm consumption, electric and gas revenue amounts, meter read dates, and days in the billing period.

2.3.4 Weather Data

The utilities provided daily average temperature data for each available weather station for the January 1990—October 2001 period. This period covered the dates included in the billing histories and also provided a 10-year period to construct "average" temperature conditions for use in normalizing savings estimates. A mapping of each customer to the appropriate weather station also was provided.

Heating degree-day and cooling degree-day variables were calculated on a daily basis. These variables were aggregated to each customer's billing month based on individual meter read dates.

2.4 ANALYSIS APPROACH

A billing-analysis approach was used to estimate measure savings. This methodology used multivariate regression models to estimate household energy use in terms of program participation, while controlling for changes in weather, household characteristics, and other market/demographic conditions.

The analysis was implemented using monthly data (in a pooled time series/cross-sectional model). The general form of the monthly model is:

$$Use_{it} = \mu_i + \tau_t + \beta_1 PART_{it} + \sum_{j=2}^{n} \beta_j X_{itj} + \varepsilon_{it}$$

where:

Use_{it}	=	Average daily electric or gas use for customer *i* in time period *t*
$PART_{it}$	=	Program participation indicator for customer *i* in time period *t* equal to one after program implementation and zero prior to implementation
X_{itj}	=	Other explanatory variables that could affect energy use
μ_i	=	Dummy variable, 1 for customer *i*, 0 otherwise
τ_t	=	Dummy variable, 1 for time period *t*, 0 otherwise
β's	=	Estimated parameters
ε_{it}	=	Error term.

The parameter in the above equation is β_1, the coefficient reflecting impacts of program participation and installing measures. For the analysis, multiple PART variables can be included to develop impact results by different measure groups. The program savings variables can be interacted with other customer attributes (such as housing type, type of air conditioner, and weather variables) to develop savings estimates that vary by key customer group. In an alternative specification, the PART variable can be replaced by engineering-based estimates of program savings (in kWh or therms per day). Then the β_1 coefficient represents an estimate of the program or measure realization rate, the fraction of the savings estimate realized in customer bills.

The customer-specific level variables, μ_i, and the time-specific level variables, τ_t, are included to control for "fixed-effects," the stable but unmeasured characteristics of each customer and time period. The fitting of these two sets of fixed effects eliminates two important potential sources of intercorrelation among the model residuals. The customer-specific variables adjust for each customer's base use, facilitating the calibration to customer bills. We will explore models both with and without these fixed effects.

The X_{itj} variables can include weather variables (interacted with the presence of space cooling and/or electric space heating), non-program factors that affect energy consumption (such as family additions, major appliance purchases, additions of cooling capacity, non-program conservation, etc.), and customer classification variables (housing type, weather zone, etc.). In addition, energy prices may be useful in the model to capture customer responses to increasing energy bills. These variables help control for non-program factors that can obscure the estimates of program savings.

Two types of electric and gas billing analysis models were developed for this study. The first set of models was developed using data for all Program Year (PY) 2000 participants who had adequate billing data for inclusion in the study (a minimum of 12 months of pre-installation data and 9 months of post-installation data). A control group consisting of PY 1998 participants with adequate billing data was included in the analysis to help control for non-program effects.

A second set of models was developed for a subset of 1,000 PY 2000 participants who were administered a telephone survey. The survey data were collected in an attempt to develop a better understanding of measure installations, key household appliance holdings, and non-program changes that occurred in the home.

3 ANALYSIS AND RESULTS

3.1 OVERVIEW

This section describes the billing analysis models that were developed for this evaluation and presents the impact estimate results that were obtained from the models.

3.2 BILLING ANALYSIS

The following topics are covered in the billing analysis discussion:

- Development of initial measure savings estimates
- Billing analysis of all participants with adequate billing data
- Billing analysis of participants with survey data
- Discussion and integration.

3.2.1 Initial Measure Savings Estimates

As discussed in Section 2, initial measure savings estimates can be used as explanatory variables in the billing analysis. This approach was especially useful for the weatherization and water heating measures, where it was possible to have multiple measures targeted at a single end use, but it was difficult to include too many measure variables into a single regression equation.

Table 3-1 summarizes the initial measure savings estimates used for key weatherization measures in the analysis. Savings estimates were developed from two key sources: the LIEE Bill Savings Report,[1] and the previous LIEE impact evaluation for the 1998 program.[2] In addition, an initial savings estimate of 560 kWh per year was utilized for the PG&E and SDG&E refrigerator replacement measures. Customer-specific refrigerator savings estimates were provided by SCE, averaging 1,304 kWh per home.

[1] *Joint Utility Low Income Energy Efficiency Program Costs and Bill Savings Report*, Final Report, February 1, 2001 (Revised as of March 5, 2001).

[2] Parris, Kenneth, *First Year Load Impact Study of 1998 Low Income Energy Efficiency Programs for Pacific Gas and Electric Company, San Diego Gas and Electric Company, Southern California Edison Company, Southern California Gas Company*, April 2000.

Table 3-1
Initial Weatherization Measure Savings Estimates

Measure	Electric - kWh per Year			Gas - Therms per Year	
	AC	Space Heat	Water Heat	Space Heat	Water Heat
Attic Insulation	130	200		25	
Caulking	10	20		2	
Weatherstripping	10	20		2	
Building Repairs	30	70		6	
Furnace Filters				3	
Evaporative Cooler Covers		60		5	
Duct Sealing	25	50		2	
Low Flow Showerheads			247		10
Water Heater Blankets			198		8
Pipe Insulation			140		3
Faucet Aerators			50		1.5

For the electric impact models, we were not able to statistically determine variations in weatherization measures between single-family and multifamily dwellings, as model parameters were unstable and provided unrealistic results in some cases. Thus, based on results from the 1998 LIEE Program evaluation, multifamily savings were constrained to equal 70 percent of single-family savings for space conditioning measures and 85 percent of single-family savings for water heating measures.

For other measures (furnace repair, furnace replacement, CFLs, and evaporative coolers), a simple program indicator (1.0 or 0.0) variable was used in the analysis.

3.2.2 Billing Analysis Using All Available Participants

The first set of billing analysis models was developed utilizing all PY 2000 participants with adequate billing data. In addition, a control group was included in the analysis to control for non-program effects. Participants from the PY 1998 program were utilized as the control group because they were considered to be similar to the PY 2000 participants but did not have program measures installed in the January 1999 to October 2001 period.

Because customers in the billing analysis were not surveyed, an additional analysis was conducted to assess the presence of major end uses (air conditioning, space heating by fuel, and water heating by fuel).

The major end-use ownership indicators were assigned to the sample using the average monthly usage profiles. Appliance ownership indicators were assigned to households that passed various usage criteria. For gas samples, space and water heating ownership indicators were developed. For the electric samples, space heating, water heating, and air conditioning indicators were created. Baseline codes were used to create the space and water heating indicators for SCG. PG&E had information on central air conditioning. Analysis of average monthly usage was undertaken to determine appliance ownership for the remaining utilities.

In the case of gas space heating, customers using more than 30 therms in the winter (December and January) months or customers whose winter use was more than 50 percent greater than summer (July and August) use were assigned as gas space heating customers. Analysis of summer use was employed to determine gas water heating. Customers whose monthly summer usage was 10 or more therms were assigned as gas water heating.

Electric space heating and water heating ownership were determined by looking at winter period use relative to spring season (April and May). Customers whose winter and spring electric use exceeded 800 kWh per month were assigned to have both electric space heating and water heating. Customers whose winter monthly usage was over 700 kWh and more than 25 percent higher than spring monthly kWh were assigned electric space heating. Customers whose spring monthly usage was greater than 650 kWh were assigned electric water heating. In the case of air conditioning, customers whose summer monthly use exceeded 800 kWh were assigned electric air conditioning.

The introduction of key end uses was required to provide structure to the billing analysis models. For example, only customers with air conditioning were modeled to be affected by cooling degree-days variables and to have air conditioning savings affects due to weatherization measures. Similarly, customers with gas water heating showed gas savings for water heating measures, and customers with electric water heating showed electric savings for the water heating measures.

Electric Model

Electric model results are presented in Table 3-2. The model has an R^2 of 0.81, which indicates that just over 80 percent of the variation in monthly kWh per day is explained by the model. This is a relatively high R^2 for models of this type. All key variables are statistically significant (with t-statistics over 2.0). Shaded rows indicate variables that are used to identify program impacts. Each variable is described as follows (with variable names in brackets):

- **[Evaporative cooling × CDD]** —A dummy variable indicating customers who received evaporative cooler measures interacted with cooling degree-days. This term identifies base cooling load for customers who received evaporative coolers through the program.
- **[Evaporative cooling × CDD × POST]**—The evaporative cooler dummy variable interacted with cooling degree-days and a post-retrofit dummy variable that takes on the value of 0.0 in periods prior to the program install date and 1.0 in periods after the program install date. This term identifies savings related to installation of program evaporative coolers.
- **[Electric heating × HDD]—**A dummy variable indicating the presence of electric heating interacted with heating degree-days. This term identifies base heating load for single-family homes.
- **[Electric heating × HDD × multifamily]—**The electric heating dummy variable interacted with heating degree-days and a dummy variable for multifamily dwellings. This term combined with the prior term identifies base heating load for multi-family homes.

Table 3-2
Electric Model – All Available Participants
Dependent Variable – Monthly kWh per Day

Variable	Parameter estimate	t-statistic
Evaporative cooling*CDD	1.353468	257.5
Evaporative cooling*CDD*POST	-0.367483	-66.2
Electric heating*HDD	0.330591	98.0
Electric heating*HDD*multifamily	-0.141309	-41.7
Electric heating*HDD*POST*weatherization savings	-0.000181	-14.7
AC*CDD	1.107636	585.2
AC*CDD*multifamily	-0.146625	-50.9
AC*HDD*POST*weatherization savings	-0.000743	-35.5
POST*refrigerator savings (PG&E, SDG&E)	-1.172125	-37.6
POST*refrigerator savings (SCE)	-0.536269	-41.31
POST*number of CFLs distributed	-0.060641	-27.0
POST*number of CFLs distributed, if less than 4	-0.022665	-2.3
Electric water heat*POST*water heating savings	-0.002654	-28.7
Customer fixed effects		F=120.48
Dummy variable, 1/1999	0.733822	27.6
Dummy variable, 2/1999	0.301450	11.7
Dummy variable, 3/1999	-0.327710	-13.2
Dummy variable, 4/1999	-0.596162	-23.9
Dummy variable, 5/1999	-1.030812	-41.0
Dummy variable, 6/1999	-0.879010	-35.6
Dummy variable, 7/1999	0.025598	1.0
Dummy variable, 8/1999	0.265937	10.8
Dummy variable, 9/1999	0.259386	10.4
Dummy variable, 10/1999	-0.107967	-4.4
Dummy variable, 11/1999	-0.237341	-9.5
Dummy variable, 12/1999	0.670521	27.1
Dummy variable, 1/2000	1.077954	43.0
Dummy variable, 2/2000	0.357828	14.2
Dummy variable, 3/2000	0.200100	8.2
Dummy variable, 4/2000	-0.521873	-21.0
Dummy variable, 5/2000	-0.474759	-19.4
Dummy variable, 6/2000	0.139309	5.7
Dummy variable, 7/2000	0.785356	31.7
Dummy variable, 8/2000	1.121171	46.3
Dummy variable, 9/2000	0.633093	25.8
Dummy variable, 10/2000	0.281459	11.5
Dummy variable, 11/2000	0.126072	5.1
Dummy variable, 12/2000	1.012342	41.1
Dummy variable, 1/2001	1.008697	41.0
Dummy variable, 2/2001	0.457201	18.3
Dummy variable, 3/2001	-0.009095	-0.4
Dummy variable, 4/2001	-0.965259	-39.4
Dummy variable, 5/2001	-1.154924	-47.3
Dummy variable, 6/2001	-0.811812	-33.3
Dummy variable, 7/2001	-0.185445	-7.6
Dummy variable, 8/2001	0.126028	5.2
Dummy variable, 9/2001	0.200620	8.1
R^2	0.8051	
Number of observations	2,357,518	

- **[Electric heating × HDD × POST × weatherization savings]**—The electric heating dummy variable interacted with heating degree-days, the post-retrofit dummy variable, and an initial estimate of space conditioning weatherization savings using combinations of values from Table 3-1, depending on the particular measures installed in each home. This term identifies electric heating savings from the installation of weatherization measures.
- **[AC × CDD]**—A dummy variable indicating the presence of air conditioning interacted with cooling degree-days. This term identifies base cooling load for single-family homes.
- **[AC × CDD × multifamily]**—The air conditioning dummy variable interacted with cooling degree-days and a dummy variable for multifamily dwellings. This term combined with the prior term identifies base cooling load for multi-family homes.
- **[AC × CDD × POST × weatherization savings]**—The air conditioning dummy variable interacted with cooling degree-days, the post-retrofit dummy variable, and the initial estimate of space conditioning weatherization savings. This term identifies air conditioning savings from the installation of weatherization measures.
- **[POST × refrigerator savings, (PG&E, SDG&E)]**—The post-retrofit dummy variable interacted with an initial estimate of refrigerator savings. This estimate, 560 kWh per year, does not vary by participant. This term identifies savings from the program installation of new refrigerators in the PG&E and SDG&E service areas.
- **[POST × refrigerator savings (SCE)]**—The post-retrofit dummy variable interacted with an initial estimate of refrigerator savings. This savings estimate varies by customer, based on estimated energy usage of the new and replace refrigerator and averages 1,304 kWh per year. This term identifies savings from the program installation of new refrigerators.
- **[POST × number of CFLs distributed]**—The post-retrofit dummy variable interacted with the number of CFLs that the tracking system indicates were provided to the customer. This term identifies program CFL savings.
- **[POST × number of CFLs distributed, if less than 4]**—The post-retrofit dummy variable interacted with the number of CFLs that the tracking system indicates were provided to the customer, if the customer received less than four CFLs. This term identifies additional program CFL savings (above those captured in the previous variable) for customer who received fewer bulbs. Evidence has shown that per-bulb CFL savings are higher for households who receive fewer bulbs because customers tend to install CFLs in fixtures they use most frequently. As more bulbs are distributed, they tend to be installed in fixtures are receive less frequent use, resulting in lower per-bulb savings.
- **[Electric water heat × POST × water heating savings]**—A dummy variable indicating the presence of electric water heating interacted with the post-retrofit dummy variable and an initial estimate of water heating measure savings using combinations of values from Table 3-1, depending on the particular measures installed in each home. This term identifies electric water heating savings from the installation of program measures.

- **[Customer fixed effects]—**These variables allow for a different intercept term for each participant, accounting for variations in bill size due to dwelling and household effects that are outside of the program.
- **[Monthly dummy variables]—**These variables account for unexplained seasonality of use and non-program variations over time. The coefficients on the monthly dummy variables for 2001 are generally lower that the coefficients on corresponding dummy variables for 2000, reflecting increased customer conservation in response to the California energy crisis.

Natural Gas Model

Gas model results are presented in Table 3-3. The model has an R^2 of 0.74, which indicates that about 74 percent of the variation in monthly therms per day is explained by the model. Again this R^2 indicates a relatively good model fit. All key variables are statistically significant (with t-statistics over 2.0). Shaded rows indicate variables that are used to identify program impacts. Each variable is described as follows (with variable names in brackets):

- **[Gas heating × (1-furnace replace/repair) × HDD]—**A dummy variable indicating the presence of gas heating interacted with a variable to exclude customers who received furnace replace or repair measures and heating degree-days. This term identifies base heating load for single-family homes.
- **[Gas heating × (1-furnace replace/repair) × HDD × multifamily]**—The gas heating dummy variable interacted with the furnace replace/repair dummy variable, heating degree-days, and a dummy variable for multifamily dwellings. This term combined with the prior term identifies base heating load for multi-family homes.
- **[Gas heating × HDD × POST × weatherization savings]**—The gas heating dummy variable interacted with heating degree-days, the post-retrofit dummy variable, and an initial estimate of space conditioning weatherization savings using combinations of values from Table 3-1, depending on the particular measures installed in each home. This term identifies gas heating savings for single-family dwellings from the installation of weatherization measures.
- **[Gas heating × HDD × multifamily × POST × weatherization savings]—**The gas heating dummy variable interacted with heating degree-days, a multifamily dummy variable, the post-retrofit dummy variable, and an initial estimate of space conditioning weatherization savings using combinations of values from Table 3-1, depending on the particular measures installed in each home. This term when combined with the prior term identifies gas heating savings for multifamily dwellings from the installation of weatherization measures.
- **[Gas heating × furnace replace × HDD]—**A dummy variable indicating the presence of gas heating interacted with a variable denoting customers who received furnace replacements and heating degree-days. This term identifies base heating load for customers who received new furnaces.
- **[Gas heating × furnace replace × HDD × POST]—**The gas heating dummy variable interacted with the furnace replacement dummy variable, heating degree-days, and the

post retro-fit dummy variable. This term is designed to identify savings for customers who received new furnaces, but the positive sign on the coefficient indicates that this measure was correlated with increased load, most likely because many customers do not have working furnaces prior to the retrofit.

- **[Gas heating × furnace repair × HDD]—**A dummy variable indicating the presence of gas heating interacted with a variable denoting customers who received furnace repairs and heating degree-days. This term identifies base heating load for customers whose furnaces were repaired.
- **[Gas heating × furnace repair × HDD × POST]—**The gas heating dummy variable interacted with the furnace repair dummy variable, heating degree-days, and the post retro-fit dummy variable. This term is designed to identify savings for customers whose furnaces were repaired, but similar to the furnace replacement term, the positive sign on the coefficient indicates that this measure was correlated with increased load because many customers do not have working furnaces prior to the retrofit.
- **[Gas water heat × POST × water heating savings]—**A dummy variable indicating the presence of gas water heating interacted with the post-retrofit dummy variable and an initial estimate of water heating measure savings using combinations of values from Table 3-1, depending on the particular measures installed in each home. This term identifies gas water heating savings for single-family dwellings from the installation of program measures.
- **[Gas water heat × multifamily × POST × water heating savings]—**A dummy variable indicating the presence of gas water heating interacted with a multifamily dummy variable, the post-retrofit dummy variable, and an initial estimate of water heating measure savings using combinations of values from Table 3-1, depending on the particular measures installed in each home. This term combined with the prior term identifies gas water heating savings for multifamily dwellings from the installation of program measures.
- **[Customer fixed effects]—**These variables allow for a different intercept term for each participant, accounting for variations in bill size due to dwelling and household effects that are outside of the program.

Note that monthly dummy variables were not included in the gas model. Due to the large seasonal component of gas use, the monthly dummy variables tended to interfere with the estimation of gas space heating savings.

Table 3-3
Natural Gas Model – All Available Participants
Dependent Variable – Monthly Therms per Day

Variable	Parameter estimate	t-statistic
Gas heating×(1-furnace replace/repair)×HDD	0.147798	551.1
Gas heating×(1-furnace replace/repair)×HDD×multifamily	-0.075331	-116.5
Gas heating×HDD×POST×weatherization savings	-0.000609	-75.1
Gas heating×HDD×multifamily×POST×weatherization savings	0.000283	14.0
Gas heating×furnace replace×HDD	0.132115	225.1
Gas heatiing×furnace replace×HDD×POST	0.003963	5.7
Gas heating×furnace repair×HDD	-0.010944	-11.0
Gas heating×furnace repair×HDD×POST	0.116123	136.6
Gas water heat×POST×water heating savings	-0.002485	-24.1
Gas water heat×multifamily×POST×water heating savings	0.000818	3.8
Customer fixed effects		F=48.22
R^2	0.7380	
Number of observations	1,606,859	

3.2.3 Billing Analysis Using Surveyed Participants

The second set of billing analysis models were developed utilizing a subset of 1,000 PY 2000 participants with adequate billing data who were administered a telephone survey. For this group, survey data were used to ascertain the presence of major end uses (air conditioning, space heating by fuel, and water heating by fuel). In addition, survey data were utilized to obtain variables that tend to influence home energy use (square footage of the home, number of people in the home, and whether someone is generally home during the day).

The survey was also used to develop equipment-related variables. A key component in the analysis of furnace repair and replace measures was the determination of whether or not the customer's furnace was working prior to the program retrofit. A similar issue was addressed for customers who received evaporative coolers.

For CFLs, we attempted to construct an engineering-based lighting savings variable using customer-reported CFL installations levels and customer estimates of lighting hours of use. However, we were not able to incorporate this variable into the electric regression model because this variable came in with the wrong sign (implying CFL installations caused an increase in energy use). It is likely that the dwelling-specific CFL savings estimates were correlating positively with customer size (as larger households with larger energy bills were also reporting more lighting hours of use, which is a key component of the CFL savings variable). The negative savings estimates developed from this variable (due to the estimated coefficient having the wrong sign) contradicted the savings estimates developed from the simpler CFL variables used in the final models presented in this section. We chose to use the simpler CFL variables because they provided more intuitive results.

Electric Model

Electric model results for surveyed participants are presented in Table 3-4. The model has an R^2 of 0.79 indicating that about 79 percent of the variation in monthly kWh per day is explained by the model. Most key variables are statistically significant (with t-statistics over 2.0). Shaded rows indicate variables that are used to identify program impacts. Each variable is described as follows (with variable names in brackets):

- **[Evaporative cooling × SQFT × CDD × unit working pre-program]—**A dummy variable indicating customers who received evaporative cooler measures interacted with dwelling square footage, cooling degree-days, and a dummy variable indicating whether a cooling unit was working prior to the retrofit. This term identifies base cooling load for customers who cooled there homes prior to the retrofit and received evaporative coolers through the program.
- **[Evaporative cooling × SQFT × CDD × unit working pre-program × POST]—**The evaporative cooler dummy variable interacted with dwelling square footage, cooling degree-days, the dummy variable indicating whether a cooling unit was working prior to the retrofit, and a post-retrofit dummy variable that takes on the value of 0.0 in periods prior to the program install date and 1.0 in periods after the program install date. This term identifies savings related to installation of program evaporative coolers for customers who had a working unit prior to the retrofit.
- **[Evaporative cooling × SQFT × CDD × unit not working pre-program × POST]—** The evaporative cooler dummy variable interacted with dwelling square footage, cooling degree-days, a dummy variable indicating whether a cooling unit was not working prior to the retrofit, and the post-retrofit dummy variable. This term identifies load increases related to installation of program evaporative coolers for customers who did not have a working unit prior to the retrofit.
- **[Electric heating × SQFT × HDD]**—A dummy variable indicating the presence of electric heating interacted with dwelling square footage and heating degree-days. This term identifies base heating load for customers who are not generally home during the day.
- **[Electric heating × SQFT × HDD × home weekdays]**—The electric heating dummy variable interacted with dwelling square footage, heating degree-days, and a dummy variable indicating someone is generally home on weekdays. This term combined with the prior term identifies base heating load for homes that are generally occupied during the day on weekdays.
- **[Electric heating × SQFT × HDD × POST × weatherization savings]**—The electric heating dummy variable interacted with heating degree-days, dwelling square footage, the post-retrofit dummy variable, and an initial estimate of space conditioning weatherization savings using combinations of values from Table 3-1, depending on the particular measures installed in each home. This term identifies electric heating savings from the installation of weatherization measures.

Table 3-4
Electric Model – Surveyed Participants
Dependent Variable – Monthly kWh per Day

Variable	Parameter estimate	t-statistic
Evaporative cooling*SQFT*CDD*unit working pre-program	0.0007552	31.5
Evaporative cooling*SQFT*CDD*unit working pre-program*POST	-0.0000485	-1.9
Evaporative cooling*SQFT*CDD*unit not working pre-program*POST	0.0006007	20.5
Electric heating*SQFT*HDD	0.0004634	16.6
Electric heating*SQFT*HDD*home weekdays	-0.0000296	-1.0
Electric heating*SQFT*HDD*POST*weatherization savings	-0.0000004	-4.7
AC*SQFT*CDD	0.0008314	21.0
AC*SQFT*CDD*home weekdays	0.0000772	1.9
AC*SQFT*HDD*POST*weatherization savings	-0.0000014	-5.3
POST*refrigerator savings (PG&E, SDG&E)	-1.5248400	-10.6
POST*refrigerator savings (SCE)	-0.6223041	-9.0
POST*number of CFLs distributed	-0.0266227	-1.0
POST*number of CFLs distributed, if less than 4	-0.0720449	-1.5
Electric water heat*number in home*POST*water heating savings	-0.0010489	-6.1
Customer fixed effects		F=99.91
Dummy variable, 1/1999	1.2294257	4.0
Dummy variable, 2/1999	0.6021315	2.0
Dummy variable, 3/1999	0.0731665	0.3
Dummy variable, 4/1999	-0.1852259	-0.7
Dummy variable, 5/1999	-0.5899779	-2.0
Dummy variable, 6/1999	-0.3693372	-1.3
Dummy variable, 7/1999	1.8322234	6.3
Dummy variable, 8/1999	1.9256572	6.8
Dummy variable, 9/1999	1.7324586	6.0
Dummy variable, 10/1999	1.0087383	3.5
Dummy variable, 11/1999	0.4227751	1.5
Dummy variable, 12/1999	1.0638226	3.7
Dummy variable, 1/2000	1.4223451	4.9
Dummy variable, 2/2000	0.6409565	2.2
Dummy variable, 3/2000	0.4254450	1.5
Dummy variable, 4/2000	-0.2938213	-1.0
Dummy variable, 5/2000	-0.3523537	-1.3
Dummy variable, 6/2000	0.6848551	2.5
Dummy variable, 7/2000	1.5739229	5.6
Dummy variable, 8/2000	2.4856074	9.1
Dummy variable, 9/2000	1.5482457	5.6
Dummy variable, 10/2000	0.4487281	1.6
Dummy variable, 11/2000	0.2867508	1.0
Dummy variable, 12/2000	1.0959126	4.0
Dummy variable, 1/2001	1.1032554	4.1
Dummy variable, 2/2001	0.5736616	2.0
Dummy variable, 3/2001	-0.1168601	-0.4
Dummy variable, 4/2001	-0.9588538	-3.5
Dummy variable, 5/2001	-1.3736654	-5.1
Dummy variable, 6/2001	-0.8200818	-3.0
Dummy variable, 7/2001	0.0026905	0.0
Dummy variable, 8/2001	0.3297577	1.2
Dummy variable, 9/2001	0.6375137	2.3
R^2	0.7877	
Number of observations	23,152	

- **[AC × SQFT × CDD]**—A dummy variable indicating that the presence of air conditioning interacted with dwelling square footage and cooling degree-days. This term identifies base cooling load for customers who are not generally home during the day.
- **[AC × SQFT × CDD × home weekdays]**—The air conditioning dummy variable interacted with cooling degree-days and a dummy variable indicating someone is generally home on weekdays. This term combined with the prior term identifies base cooling load for homes that are generally occupied during the day on weekdays.
- **[AC × SQFT × CDD × POST × weatherization savings]**—The air conditioning dummy variable interacted with dwelling square footage, cooling degree-days, the post-retrofit dummy variable, and the initial estimate of space conditioning weatherization savings. This term identifies air conditioning savings from the installation of weatherization measures.
- **[POST × refrigerator savings, (PG&E, SDG&E)]**—The post-retrofit dummy variable interacted with an initial estimate of refrigerator savings. This estimate, 560 kWh per year does not vary by participant. This term identifies savings from the program installation of new refrigerators in the PG&E and SDG&E service areas.
- **[POST × refrigerator savings (SCE)]**—The post-retrofit dummy variable interacted with an initial estimate of refrigerator savings. This savings estimate varies by customer, based on estimated energy usage of the new and replace refrigerator and averages 1,304 kWh per year. This term identifies savings from the program installation of new refrigerators.
- **[POST × number of CFLs distributed]**—The post-retrofit dummy variable interacted with the number of CFLs that the tracking system indicates were provided to the customer. This term identifies program CFL savings.
- **[POST × number of CFLs distributed, if less than 4]**—The post-retrofit dummy variable interacted with the number of CFLs that the tracking system indicates were provided to the customer, if the customer received fewer than four CFLs. This term identifies additional program CFL savings (above those captured in the previous variable) for customer who received fewer bulbs. Evidence has shown that per-bulb CFL savings are higher for households who receive fewer bulbs because customers tend to install CFLs in fixtures they use most frequently. As more bulbs are distributed, they tend to be installed in fixtures are receive less frequent use, resulting in lower per-bulb savings.
- **[Electric water heat × number in home × POST × water heating savings]**—A dummy variable indicating the presence of electric water heating interacted with the number of people living in the home, the post-retrofit dummy variable, and an initial estimate of water heating measure savings using combinations of values from Table 3-1, depending on the particular measures installed in each home. This term identifies electric water heating savings from the installation of program measures.
- **[Customer fixed effects]—**These variables allow for a different intercept term for each participant, accounting for variations in bill size due to dwelling and household effects that are outside of the program.

- **[Monthly dummy variables]**—These variables account for unexplained seasonality of use and non-program variations over time.

Natural Gas Model

Gas model results are presented in Table 3-5. The model has an R^2 of 0.70 which indicates that about 70 percent of the variation in monthly therms per day is explained by the model. Most variables and all key variables are statistically significant (with t-statistics over 2.0). Shaded rows indicate variables that are used to identify program impacts. Each variable is described as follows (with variable names in brackets):

- **[Gas heating × (1-furnace replace/repair) × SQFT × HDD]**—A dummy variable indicating that the presence of gas heating interacted with a variable to exclude customers who received furnace replacement or repair measures, dwelling square footage, and heating degree-days. This term identifies base heating load for single-family homes where someone is not home during weekday days.
- **[Gas heating × (1-furnace replace/repair) × SQFT × HDD × home weekdays]**—The gas heating dummy variable interacted with the furnace replace/repair dummy variable, dwelling square footage, heating degree-days, and a dummy variable indicating someone is home during the day. This term combined with the prior term identifies base heating load for single-family homes where someone is home during the day on weekdays.
- **[Gas heating × (1-furnace replace/repair) × SQFT × HDD × multifamily]**—The gas heating dummy variable interacted with the furnace replace/repair dummy variable, dwelling square footage, heating degree-days, and a dummy variable for multifamily dwellings. When this term is combined with the first heating term, it identifies base heating load for multifamily homes where someone is not generally home during weekday days. When this term is combined with the two prior terms, it identifies base heating load for multifamily homes where someone is home during weekday days.
- **[Gas heating × SQFT × HDD × POST × weatherization savings]**—The gas heating dummy variable interacted with heating degree-days, dwelling square footage, the post-retrofit dummy variable, and an initial estimate of space conditioning weatherization savings using combinations of values from Table 3-1, depending on the particular measures installed in each home. This term identifies gas heating savings for single-family dwellings from the installation of weatherization measures.
- **[Gas heating × SQFT × HDD × multifamily × POST × weatherization savings]**—The gas heating dummy variable interacted with building square footage, heating degree-days, a multifamily dummy variable, the post-retrofit dummy variable, and an initial estimate of space conditioning weatherization savings using combinations of values from Table 3-1, depending on the particular measures installed in each home. This term, when combined with the prior term, identifies gas heating savings for multifamily dwellings from the installation of weatherization measures.
- **[Gas heating × furnace replace × SQFT × HDD × unit working pre-program]**—A dummy variable indicating the presence of gas heating interacted with a variable denoting customers who received furnace replacements, dwelling square footage, heating degree-

days, and a dummy variable indicating the home had a working furnace prior to the retrofit. This term identifies base heating load for customers who had a working furnace prior to the retrofit and received new furnaces through the program.

- **[Gas heating × furnace replace × SQFT × HDD × unit working pre-program × POST]**—The gas heating dummy variable interacted with the furnace replacement dummy variable, dwelling square footage, heating degree-days, the dummy variable indicating there was a working pre-retrofit furnace, and the post retro-fit dummy variable. This term identifies savings for customers who had working furnaces prior to the retrofit and received new furnaces.
- **[Gas heating × furnace replace × SQFT × HDD × unit not working pre-program × POST]**—The gas heating dummy variable interacted with the furnace replacement dummy variable, dwelling square footage, heating degree-days, a dummy variable indicating there was not a working pre-retrofit furnace, and the post retro-fit dummy variable. This term identifies usage increases related to installation of program furnaces for customers who did not have a working furnace prior to the retrofit.
- **[Gas heating × furnace repair × SQFT × HDD × unit working pre-program]**—A dummy variable indicating the presence of gas heating interacted with a variable denoting customers who received furnace repairs, heating degree-days, and a dummy variable indicating there was a working furnace prior to the repair. This term identifies base heating load for customers with working pre-retrofit furnaces whose furnaces were repaired through the program.
- **[Gas heating × furnace repair × SQFT × HDD × unit working pre-program × POST]—**The gas heating dummy variable interacted with the furnace repair dummy variable, heating degree-days, the dummy variable indicating a working pre-retrofit furnace, and the post retro-fit dummy variable. This term identifies savings for customers who had working furnaces prior to the retrofit and received furnace repairs.
- **[Gas heating × furnace repair × SQFT × HDD × unit not working pre-program × POST]**—The gas heating dummy variable interacted with the furnace repair dummy variable, heating degree-days, a dummy variable indicating there was not a working furnace prior to the repair and the post retro-fit dummy variable. This term identifies usage increases related to program furnaces repairs for customers who did not have a working furnace prior to the repair.
- **[Gas water heat × number in home × POST × water heating savings]**—A dummy variable indicating the presence of gas water heating interacted with the number of people in the home, the post-retrofit dummy variable, and an initial estimate of water heating measure savings using combinations of values from Table 3-1, depending on the particular measures installed in each home. This term identifies gas water heating savings for single-family dwellings from the installation of program measures.
- **[Gas water heat × number in home × multifamily × POST × water heating savings]**—A dummy variable indicating the presence of gas water heating interacted with the number of people in the home, a multifamily dummy variable, the post-retrofit dummy variable, and an initial estimate of water heating measure savings using combinations of values from Table 3-1, depending on the particular measures installed in

each home. This term combined with the prior term identifies gas water heating savings for multifamily dwellings from the installation of program measures.

- **[Customer fixed effects]—**These variables allow for a different intercept term for each participant, accounting for variations in bill size due to dwelling and household effects that are outside of the program.

Note that monthly dummy variables were not included in the gas model. Due to the large seasonal component of gas use, the monthly dummy variables tended to interfere with the estimation of gas space heating savings.

Table 3-5
Natural Gas Model – Surveyed Participants
Dependent Variable – Monthly Therms per Day

Variable	Parameter estimate	t-statistic
Gas heating×(1-furnace replace/repair)×SQFT×HDD	0.0001036	54.4
Gas heating×(1-furnace replace/repair)×SQFT×HDD×home weekdays	0.0000162	8.2
Gas heating×(1-furnace replace/repair)×SQFT×HDD×multifamily	-0.0000497	-18.6
Gas heating×SQFT×HDD×POST×weatherization savings	-0.0000006	-11.6
Gas heating×SQFT×HDD×multifamily×POST×weatherization savings	0.0000003	1.7
Gas heating×furnace replace×SQFT×HDD×unit working pre-program	0.0001245	23.1
Gas heating×furnace replace×SQFT×HDD×unit working pre-program×POST	-0.0000469	-7.0
Gas heating×furnace replace×SQFT×HDD×unit not working pre-program×POST	0.0000626	21.8
Gas heating×furnace repair×SQFT×HDD×unit working pre-program	0.0000791	17.5
Gas heating×furnace repair×SQFT×HDD×unit working pre-program×POST	-0.0000132	-2.3
Gas heating×furnace repair×SQFT×HDD×unit not working pre-program×POST	0.0000549	25.6
Gas water heat×number in home×POST×water heating savings	-0.0016148	-7.3
Gas water heat×number in home×multifamily×POST×water heating savings	0.0013278	3.1
Customer fixed effects		F=36.59
R^2	0.6986	
Number of observations	21,567	

3.2.4 Billing Analysis Discussion and Integration

In general, it was felt that the billing analysis models using all available participants provided better results than the models using surveyed participants. The all-participant models included many more observations and provided better statistical fit than the surveyed-participant models.

The all-participant models were better able to capture more realistic savings from refrigerator replacement and CFL measures, while the surveyed-participant models tended to provide much lower-than-expected CFL savings and higher-than-expected refrigerator replacement savings. The all-participant models also provided more realistic variation in gas water heating savings between single-family and multifamily dwellings—with multifamily savings equal to about 85 percent of single-family savings. The surveyed-participant models showed single-family savings for gas water heating measures to be about five times as large as the multifamily savings.

The primary area where the all-participant models performed worse than the surveyed-participant models was in the development of savings for furnace repair and replace measures. For these measures, participants often had furnaces that were not working prior to the program treatment. Thus, the all-participant models tended to associate an increase in natural gas use with the presence of furnace measures. For the surveyed participants, we were able to identify the customers who did not have a working furnace prior to the program and net them out of the savings calculation since these customers were now receiving substantial non-energy-savings benefits. Thus the surveyed-participant models tended to provide better estimates for the energy savings component of the furnace measures.

For calculation of impacts, the all-participant model results were utilized for all measures except the furnace repair and furnace replacement measures. For these measures, results of the surveyed-participant models were used.

3.3 IMPACT ESTIMATES

3.3.1 Calculation of Impacts

Impact estimates were developed using the billing analysis models discussed above. The models were simulated for each household under two conditions:

1. Assuming no LIEE program measures were installed
2. Assuming all LIEE program measures were installed as tracked.

All non-program variables, such as household characteristics and weather, are held constant for the simulations. The resulting differences between the simulations provide estimates of measure savings. Since normal weather variables are used in the simulation process, weather-sensitive measure impacts reflect normal weather conditions.

Customer-specific impacts are then averaged to provide program unit savings. Weights were developed to ensure that the sample of customers reflected the program population for the averaging process.

Next, measure counts were developed for each relevant combination of measure, dwelling type, and fuel. For weatherization measures, this involved determining each participant's heating fuel type and whether or not space cooling was present. For water heating measures, this involved determining each participant's fuel type.

Finally, program impacts are estimated by multiplying unit impacts time measure counts.

3.3.2 Impact Estimates

Tables 3-6 through 3-9 below provide estimates of program impacts by utility. Non-weather-sensitive measure unit impacts are constant across utilities. Weather-sensitive impacts (weatherization measures, evaporative cooler measures, furnace repair and replacement

measures, and evaporative cooler measures) vary by utility due to climatic differences among the service territories. Unit savings are expressed on a per-home basis, except for CFLs, which are expressed on a per-bulb basis.

SCE

SCE impacts are presented in Table 3-6. Overall, the PY2000 LIEE program is estimated to be saving 7.5 GWh per year in the SCE area. Key measures include CFLs with savings of 4.5 GWh, new refrigerators with savings of 1.8 GWh, and evaporative coolers with savings of 0.8 GWh. Higher evaporative cooler unit savings for multifamily dwellings versus single-family dwelling is primarily the results of climatic conditions facing the multifamily and single-family participants.

Table 3-6
SCE LIEE Program Impact Estimates for PY2000

		Unit Savings			Measure Counts			Total Savings		
		kWh		Therms	kWh		Therms	kWh		Therms
Measure	Dwelling Type	Heating and Other	Cooling	Heating and Other	Heating and Other	Cooling	Heating and Other	Heating and Other	Cooling	Heating and Other
Caulking	Multifamily	4.7	2.6		992	339		4,662	881	0
	Single Family	6.9			7			49	0	0
Ceiling Insulation	Multifamily	34.4			5			172	0	0
	Single Family	50.1			1			50	0	0
Duct Sealing	Multifamily							0	0	0
	Single Family							0	0	0
Evaporative Cooler Covers	Multifamily							0	0	0
	Single Family							0	0	0
Building Envelope Repair	Multifamily	14.8	5.1		1,236	738		18,293	3,764	0
	Single Family	21.6			9			194	0	0
Weatherstripping	Multifamily	4.2	1.7		1,292	758		5,426	1,289	0
	Single Family	6.2			13			81	0	0
Faucet Aerators	Multifamily	41.2			255			10,506	0	0
	Single Family	48.4			6			290	0	0
Low Flow Showerheads	Multifamily	203.3			1,173			238,471	0	0
	Single Family	239.2			13			3,110	0	0
Water Heater Blankets	Multifamily	163.0			50			8,150	0	0
	Single Family							0	0	0
Water Heater Pipe Wrap	Multifamily	115.3			18			2,075	0	0
	Single Family							0	0	0
Furnace Filters	Multifamily							0	0	0
	Single Family							0	0	0
Furnace Repair	Multifamily							0	0	0
	Single Family							0	0	0
Furnace Replacement	Multifamily							0	0	0
	Single Family							0	0	0
Lighting - CFLs	Multifamily	22.8			136,810			3,119,517	0	0
	Single Family	22.4			63,278			1,416,287	0	0
Evaporative Coolers	Multifamily		618.1			50		0	30,905	0
	Single Family		397.2			2,033		0	807,508	0
Refrigerators	Multifamily	695.4			1,667			1,159,232	0	0
	Single Family	711.6			946			673,174	0	0
Total								6,659,739	844,346	0

PG&E

PG&E impacts are presented in Table 3-7. Overall, the PY2000 LIEE program is estimated to be saving 8.8 GWh per year and 1.0 million therms per year in the PG&E area. Similar to SCE, key electricity saving measures include CFLs with savings of 3.2 GWh, new refrigerators with savings of 2.8 GWh, and evaporative coolers with savings of 1.1 GWh. The major gas saving measures include ceiling insulation (0.215 Mth), building repairs (0.168 Mth), and low-flow showerheads (0.208 Mth).

Table 3-7
PG&E LIEE Program Impact Estimates for PY2000

Measure	Dwelling Type	Unit Savings			Measure Counts			Total Savings		
		kWh		Therms	kWh		Therms	kWh		Therms
		Heating and Other	Cooling	Heating and Other	Heating and Other	Cooling	Heating and Other	Heating and Other	Cooling	Heating and Other
Caulking	Multifamily	6.0	4.5	1.6	2,366	4,549	12,002	14,196	20,471	19,203
	Single Family	8.5	8.2	3.3	724	4,091	16,576	6,154	33,546	54,701
Ceiling	Multifamily	59.0	70.2	18.7	124	1,517	2,189	7,316	106,493	40,934
Insulation	Single Family	81.6	110.7	34.2	111	1,232	5,094	9,058	136,382	174,215
Duct Sealing	Multifamily							0	0	0
	Single Family							0	0	0
Evaporative	Multifamily	18.7		4.0	159		1,604	2,973	0	6,416
Cooler Covers	Single Family	24.0		7.2	66		4,449	1,584	0	32,033
Building Envelope	Multifamily	20.8	14.1	4.6	1,686	3,925	9,246	35,069	55,343	42,532
Repair	Single Family	29.3	25.1	8.8	503	3,620	14,313	14,738	90,862	125,954
Weatherstripping	Multifamily	6.1	4.5	1.6	3,688	4,665	10,010	22,497	20,993	16,016
	Single Family	8.5	8.2	3.3	712	4,061	16,396	6,052	33,300	54,107
Faucet	Multifamily	41.2		0.9	694		13,361	28,593	0	12,025
Aerators	Single Family	48.4		1.4	1,596		15,314	77,246	0	21,440
Low Flow	Multifamily	203.3		6.1	669		12,636	136,008	0	77,080
Showerheads	Single Family	239.2		9.1	1,492		14,505	356,886	0	131,996
Water Heater	Multifamily	163.0		4.9	391		4,634	63,733	0	22,707
Blankets	Single Family	191.8		7.3	926		8,696	177,607	0	63,481
Water Heater	Multifamily	115.3		1.8	375		3,330	43,238	0	5,994
Pipe Wrap	Single Family	135.6		2.7	763		6,110	103,463	0	16,497
Furnace	Multifamily			2.3			5,430	0	0	12,489
Filters	Single Family			4.7			9,472	0	0	44,518
Furnace	Multifamily			42.9			10	0	0	429
Repair	Single Family			42.9			470	0	0	20,163
Furnace	Multifamily			147.2			2	0	0	294
Replacement	Single Family			147.2			49	0	0	7,213
Lighting - CFLs	Multifamily	22.5			64,733			1,456,493	0	0
	Single Family	22.3			77,032			1,717,798	0	0
Evaporative	Multifamily		384.2			170		0	65,314	0
Coolers	Single Family		446.2			2,452		0	1,094,082	0
Refrigerators	Multifamily	644.7			795			512,537	0	0
	Single Family	644.7			3,581			2,308,671	0	0
Total								7,101,907	1,656,786	1,002,435

SDG&E

SDG&E impacts are presented in Table 3-8. Overall, the PY2000 LIEE program is estimated to be saving 1.3 GWh per year and 0.2 million therms per year in the SDG&E area. Key electricity saving measures include CFLs with savings of 0.7 GWh and new refrigerators with savings of 0.5 GWh. The major gas saving measures include low-flow showerheads (0.050 Mth), building repairs (0.044 Mth), and furnace replacements (0.021 Mth).

Table 3-8
SDG&E LIEE Program Impact Estimates for PY2000

Measure	Dwelling Type	Unit Savings			Measure Counts			Total Savings		
		kWh		Therms	kWh		Therms	kWh		Therms
		Heating and Other	Cooling	Heating and Other	Heating and Other	Cooling	Heating and Other	Heating and Other	Cooling	Heating and Other
Caulking	Multifamily	3.7	2.3	2.0	1,225	857	2,250	4,533	1,971	4,500
	Single Family	5.1	2.7	2.5	208	826	5,814	1,061	2,230	14,535
Ceiling	Multifamily	34.4		11.0	4		5	138	0	55
Insulation	Single Family	50.1	43.5	16.9	18	6	89	902	261	1,504
Duct Sealing	Multifamily							0	0	0
	Single Family	13.4	7.3	1.8	51	635	3,855	683	4,636	6,939
Evaporartive	Multifamily							0	0	0
Cooler Covers	Single Family	15.8		4.3	16		599	253	0	2,576
Building Envelope	Multifamily	12.9	7.0	3.8	1,243	629	2,293	16,035	4,403	8,713
Repair	Single Family	18.0	8.1	5.5	231	898	6,439	4,158	7,274	35,415
Weatherstripping	Multifamily	3.7	2.4	2.0	1,233	869	2,267	4,562	2,086	4,534
	Single Family	5.2	2.8	2.7	183	512	3,888	952	1,434	10,498
Faucet	Multifamily	41.2		0.9	92		2,423	3,790	0	2,181
Aerators	Single Family	48.4		1.4	152		5,021	7,357	0	7,029
Low Flow	Multifamily	203.3		6.1	114		2,445	23,176	0	14,915
Showerheads	Single Family	239.2		9.1	115		3,846	27,508	0	34,999
Water Heater	Multifamily	163.0		4.9	36		85	5,868	0	417
Blankets	Single Family	191.8		7.3	24		1,072	4,603	0	7,826
Water Heater	Multifamily	115.3		1.8	11		5	1,268	0	9
Pipe Wrap	Single Family	135.6		2.7	12		1,148	1,627	0	3,100
Furnace	Multifamily							0	0	0
Filters	Single Family							0	0	0
Furnace	Multifamily			16.0			111	0	0	1,776
Repair	Single Family			23.0			392	0	0	9,016
Furnace	Multifamily							0	0	0
Replacement	Single Family			84.3			251	0	0	21,159
Lighting - CFLs	Multifamily	29.3			4,958			145,104	0	0
	Single Family	26.1			22,571			588,549	0	0
Evaporative	Multifamily							0	0	0
Coolers	Single Family							0	0	0
Refrigerators	Multifamily	644.7			1			645	0	0
	Single Family	644.7			712			459,026	0	0
Total								1,301,798	24,294	191,694

SoCalGas

SoCalGas impacts are presented in Table 3-9. Overall, the PY2000 LIEE program is estimated to be saving 0.6 million therms per year in the SoCalGas area. Key measures include furnace replacement with savings of 0.250 Mth and low-flow showerheads with savings of 0.143 Mth.

Table 3-9
SoCalGas LIEE Program Impact Estimates for PY2000

Measure	Dwelling Type	Unit Savings kWh Heating and Other	Unit Savings kWh Cooling	Unit Savings Therms Heating and Other	Measure Counts kWh Heating and Other	Measure Counts kWh Cooling	Measure Counts Therms Heating and Other	Total Savings kWh Heating and Other	Total Savings kWh Cooling	Total Savings Therms Heating and Other
Caulking	Multifamily			0.7			6,463	0	0	4,524
	Single Family			1.5			10,722	0	0	16,083
Ceiling Insulation	Multifamily			9.6			834	0	0	8,006
	Single Family			18.7			1,478	0	0	27,639
Duct Sealing	Multifamily							0	0	0
	Single Family							0	0	0
Evaporartive Cooler Covers	Multifamily			4.1			28	0	0	113
	Single Family			8.1			307	0	0	2,487
Building Envelope Repair	Multifamily			2.2			7,551	0	0	16,612
	Single Family			4.4			13,646	0	0	60,042
Weatherstripping	Multifamily			0.7			7,754	0	0	5,428
	Single Family			1.4			14,662	0	0	20,527
Faucet Aerators	Multifamily			0.9			7,266	0	0	6,539
	Single Family			1.4			13,597	0	0	19,036
Low Flow Showerheads	Multifamily			6.1			6,118	0	0	37,320
	Single Family			9.1			11,677	0	0	106,261
Water Heater Blankets	Multifamily			4.9			1,207	0	0	5,914
	Single Family			7.3			2,344	0	0	17,111
Water Heater Pipe Wrap	Multifamily			1.8			740	0	0	1,332
	Single Family			2.7			1,913	0	0	5,165
Furnace Filters	Multifamily							0	0	0
	Single Family							0	0	0
Furnace Repair	Multifamily							0	0	0
	Single Family			24.4			361	0	0	8,808
Furnace Replacement	Multifamily							0	0	0
	Single Family			110.1			2,269	0	0	249,817
Lighting - CFLs	Multifamily							0	0	0
	Single Family							0	0	0
Evaporative Coolers	Multifamily							0	0	0
	Single Family							0	0	0
Refrigerators	Multifamily							0	0	0
	Single Family							0	0	0
Total								0	0	618,765

3.3.3 Statistical Precision of the Impact Estimates

Tables 3-10 through 3-13 present, by utility, the 90 percent and 80 percent confidence intervals associated with the unit savings estimates. The confidence intervals were calculated from the standard errors of the regression coefficients associated with the measure impact variables. As the tables show, most of the confidence intervals are small relative to the unit estimates, which indicates a fairly high degree of statistical precision.

Table 3-10
SCE Unit Impacts and Associated Confidence Intervals

Measure	Dwelling Type	kWh					
		Heating and Other			Cooling		
		Unit Savings	90 percent Conf. Interval	80 percent Conf. Interval	Unit Savings	90 percent Conf. Interval	80 percent Conf. Interval
Caulking	Multifamily	4.7	±0.57	±0.45	2.6	±0.17	±0.14
	Single Family						
Ceiling Insulation	Multifamily						
	Single Family						
Duct Sealing	Multifamily						
	Single Family						
Evaporartive Cooler Covers	Multifamily						
	Single Family						
Building Envelope Repair	Multifamily	14.8	±1.92	±1.51	5.1	±0.40	±0.32
	Single Family	21.6	±2.92	±2.30			
Weather stripping	Multifamily	4.2	±0.55	±0.43	1.7	±0.14	±0.11
	Single Family	6.2	±0.83	±0.66			
Faucet Aerators	Multifamily	41.2	±2.36	±1.86			
	Single Family	48.4	±2.78	±2.18			
Low Flow Showerheads	Multifamily	203.3	±11.66	±9.17			
	Single Family	239.2	±13.72	±10.79			
Water Heater Blankets	Multifamily	163.0	±9.35	±7.35			
	Single Family						
Water Heater Pipe Wrap	Multifamily	115.3	±6.61	±5.20			
	Single Family						
Furnace Filters	Multifamily						
	Single Family						
Furnace Repair	Multifamily						
	Single Family						
Furnace Replacement	Multifamily						
	Single Family						
Lighting - CFLs	Multifamily	22.8	±5.89	±4.64			
	Single Family	22.4	±5.89	±4.64			
Evaporative Coolers	Multifamily				618.1	±20.64	±16.24
	Single Family				397.2	±9.94	±7.82
Refrigerators	Multifamily	695.4	±27.70	±21.79			
	Single Family	711.6	±28.34	±22.29			

Table 3-11
PG&E Unit Impacts and Associated Confidence Intervals

Measure	Dwelling Type	kWh						Therms		
		Heating and Other			Cooling			Heating and Other		
		Unit Savings	90 percent Conf. Interval	80 percent Conf. Interval	Unit Savings	90 percent Conf. Interval	80 percent Conf. Interval	Unit Savings	90 percent Conf. Interval	80 percent Conf. Interval
Caulking	Multifamily	6.0	±0.68	±0.53	4.5	±0.23	±0.18	1.6	±0.15	±0.12
	Single Family	8.5	±0.93	±0.73	8.2	±0.42	±0.33	3.3	±0.06	±0.05
Ceiling Insulation	Multifamily	59.0	±6.36	±5.01	70.2	±3.60	±2.83	18.7	±1.74	±1.37
	Single Family	81.6	±8.97	±7.06	110.7	±5.68	±4.47	34.2	±0.73	±0.57
Duct Sealing	Multifamily									
	Single Family									
Evaporartive Cooler Covers	Multifamily	18.7	±1.81	±1.42				4.0	±0.37	±0.29
	Single Family	24.0	±2.59	±2.03				7.2	±0.14	±0.11
Building Envelope Repair	Multifamily	20.8	±2.34	±1.84	14.1	±0.72	±0.57	4.6	±0.44	±0.35
	Single Family	29.3	±3.23	±2.54	25.1	±1.29	±1.01	8.8	±0.18	±0.14
Weather stripping	Multifamily	6.1	±0.68	±0.53	4.5	±0.23	±0.18	1.6	±0.15	±0.12
	Single Family	8.5	±0.93	±0.73	8.2	±0.42	±0.33	3.3	±0.06	±0.05
Faucet Aerators	Multifamily	41.2	±2.36	±1.86				0.9	±0.17	±0.13
	Single Family	48.4	±2.78	±2.18				1.4	±0.09	±0.07
Low Flow Showerheads	Multifamily	203.3	±11.66	±9.17				6.1	±1.14	±0.90
	Single Family	239.2	±13.72	±10.79				9.1	±0.62	±0.49
Water Heater Blankets	Multifamily	163.0	±9.35	±7.35				4.9	±0.91	±0.72
	Single Family	191.8	±11.00	±8.65				7.3	±0.49	±0.39
Water Heater Pipe Wrap	Multifamily	115.3	±6.61	±5.20				1.8	±0.34	±0.27
	Single Family	135.6	±7.78	±6.12				2.7	±0.19	±0.15
Furnace Filters	Multifamily							2.3	±0.21	±0.17
	Single Family							4.7	±0.09	±0.07
Furnace Repair	Multifamily									
	Single Family							42.9	±21.73	±17.10
Furnace Replacement	Multifamily									
	Single Family							147.2	±26.26	±20.66
Lighting - CFLs	Multifamily	22.5	±5.89	±4.64						
	Single Family	22.3	±5.89	±4.64						
Evaporative Coolers	Multifamily				384.2	±10.24	±8.05			
	Single Family				446.2	±12.14	±9.55			
Refrigerators	Multifamily	644.7	±28.20	±22.18						
	Single Family	644.7	±28.20	±22.18						

Table 3-12
SDG&E Unit Impacts and Associated Confidence Intervals

Measure	Dwelling Type	kWh						Therms		
		Heating and Other			Cooling			Heating and Other		
		Unit Savings	90 percent Conf. Interval	80 percent Conf. Interval	Unit Savings	90 percent Conf. Interval	80 percent Conf. Interval	Unit Savings	90 percent Conf. Interval	80 percent Conf. Interval
Caulking	Multifamily	3.7	±0.45	±0.35	2.3	±0.09	±0.07	2.0	±0.09	±0.07
	Single Family	5.1	±0.64	±0.50	2.7	±0.10	±0.08	2.5	±0.04	±0.03
Ceiling	Multifamily	34.4	±4.48	±3.52				11.0	±1.21	±0.95
Insulation	Single Family	50.1	±6.33	±4.98	43.5	±1.71	±1.35	16.9	±0.38	±0.30
Duct Sealing	Multifamily									
	Single Family	13.4	±1.56	±1.23	7.3	±0.29	±0.22	1.8	±0.04	±0.03
Evaporartive	Multifamily									
Cooler Covers	Single Family	15.8	±1.82	±1.43				4.3	±0.10	±0.08
Building Envelope	Multifamily	12.9	±1.57	±1.23	7.0	±0.28	±0.22	3.8	±0.29	±0.22
Repair	Single Family	18.0	±2.24	±1.76	8.1	±0.31	±0.24	5.5	±0.11	±0.09
Weather stripping	Multifamily	3.7	±0.45	±0.35	2.4	±0.10	±0.08	2.0	±0.10	±0.07
	Single Family	5.2	±0.64	±0.50	2.8	±0.11	±0.08	2.7	±0.04	±0.03
Faucet	Multifamily	41.2	±2.36	±1.86				0.9	±0.17	±0.13
Aerators	Single Family	48.4	±2.78	±2.18				1.4	±0.09	±0.07
Low Flow	Multifamily	203.3	±11.66	±9.17				6.1	±1.14	±0.90
Showerheads	Single Family	239.2	±13.72	±10.79				9.1	±0.62	±0.49
Water Heater	Multifamily	163.0	±9.35	±7.35				4.9	±0.91	±0.72
Blankets	Single Family	191.8	±11.00	±8.65				7.3	±0.49	±0.39
Water Heater	Multifamily	115.3	±6.61	±5.20				1.8	±0.34	±0.27
Pipe Wrap	Single Family	135.6	±7.78	±6.12				2.7	±0.19	±0.15
Furnace	Multifamily									
Filters	Single Family									
Furnace	Multifamily							16.0	±13.32	±10.48
Repair	Single Family							23.0	±17.05	±13.41
Furnace	Multifamily									
Replacement	Single Family							84.3	±15.57	±12.25
Lighting - CFLs	Multifamily	29.3	±5.89	±4.64						
	Single Family	26.1	±5.89	±4.64						
Evaporative	Multifamily									
Coolers	Single Family									
Refrigerators	Multifamily									
	Single Family	644.7	±28.20	±22.18						

Table 3-13
SoCalGas Unit Impacts and Associated Confidence Intervals

Measure	Dwelling Type	Therms		
		Heating and Other		
		Unit Savings	90 percent Conf. Interval	80 percent Conf. Interval
Caulking	Multifamily	0.7	±0.08	±0.06
	Single Family	1.5	±0.04	±0.03
Ceiling Insulation	Multifamily	9.6	±1.03	±0.81
	Single Family	18.7	±0.44	±0.34
Duct Sealing	Multifamily			
	Single Family			
Evaporartive Cooler Covers	Multifamily			
	Single Family	8.1	±0.13	±0.10
Building Envelope Repair	Multifamily	2.2	±0.23	±0.23
	Single Family	4.4	±0.10	±0.10
Weather stripping	Multifamily	0.7	±0.08	±0.06
	Single Family	1.4	±0.04	±0.03
Faucet Aerators	Multifamily	0.9	±0.17	±0.13
	Single Family	1.4	±0.09	±0.07
Low Flow Showerheads	Multifamily	6.1	±1.14	±0.90
	Single Family	9.1	±0.62	±0.49
Water Heater Blankets	Multifamily	4.9	±0.91	±0.72
	Single Family	7.3	±0.49	±0.39
Water Heater Pipe Wrap	Multifamily	1.8	±0.34	±0.27
	Single Family	2.7	±0.19	±0.15
Furnace Filters	Multifamily			
	Single Family			
Furnace Repair	Multifamily			
	Single Family	24.4	±17.89	±14.07
Furnace Replacement	Multifamily			
	Single Family	110.1	±18.94	±14.90
Lighting - CFLs	Multifamily			
	Single Family			
Evaporative Coolers	Multifamily			
	Single Family			
Refrigerators	Multifamily			
	Single Family			

3.3.4 Comparison to Initial Utility Estimates

This subsection compares evaluation savings results with initial utility estimates as found in the LIEE Program Bill Savings Report. Non-weather-sensitive measure savings are compared first, followed by weather-sensitive measure savings.

Non-Weather-Sensitive Measures

Non-weather-sensitive electric impact results for the evaluation are compared to utility estimates in Table 3-14. Gas results are compared to utility estimates in Table 3-15. Blank cells in each table indicate that no utility estimate was provided for PY2000 in the Bills Savings Report. Also, in each table realization rates are provided in parentheses below the utility estimate. The realization rates represent the fraction of the initial estimates that were realized in customer bills. They are calculated by dividing the evaluation results by the utility estimate.

For the measures affecting electric end uses, the utility water heating measure estimates were closest to the impact results. Utility refrigerator estimates for PG&E and SDG&E were lower than the impact result, but SCE's refrigerator impact estimate was much higher. Also, for SCE the refrigerator unit impact estimate of 1,776 kWh per year for the Bill Savings Report overstates the average unit impact estimate of 1,304 kWh per year provided by SCE in their tracking data. It appears that the 1,776 kWh figure was actually the estimate of average pre-retrofit refrigerator usage and not the kWh savings estimate.

For lighting, all three utilities' estimates were considerably higher that the impact results. Note, the evaluation could not separate out interior and exterior CFL savings because only SCE provided an indicator for customers who received porch lights. Thus, the evaluation results reflect average CFL savings for all installed interior and exterior bulbs. The evaluation estimates imply average daily lighting hours equal to about 1.3 hours per delivered bulb, while the utility numbers are higher at about 3 hours per day per bulb for PG&E, 3.5 hours for SCE, and 4.5 hours for SDG&E. Given, the fairly large number of bulbs given out to each household (averaging over four bulbs per home for PG&E and SCE and over two bulbs per home for SDG&E), it is reasonable to expect relatively low hours of use per bulb. Per-bulb savings for SDG&E were estimated to be somewhat higher than for SCE and PG&E, reflecting the fact that SDG&E gave out fewer bulbs to each household, and bulbs were most likely placed in higher-usage fixtures.

Table 3-14
Comparison of Non-Weather-Sensitive Electric Impacts– kWh per Year

Measure	Dwelling Type	Evaluation	SCE[1]	PG&E	SDG&E
Faucet Aerators	Multifamily	41.2			
	Single Family	48.4			
Low Flow Showerheads	Multifamily	203.3		247.2 (0.82)	174.0 (1.17)
	Single Family	239.2		247.2	174.0 (1.37)
Water Heater Blankets	Multifamily	163.0		197.8 (0.82)	138.0 (1.18)
	Single Family	191.8		197.8	138.0 (1.39)
Water Heater Pipe Wrap	Multifamily	115.3		53.0 (2.18)	
	Single Family	135.6		53.0 (2.56)	
Lighting - CFLs SCE	Multifamily	22.8	45.7 (0.50)		
	Single Family	22.4	45.7 (0.49)		
Porch CFLs SCE	Multifamily	22.8	204.1 (0.11)		
	Single Family	22.4	204.1 (0.11)		
Lighting - CFLs PG&E	Multifamily	22.5		57.8 (0.39)	
	Single Family	22.3		57.8 (0.39)	
Porch CFLs PG&E	Multifamily	22.5		70.0 (0.32)	
	Single Family	22.3		70.0 (0.32)	
Lighting - CFLs SDG&E	Multifamily	29.3			77.0 (0.38)
	Single Family	26.1			77.0 (0.34)
Porch CFLs SDG&E	Multifamily	29.3			181.0 (0.16)
	Single Family	26.1			181.0 (0.14)
Refrigerators SCE	Multifamily	695.4	1,776.0 (0.39)		
	Single Family	711.6	1,776.0 (0.40)		
Refrigerators PG&E and SDG&E	Multifamily	644.7		542.0 (1.19)	402.0 (1.60)
	Single Family	644.7		542.0 (1.19)	402.0 (1.60)

[1] SCE weatherization impacts are not reported by measure; total savings of 536 kWh per year are assumed.

For non-weather-sensitive gas measures, evaluation impacts for multifamily dwellings were estimated to be much lower than single-family impacts. Given this effect, the utility estimates tend to be fairly comparable to evaluation results for single-family homes (with the exception of faucet aerators), but the utility multifamily estimates tend to be much higher than the evaluation results. PG&E's estimates tend to exceed the evaluation results by the largest margin.

Table 3-15
Comparison of Non-Weather-Sensitive Gas Impacts – Therms per Year

Measure	Dwelling Type	Evaluation	PG&E	SDG&E	SoCalGas
Faucet Aerators	Multifamily	0.9	3.5 (0.26)		3.5 (0.26)
	Single Family	1.4	3.5 (0.40)		3.5 (0.40)
Low Flow Showerheads	Multifamily	6.1	16.4 (0.37)	7.0 (0.87)	8.8 (0.69)
	Single Family	9.1	16.4 (0.55)	7.0 (1.30)	8.8 (1.03)
Water Heater Blankets	Multifamily	4.9	13.2 (0.37)	6.0 (0.82)	7.0 (0.70)
	Single Family	7.3	13.2 (0.55)	6.0 (1.22)	7.0 (1.04)
Water Heater Pipe Wrap	Multifamily	1.8	4.0 (0.45)		2.6 (0.69)
	Single Family	2.7	4.0 (0.68)		2.6 (1.04)

Weather-Sensitive Measures

For weather-sensitive measures, the comparison between evaluation results and utility estimates is presented by utility because the evaluation results vary by utility due to climatic differences.

The comparison between the evaluation and SCE is presented in Table 3-16. Because SCE does not report weatherization impacts by measure and does not offer furnace measures, the only weather-sensitive measure available for comparison is evaporative coolers. The evaluation evaporative cooler results come in at 88 percent of SCE's estimate for multifamily dwellings and 56 percent of SCE's estimate for single-family dwellings.

Table 3-16
Comparison of Weather-Sensitive Impacts - SCE

Measure	Dwelling Type	Heating kWh per Year		Cooling kWh per Year	
		Evaluation	SCE[1]	Evaluation	SCE[1]
Caulking	Multifamily	4.7		2.6	
	Single Family	6.9			
Ceiling Insulation	Multifamily	34.4			
	Single Family	50.1			
Duct Sealing	Multifamily				
	Single Family				
Evaporative Cooler Covers	Multifamily				
	Single Family				
Building Envelope Repair	Multifamily	14.8		5.0	
	Single Family	21.6			
Weatherstripping	Multifamily	4.2		1.7	
	Single Family	6.2			
Furnace Filters	Multifamily				
	Single Family				
Furnace Repair	Multifamily				
	Single Family				
Furnace Replacement	Multifamily				
	Single Family				
Evaporative Coolers	Multifamily			618.1	705.3 (0.88)
	Single Family			397.2	705.3 (0.56)

[1] SCE weatherization impacts are not reported by measure; total savings of 536 kWh per year are assumed.

The comparison between the weather-sensitive evaluation results and PG&E's estimates is presented in Table 3-17. For most weather-sensitive measures, the evaluation results tend to nearly equal or exceed PG&E's estimates. The major exceptions are for electric heating impacts involving caulking, weatherstripping, building repair, and ceiling insulation measures. Also,

PG&E has assumed electric energy savings for their furnace filter measure while the evaluation found no savings.

Table 3-17
Comparison of Weather-Sensitive Impacts – PG&E

Measure	Dwelling Type	Heating kWh per Year		Cooling kWh per Year		Heating Therms per Year	
		Evaluation	PG&E	Evaluation	PG&E	Evaluation	PG&E
Caulking	Multifamily	6.0	9.2 (0.65)	4.5	3.8 (1.17)	1.6	0.1 (16.00)
	Single Family	8.5	10.2 (0.83)	8.2	4.9 (1.68)	3.3	1.1 (3.06)
Ceiling Insulation	Multifamily	59.0	266.1 (0.22)	70.2	102.0 (0.69)	18.7	2.9 (6.45)
	Single Family	81.6	271.7 (0.30)	110.7	129.9 (0.85)	34.2	29.0 (1.18)
Duct Sealing	Multifamily						
	Single Family						
Evaporative Cooler Covers	Multifamily	18.7				4.0	2.6 (1.54)
	Single Family	24.0				7.2	2.6 (2.77)
Building Envelope Repair	Multifamily	20.8	66.5 (0.31)	14.1	25.5 (0.55)	4.6	0.7 (6.57)
	Single Family	29.3	67.9 (0.43)	25.1	32.5 (0.77)	8.8	7.2 (1.22)
Weatherstripping	Multifamily	6.1	27.7 (0.22)	4.5	11.5 (0.39)	1.6	2.5 (0.65)
	Single Family	8.5	30.6 (0.28)	8.2	14.6 (0.56)	3.3	4.0 (0.83)
Furnace Filters	Multifamily		9.2 -		3.8	2.3 4.7	0.1 (23.00)
	Single Family		10.2 -		4.9	4.0	1.1 (3.70)
Furnace Repair	Multifamily					42.9	
	Single Family					42.9	
Furnace Replacement	Multifamily					147.2	
	Single Family					147.2	
Evaporative Coolers	Multifamily			384.2	353.6 (1.09)		
	Single Family			446.2	353.6 (1.26)		

The comparison between the weather-sensitive evaluation results and SDG&E's estimates is presented in Table 3-18. The evaluation results were higher than SDG&E's estimates for all electric savings measures except weatherstripping. For gas savings measures, SDG&E's

estimates tend to exceed the evaluation results, with the exception of multifamily caulking and weatherstripping and single-family furnace replacement.

Table 3-18
Comparison of Weather-Sensitive Impacts – SDG&E

Measure	Dwelling Type	Heating kWh per Year		Cooling kWh per Year		Heating Therms per Year	
		Evaluation	SDG&E	Evaluation	SDG&E[1]	Evaluation	SDG&E
Caulking	Multifamily	3.7		2.3		2.0	1.0 (2.00)
	Single Family	5.1		2.7		2.5	3.0 (0.83)
Ceiling Insulation	Multifamily	34.4	34.0 (1.01)			11.0	21.0 (0.52)
	Single Family	50.1	34.0 (1.47)	43.5	34.0 (1.28)	16.9	21.0 (0.80)
Duct Sealing	Multifamily						
	Single Family	13.4		7.3		1.8	
Evaporartive Cooler Covers	Multifamily						
	Single Family	15.8				4.3	26.0 (0.17)
Building Envelope Repair	Multifamily	12.9	5.0 (2.58)	7.0	5.0 (1.40)	3.8	8.0 (0.48)
	Single Family	18.0		8.1		5.5	8.0 (0.69)
Weatherstripping	Multifamily	3.7	5.0 (0.74)	2.4	5.0 (0.48)	2.0	1.0 (2.00)
	Single Family	5.2	5.0 (1.04)	2.8	5.0 (0.56)	2.7	3.0 (0.90)
Furnace Filters	Multifamily						
	Single Family						
Furnace Repair	Multifamily					16.0	
	Single Family					23.0	
Furnace Replacement	Multifamily						
	Single Family					84.3	8.0 (10.54)
Evaporative Coolers	Multifamily						
	Single Family				130.0		

[1] SDG&E did not break out electric weatherization savings into space heating and cooling components. For comparison to evaluation results, it was assumed that all electric weatherization savings applied to space heating.

The comparison between the weather-sensitive evaluation results and SoCalGas's estimates are presented in Table 3-19. For most measures, the SoCalGas single-family estimates are similar to

the evaluation results, while the SoCalGas multifamily estimates are about double the evaluation results. The exceptions are for evaporative cooler covers and furnace replacement, where the evaluation results are considerably higher than the SoCalGas estimates.

Table 3-19
Comparison of Weather-Sensitive Impacts – SoCalGas

Measure	Dwelling Type	Heating Therms per Year	
		Evaluation	SoCalGas
Caulking	Multifamily	0.7	1.5 (0.47)
	Single Family	1.5	1.5 (1.00)
Ceiling Insulation	Multifamily	9.6	18.9 (0.51)
	Single Family	18.7	18.9 (0.99)
Duct Sealing	Multifamily		
	Single Family		
Evaporartive Cooler Covers	Multifamily	4.1	2.6 (1.58)
	Single Family	8.1	
Building Envelope Repair	Multifamily	2.2	4.5 (0.49)
	Single Family	4.4	4.5 (0.98)
Weatherstripping	Multifamily	0.7	1.5 (0.47)
	Single Family	1.4	1.5 (0.93)
Furnace Filters	Multifamily		
	Single Family		
Furnace Repair	Multifamily		
	Single Family	24.4	
Furnace Replacement	Multifamily		6.8
	Single Family	110.1	6.8 (16.19)
Evaporative Coolers	Multifamily		
	Single Family		

A SURVEY INSTRUMENT AND FREQUENCIES

INTRO:

IF PERSON NO LONGER LIVES THERE OR THERE'S NO ONE BY THAN NAME AT THIS PHONE NUMBER, CODE 19 - THANK & TERMINATE

Hello, my name is ___, and I'm calling on behalf of<util1>. May I speak to<cont>?
IF NEEDED: I'm calling from the Gilmore Research Group.
REINTRODUCE IF NECESSARY: Our records show that in <MONTH> of <YEAR> your household participated in the <PROGM>. As part of this program, improvements were made to your home to make it more energy efficient. Do you remember participating in this program?
IF DON'T KNOW/NOT SURE, SAY: These improvements may have included: <ecc> <refrg> <water> <ducts> <nonci> <ceili> <frepr> <frepl> <ec> <cfl>

N =		1000	100%

Q1:

We are conducting a survey of customers who participated to learn about their energy usage and experience with the program. This information will be used to help improve services for <util1> customers. All information will remain confidential. IF NEEDED: This survey will take about 10 minutes.

Q4:

I'm going to read off a list of things that might have been installed in your home as part of the <PROGRAM NAME>. Please tell me if these were installed, and whether they are still in place and working. The first is . . .

N =			876	100%
Continue	1	D	876	100%

Q4A:

An evaporative cooler cover? Was this installed?

=> Q4B IF NOT ECC=1

N =		110	100%
Yes	1	75	68%
No	2	32	29%
Don't know	3	3	3%
Refused	4	0	0%

Q4AA:

Is it still in place?

=> Q4B IF NOT Q4A=1

N =		75	100%
Yes	1	64	85%
No	2	9	12%
Don't know	3	2	3%
Refused	4	0	0%

Q6A:

Why isn't the evaporator cooler cover still in place?

=> +1 IF NOT Q4AA=2

N =			9	100%
Didn't like the way it (they) worked	01		2	22%
Wasn't in the right location	02		1	11%
Other (SPECIFY):	97	O	0	0%
Don't know	98	X	0	0%
Refused	99	X	0	0%
Took it down for summer/will put it back when use it	03	N	6	67%

Q4B:

Did you receive a new refrigerator?

=> Q4C IF NOT REFRG=1

N =			124	100%
Yes	1		124	100%
No	2		0	0%
Don't know	3		0	0%
Refused	4		0	0%

Q4BA:

Is it still in place?

=> Q4C IF NOT Q4B=1

N =			124	100%
Yes	1		124	100%
No	2		0	0%
Don't know	3		0	0%
Refused	4		0	0%

Q6B:

Why isn't the refrigerator still in place?

=> +1 IF NOT Q4BA=2

N =			0	100%
Didn't like the way it (they) worked	01		0	0%
Wasn't in the right location	02		0	0%
Other (SPECIFY):	97	O	0	0%
Don't know	98	X	0	0%
Refused	99	X	0	0%

Q4BB:

Is it still working?

=> +2 IF NOT Q4BA=1

N =			124	100%
Yes	1		123	99%
No	2		1	1%
Don't know	3		0	0%
Refused	4		0	0%

Q5B:

Why is the refrigerator not working?

=> +1 IF NOT Q4BB=2

N =			1	100%
It was damaged or broken	01		1	100%
Didn't like the way it worked	02		0	0%
Wasn't in the right location	03		0	0%
It cost too much to use	04		0	0%
Other (SPECIFY):	97	O	0	0%
Don't know	98	X	0	0%
Refused	99	X	0	0%

Q4C:

Were any showerheads, faucet aerators, or water heater blankets installed? NO NEED TO PROBE FOR WHICH, OR HOW MANY

=> Q4D IF NOT WATER=1

N =			662	100%
Yes	1		496	75%
No	2		159	24%
Don't know	3		7	1%
Refused	4		0	0%

Q4CA:

Are all of them still installed, most of them or just some of them? IF RECEIVED ONLY ONE: Is it still installed? IF YES, ENTER CODE 1

=> Q4D IF NOT Q4C=1

N =			496	100%
All	1		446	90%
Most	2		14	3%
Some	3		14	3%
None still in place	4		16	3%
Don't know/Not sure	5		5	1%
Refused	6		1	0%

Q6C:

Why aren't the hot water saving devices still in place?

=> +1 IF NOT Q4CA=2-4

N =			44	100%
Didn't like the way it (they) worked	01		11	25%
Wasn't in the right location	02		2	5%
They/It broke	03	N	16	36%
Bathroom burned down	04	N	1	2%
Shower head was replace with a handheld	05	N	1	2%
Not installed yet/never installed	06	N	2	5%
Other (SPECIFY):	97	O	0	0%
Don't know	98	X	10	23%
Refused	99	X	2	5%

Q4D:

Duct sealing? Was this installed?

=> +1 IF NOT DUCTS=1

N =			204	100%
Yes	1		75	37%
No	2		85	42%
Don't know	3		43	21%
Refused	4		1	0%

Q4E:

Weatherstripping, or caulking? Were any of these installed?

=> Q4F IF NOT NONCI=1

N =			711	100%
Yes	1		571	80%
No	2		127	18%
Don't know	3		12	2%
Refused	4		1	0%

Q4EA:

Are all of them still installed, most of them or just some of them? IF RECEIVED ONLY ONE: Is it still installed? IF YES, ENTER CODE 1

=> Q4F IF NOT Q4E=1

N =			571	100%
ALL	1		525	92%
MOST	2		18	3%
SOME	3		17	3%
None	4		9	2%
Don't know	5		1	0%
Refused	6		1	0%

Q6E:

Why aren't the weatherstripping, or caulking still in place?

=> +1 IF NOT Q4EA=2-4

N =			44	100%
Didn't like the way it (they) worked	01		7	16%
Wasn't in the right location	02		4	9%
It fell off/ came loose	03	N	11	25%
Doesn't fit/ too thick/ too tight	04	N	3	7%
Poorly Installed	05	N	6	14%
Removed or replaced window/door	06	N	3	7%
Other (SPECIFY):	97	O	0	0%
Don't know	98	X	11	25%
Refused	99	X	2	5%

Q4F:

Ceiling insulation? Was this installed?

=> Q4G IF NOT CEILI=1

N =			128	100%
Yes	1		86	67%
No	2		36	28%
Don't know	3		5	4%
Refused	4		1	1%

Q4FA:

Is it still in place?

=> Q4G IF NOT Q4F=1

N =			86	100%
Yes	1		84	98%
No	2		0	0%
Don't know	3		2	2%
Refused	4		0	0%

Q6F:

Why isn't the ceiling insulation still in place?

=> +1 IF NOT Q4FA=2

N =			0	100%
Didn't like the way it (they) worked	01		0	0%
Wasn't in the right location	02		0	0%
Other (SPECIFY):	97	O	0	0%
Don't know	98	X	0	0%
Refused	99	X	0	0%

Q4G:

Did you get your furnace repaired?

=> Q4H IF NOT FREPR=1

N =			82	100%
Yes	1		56	68%
No	2		24	29%
Don't know	3		2	2%
Refused	4		0	0%

Q4GB:

Is your furnace still working?

=> Q4H IF NOT Q4G=1

N =			56	100%
Yes	1		55	98%
No	2		1	2%
Don't know	3		0	0%
Refused	4		0	0%

Q5G:

Why is the furnace not working after the repair?

=> +1 IF NOT Q4GB=2

N =			1	100%
Other (SPECIFY):	97	O	0	0%
Don't know	98	X	1	100%
Refused	99	X	0	0%

Q4H:

Did you receive a new furnace to replace your old one?

=> Q4I IF NOT FREPL=1

N =			85	100%
Yes	1		22	26%
No	2		61	72%
Don't know	3		2	2%
Refused	4		0	0%

Q4HA:

Is the new furnace still there?

=> Q4I IF NOT Q4H=1

N =			22	100%
Yes	1		22	100%
No	2		0	0%
Don't know	3		0	0%
Refused	4		0	0%

Q6H:

Why isn't the new furnace still there?

=> +1 IF NOT Q4HA=2

N =			0	100%
Didn't like the way it (they) worked	01		0	0%
Wasn't in the right location	97		0	0%
Other (SPECIFY):	98	O	0	0%
Don't know	99	X	0	0%

Q4HB:

Is your new furnace still working?

=> +1 IF NOT Q4HA=1

N =			22	100%
Yes	1		20	91%
No	2		2	9%
Don't know	3		0	0%
Refused	4		0	0%

Q5H:

Why isn't your new furnace still working?

=> +1 IF NOT Q4HB=2

N =			2	100%
It needs to be cleaned and since my husband died there's no one to do it.	01	N	1	50%
One of them isn't working	02	N	1	50%
Other (SPECIFY):	97	O	0	0%
Don't know	98	X	0	0%
Refused	99	X	0	0%

Q4I:

An evaporative cooler? Was this installed?

=> Q7 IF NOT EC=1

N =			86	100%
Yes	1		70	81%
No	2		14	16%
Don't know	3		2	2%
Refused	4		0	0%

Q4IA:

Is it still in place?

=> Q7 IF NOT Q4I=1

N =			70	100%
Yes	1		66	94%
No	2		4	6%
Don't know	3		0	0%
Refused	4		0	0%

Q6I:

Why isn't the evaporator cooler still in place?

=> +1 IF NOT Q4IA=2

N =			4	100%
Didn't like the way it (they) worked	01		1	25%
Moved it for the winter	02	N	2	50%
Wasn't in the right location	97		1	25%
Other (SPECIFY):	98	O	0	0%
Don't know	99	X	0	0%

Q4IB:

Is it still operating?

=> Q7 IF NOT Q4IA=1

N =			66	100%
Yes	1		63	95%
No	2		2	3%
Don't know	3		1	2%
Refused	4		0	0%

Q5I:

Why is the evaporative cooler not working?

=> +1 IF NOT Q4IB=2

N =			2	100%
Other (SPECIFY):	97	O	0	0%
Don't know	98	X	1	50%
Refused	99	X	1	50%

Q7:

Our records indicate that you received<# OF CFLs>light bulbs through the<PROGRAM NAME>in 2000. Is this correct?

=> Q23 IF CFLNM==0

N =			530	100%
Yes	1	=> Q9	487	92%
No	2		41	8%
Don't know	3	=> Q9	2	0%
Refused	4	=> Q9	0	0%

Q8:

How many did you receive?

N =			41	100%
	01		0	0%
	02		4	10%
	03		2	5%
	04		3	7%
	05		3	7%
NONE	97	=> Q23	22	54%
Don't know	98		1	2%
Refused	99		6	15%

Q9:

Are all the program bulbs that you received currently installed in your home?

N =			508	100%
Yes	1	=> BULBS	381	75%
No	2		117	23%
Don't know	3	=> BULBS	4	1%
Refused	4	=> BULBS	6	1%

Q10:

How many are currently installed?

N =			117	100%
	00		0	0%
	01		22	19%
	02		20	17%
	03		10	9%
	04		7	6%
	05		1	1%
	06		2	2%
96 or more	96		2	2%
NONE	97		42	36%
Don't know	98		2	2%
Refused	99		0	0%

Q11:

Why aren't all the bulbs currently installed?

N =			117	100%
Not enough fixtures for all bulbs	01		6	5%
Bulbs didn't fit in fixtures	02		9	8%
Didn't like the quality of light	03		12	10%
Light wasn't bright enough	04		8	7%
Light flickered when I turned it on	05		4	3%
Burned out	06		65	56%
Broken	07		10	9%
Stolen	08		0	0%
Gave to someone else	09		3	3%
Haven't had time/still in package	10		2	2%
Didn't look good in lamp	11		1	1%
Room burned down and lost bulbs in fire	12		1	1%
Other (SPECIFY):	97	O	0	0%
Don't know	98	X	4	3%
Refused	99	X	2	2%

Q12:

We'd like to ask a few questions about each compact fluorescent bulb still installed. Considering the bulb that you use most, about how many hours per day is it on? IF USE EQUALLY SAY: Then please choose one to describe.

N =			445	100%
Average=			5.12	
N =			445	100%
	1	N	26	6%
	2	N	42	9%
	3	N	60	13%
	4	N	63	14%
	5	N	60	13%
	6	N	48	11%
	7	N	17	4%
	8	N	16	4%
	9	N	3	1%
	10		13	3%
	11		4	1%
	12		13	3%
	14		3	1%
	20		1	0%
	22		1	0%
	24		4	1%
Less than 1 hour	97		33	7%
Don't know	98		28	6%
Refused	99		10	2%

Q13:

And is it usually on during weekday afternoons?

N =		445	100%
Yes	1	180	40%
No	2	249	56%
Don't know	3	8	2%
Refused	4	8	2%

Q14:

In which room is this bulb located?

N =			445	100%
Living room	01		174	39%
Bathroom	02		34	8%
Kitchen	03		82	18%
Bedroom	04		62	14%
Porch	05		18	4%
Dining room	06		21	5%
Hall	07		14	3%
Closet	08		0	0%
Den/office	10	N	5	1%
family room	11	N	11	2%
garage	12	N	3	1%
porch/outside	13	N	3	1%
laundry room	14	N	0	0%
basement	15	N	1	0%
Other (SPECIFY):	97	O	0	0%
Don't know	98		8	2%
Refused	99		8	2%

Q15:

Now, considering the bulb that you use next most, about how many hours per day is it on? IF USE EQUALLY SAY: Then please choose one , other than the previous one, to describe.

=> Q23 IF BULBS<2

Average =			3.85	
N =			347	100%
Less than 1 hour	97		46	13%
	1	N	38	11%
	2	N	52	15%
	3	N	33	10%
	4	N	43	12%
	5	N	31	9%
	6	N	22	6%
	7	N	4	1%
	8	N	7	2%
	9	N	3	1%
	10		6	2%
	11		1	0%
	12		3	1%
	22		1	0%
Don't know	98		42	12%
Refused	99		15	4%

Q16:

And is it usually on during weekday afternoons?

N =			347	100%
Yes	1		116	33%
No	2		194	56%
Don't know	3		22	6%
Refused	4		15	4%

Q17:

In which room is this bulb located?

N =			347	100%
Living room	01		80	23%
Bathroom	02		40	12%
Kitchen	03		55	16%
Bedroom	04		83	24%
Porch	05		7	2%
Dining room	06		19	5%
Hall	07		19	5%
Closet	08		2	1%
den/office	10	N	5	1%
family room	11	N	6	2%
garage	12	N	2	1%
porch/outside	13	N	0	0%
laundry room	14	N	2	1%
basement	15	N	1	0%
Other (SPECIFY):	97	O	0	0%
Don't know	98		13	4%
Refused	99		13	4%

Q18:

Now, considering the bulb that you use third most, about how many hours per day is it on? IF USE EQUALLY SAY: Then please choose one , other than the previous two, to describe.

=> Q23 IF BULBS<3

Average =			3.00	
N =			305	100%
Less than 1 hour	97		66	22%
	0		1	0%
	1	N	29	10%
	2	N	40	13%
	3	N	28	9%
	4	N	18	6%
	5	N	16	5%
	6	N	7	2%
	8	N	1	0%
	12		1	0%
	19		1	0%
Don't know	98		68	22%
Refused	99		29	10%

Q19:

And is it usually on during weekday afternoons?

N =			305	100%
Yes	1		81	27%
No	2		164	54%
Don't know	3		33	11%
Refused	4		27	9%

Q20:

In which room is this bulb located?

N =			305	100%
Living room	01		47	15%
Bathroom	02		37	12%
Kitchen	03		37	12%
Bedroom	04		80	26%
Porch	05		10	3%
Dining room	06		4	1%
Hall	07		8	3%
Closet	08		1	0%
Den/office	10	N	3	1%
Family room	11	N	2	1%
Garage	12	N	3	1%
porch/outside	13	N	1	0%
laundry room	14	N	3	1%
basement	15	N	1	0%
storage room	16	N	1	0%
sewing room	17	N	1	0%
Other (SPECIFY):	97	O	0	0%
Don't know	98		36	12%
Refused	99		30	10%

Q21:

For the remaining program bulbs that are still installed, on average about how many hours per day are they on for?

=> Q23 IF BULBS<4

Average =			3.24	
N =			253	100%
Less than 1 hour	97		59	23%
	0		2	1%
	1	N	19	8%
	2	N	29	11%
	3	N	20	8%
	4	N	6	2%
	5	N	10	4%
	6	N	5	2%
	7	N	1	0%
	8	N	1	0%
	9	N	3	1%
	10		1	0%
	12		1	0%
	16		1	0%
Don't know	98		59	23%
Refused	99		36	14%

Q22:

And are any of these bulbs usually on during weekday afternoons?

N =			253	100%
Yes	1		58	23%
No	2		130	51%
Don't know	3		35	14%
Refused	4		30	12%

Q23:

We'd like to ask you a few questions related to the evaporative cooler you received from<UTILITY NAME>. Did you have a working air conditioner before you received the evaporative cooler from<UTILITY NAME>?

=> Q28 IF NOT Q4I=1

N =			70	100%
Yes	1		65	93%
No	2		5	7%
Don't know	3		0	0%
Refused	4		0	0%

Q24:

ENTER ALL THAT APPLY

What type(s) of air conditioner(s) did you have before the<UTILITY NAME>evaporative cooler was installed?

=> +1 IF NOT Q23=1

N =			65	100%
A central air conditioner	01		44	68%
One or more room air conditioners	02		6	9%
Another evaporative cooler	03		3	5%
Water cooler	04		2	3%
Other (SPECIFY):	97	O	0	0%
Don't know	98	X	9	14%
Refused	99	X	1	2%

Q25:

Now that you have the evaporative cooler do you cool your home more, less, or about the same as you did prior to receiving the evaporative cooler?

=> +1 IF NOT Q4IB=1

N =		63	100%
More	1	28	44%
Less	2	9	14%
About the same	3	25	40%
Don't know	4	1	2%
Refused	5	0	0%

Q28:

Did you have a working furnace before <UTILITY NAME> <replace/repaired>your furnace?

=> Q30 IF NOT Q4G=1 AND NOT Q4H=1

N =		74	100%
Yes	1	25	34%
No	2	47	64%
Don't know	3	2	3%
Refused	4	0	0%

Q29:

Do you heat your home more, less, or about the same as you did prior to< receiving the new furnace /having your furnace repaired>?

=> +1 IF NOT Q4IB=1

N =		2	100%
More	1	0	0%
Less	2	0	0%
About the same	3	2	100%
Don't know	4	0	0%
Refused	5	0	0%

Q30:

Now I'd like to ask you some questions about your home. Approximately how old is your home?

N =		1000	100%
Under 10 years old	1	36	4%
10-20 years old	2	161	16%
21-30 years old	3	162	16%
Over 30 years old	4	451	45%
Don't know	5	189	19%
Refused	6	1	0%

Q31:

How many rooms are there in your home, not counting bathrooms, garages, and halls? DO NOT COUNT UNHEATED BASEMENT AREAS

Average =		4.70	
N =		1000	100%
	1	25	3%
	2	120	12%
	3	203	20%
	4	238	24%
	5	235	24%
	6	127	13%
	7	34	3%
	8	9	1%
	9	1	0%
	10	1	0%
	14	1	0%
Don't know	98	2	0%
Refused	99	4	0%

Q32:

Approximately how many square feet of living space are in your home, not including the garage?

N =		1000	100%
Under 500 square feet	01	42	4%
500-750 square feet	02	52	5%
751-1000 square feet	03	92	9%
1001-1500 square feet	04	155	16%
1501-2000 square feet	05	69	7%
2001-2500 square feet	06	16	2%
2501-3000 square feet	07	7	1%
Over 3000 square feet	08	5	1%
Don't know	98	560	56%
Refused	99	2	0%

Q33:

How many people currently live in your home, including yourself and any children?

Average =		3.60	
N =		1000	100%
	1	280	28%
	2	232	23%
	3	113	11%
	4	134	13%
	5	107	11%
	6	78	8%
	7	30	3%
	8	12	1%
	9	5	1%
	10	1	0%
	11	1	0%
	12	1	0%
Don't know	98	3	0%
Refused	99	3	0%

Q34:

How many people lived in your home in 1999, including yourself and any children?

Average =		4.49	
N =		1000	100%
	1	255	26%
	2	235	24%
	3	120	12%
	4	131	13%
	5	115	12%
	6	64	6%
	7	37	4%
	8	14	1%
	9	6	1%
	10	3	0%
	11	2	0%
	12	1	0%
	13	2	0%
	33	1	0%
Don't know	98	10	1%
Refused	99	4	0%

Q35:

Is someone usually at home during the day for three or more weekdays per week?

N =			1000	100%
Yes	1		797	80%
No	2		187	19%
Don't know	3		11	1%
Refused	4		5	1%

Q36:

Do you have air conditioning in your home?

=> +2 IF Q4I=1

N =			934	100%
Yes	1		437	47%
No	2		497	53%
Don't know	3		0	0%
Refused	4		0	0%

Q37:

What type(s) of air conditioner(s) do you have?

=> +1 IF NOT Q36=1

N =			437	100%
A central air conditioner	01		179	41%
One or more room air conditioners	02		83	19%
Another evaporative cooler	03		71	16%
Heat pump	04		6	1%
Swamp cooler	05	N	9	2%
water cooler	06	N	1	0%
forced air	07	N	5	1%
wall mounted	08	N	6	1%
Other (SPECIFY):	97	O	6	1%
Don't know	98	X	76	17%
Refused	99	X	0	0%

Q38:

What is the primary type of fuel that is used for heating your home?

N =			1000	100%
Electricity	01		177	18%
Natural gas	02		665	67%
Propane	03		12	1%
Wood	04		17	2%
No space heating	05		82	8%
Other (SPECIFY):	97	O	5	1%
Don't know	98		40	4%
Refused	99		2	0%

Q39:

What is the primary type of fuel that is used for water heating?

N =				1000	100%
Electricity	01			115	12%
Natural gas	02			773	77%
Propane	03			9	1%
Solar	04			1	0%
Other (SPECIFY):	97	O		4	0%
Don't know	98			96	10%
Refused	99			2	0%

Q40A:

READ 1-96. UP TO 7 RESPONSES

Have you ADDED any appliances since 1999, such as an electric blanket, air conditioner, electric clothes dryer, freezer, extra refrigerator, heated waterbed or any other major appliances? IF YES TO ANY OF THESE: This was a new or additional one, not a replacement for one you already had? IMPORTANT - DOES NOT COUNT IF IT WAS A REPLACEMENT FOR ONE THEY ALREADY HAD - PLEASE CLARIFY

N =				1000	100%
Electric blanket	01			14	1%
Air conditioner	02			20	2%
Electric clothes dryer	03			40	4%
Freezer	04			14	1%
Extra refrigerator	05			43	4%
Heated waterbed	06			2	0%
washer	07	N		14	1%
Stove/Oven	08	N		12	1%
TV	09	N		3	0%
Computer	10	N		7	1%
dishwasher	11	N		5	1%
window cooler	12	N		1	0%
microwave	13	N		8	1%
Cooler	14	N		3	0%
fan	15	N		3	0%
Heater	16	N		3	0%
Gas washer/dryer	17	N		2	0%
Electric Boiler/Furnace	18	N		2	0%
Or some other major appliance	96	O		10	1%
None of the above - DO NOT READ	88	X	=> Q41A	812	81%
Don't know/Not sure - DO NOT READ	98	X	=> Q41A	14	1%
Refused - DO NOT READ	99	X	=> Q41A	3	0%

Q40AA:

Was the electric blanket added before, after or about the same time you participated in the <PROGRAM NAME>?

=> +1 IF NOT Q40A=01

N =			14	100%
Before	1		1	7%
After	2		9	64%
About the same time	3		3	21%
Don't know	4		1	7%
Refused	5		0	0%

Q40B:

Was the air conditioner added before, after or about the same time you participated in the <PROGRAM NAME>?

=> +1 IF NOT Q40A=02

N =		19	100%
Before	1	7	37%
After	2	10	53%
About the same time	3	1	5%
Don't know	4	0	0%
Refused	5	1	5%

Q40C:

Was the electric clothes dryer added before, after or about the same time you participated in the <PROGRAM NAME>?

=> +1 IF NOT Q40A=03

N =		35	100%
Before	1	12	34%
After	2	15	43%
About the same time	3	6	17%
Don't know	4	1	3%
Refused	5	1	3%

Q40D:

Was the freezer added before, after or about the same time you participated in the <PROGRAM NAME>?

=> +1 IF NOT Q40A=05

N =		14	100%
Before	1	3	21%
After	2	8	57%
About the same time	3	2	14%
Don't know	4	1	7%
Refused	5	0	0%

Q40E:

Was the extra refrigerator added before, after or about the same time you participated in the<PROGRAM NAME>?

=> +1 IF NOT Q40A=05

N =		40	100%
Before	1	9	23%
After	2	26	65%
About the same time	3	4	10%
Don't know	4	0	0%
Refused	5	1	3%

Q40F:

Was the heated waterbed added before, after or about the same time you participated in the <PROGRAM NAME>?

=> +1 IF NOT Q40A=06

N =		2	100%
Before	1	0	0%
After	2	1	50%
About the same time	3	0	0%
Don't know	4	0	0%
Refused	5	1	50%

Q40G:

(Was)/(Were) <q40a:o>added before, after or about the same time you participated in the <PROGRAM NAME>?

=> +1 IF NOT Q40A=96

N =		71	100%
Before	1	17	24%
After	2	43	61%
About the same time	3	7	10%
Don't know	4	4	6%
Refused	5	0	0%

Q41A:

READ 1-96. UP TO 7 RESPONSES

Have you REMOVED any appliances since 1999, such as an electric blanket, air conditioner, electric clothes dryer, freezer, extra refrigerator, heated waterbed or any other major appliances? IF YES: What have you removed? VERIFY: And you removed it without replacing it with another one? DOES NOT COUNT IF REPLACED WITH ANOTHER

N =				1000	100%
Electric blanket	01			2	0%
Air conditioner	02			1	0%
Electric clothes dryer	03			5	1%
Freezer	04			11	1%
Extra refrigerator	05			14	1%
Heated waterbed	06			3	0%
washer	07	N		2	0%
stove/oven	08	N		5	1%
TV	09	N		2	0%
computer	10	N		1	0%
Dishwasher	11	N		2	0%
Window cooler	12	N		1	0%
Microwave	13	N		3	0%
Cooler	14	N		0	0%
Fan	15	N		0	0%
Heater	16	N		1	0%
Furnace	17	N		2	0%
Water filter	18	N		1	0%
Or some other major appliance	96	O		0	0%
None of the above - DO NOT READ	88	X	=> Q42	912	91%
Don't know/Not sure - DO NOT READ	98	X	=> Q42	24	2%
Refused - DO NOT READ	99	X	=> Q42	11	1%

Q41AA:

Was the electric blanket removed before, after or about the same time you participated in the <PROGRAM NAME>?

=> +1 IF NOT Q41A=01

N =		2	100%
Before	1	0	0%
After	2	2	100%
About the same time	3	0	0%
Don't know	4	0	0%
Refused	5	0	0%

Q41B:

Was the air conditioner removed before, after or about the same time you participated in the <PROGRAM NAME>?

=> +1 IF NOT Q41A=02

N =		1	100%
Before	1	0	0%
After	2	1	100%
About the same time	3	0	0%
Don't know	4	0	0%
Refused	5	0	0%

Q41C:

Was the electric clothes dryer removed before, after or about the same time you participated in the<PROGRAM NAME>?

=> +1 IF NOT Q41A=03

N =		4	100%
Before	1	0	0%
After	2	3	75%
About the same time	3	0	0%
Don't know	4	1	25%
Refused	5	0	0%

Q41D:

Was the freezer removed before, after or about the same time you participated in the<PROGRAM NAME>?

=> +1 IF NOT Q41A=05

N =		9	100%
Before	1	3	33%
After	2	6	67%
About the same time	3	0	0%
Don't know	4	0	0%
Refused	5	0	0%

Q41E:

Was the extra refrigerator removed before, after or about the same time you participated in the<PROGRAM NAME>?

=> +1 IF NOT Q41A=05

N =		14	100%
Before	1	2	14%
After	2	9	64%
About the same time	3	2	14%
Don't know	4	1	7%
Refused	5	0	0%

Q41F:

Was the heated waterbed removed before, after or about the same time you participated in the <PROGRAM NAME>?

=> +1 IF NOT Q41A=06

N =		3	100%
Before	1	1	33%
After	2	2	67%
About the same time	3	0	0%
Don't know	4	0	0%
Refused	5	0	0%

Q41G:

(Was)/(Were) <q41a:o>removed before, after or about the same time you participated in the <PROGRAM NAME>?

=> +1 IF NOT Q41A=96

N =		23	100%
Before	1	3	13%
After	2	15	65%
About the same time	3	5	22%
Don't know	4	0	0%
Refused	5	0	0%

Q42:

Have there been any other changes in your family or your house since 1999 that might have increased your energy consumption? IF YES: Such as?

N =			1000	100%
Yes (SPECIFY):	01	O	0	0%
No	02	X	869	87%
New baby/new family member/added resident of household	03	XN	50	5%
New appliance/device (misc.)	04	XN	23	2%
Television	05	XN	3	0%
Computer	06	XN	10	1%
Dishwasher	07	XN	1	0%
Washer and/or dryer	08	XN	0	0%
Microwave	09	XN	1	0%
Water heater	10	XN	0	0%
Stove/range	11	XN	1	0%
Using low wattage/energy efficient light bulbs	12	XN	2	0%
Refrigerator	13	XN	2	0%
Something broke/old/faulty equipment	15	XN	7	1%
Illness/old age requires more heat/oxygen machine	14	XN	13	1%
Using more lights	16	XN	1	0%
Cooking more	17	XN	1	0%
Room addition, now have 3 bedrooms instead of 2	18	XN	1	0%
Running business/took ownership of apartments, so we're here more	19	XN	2	0%
Children are older/bigger and using more energy	20	XN	3	0%
Don't know	98	X	15	2%
Refused	99	X	2	0%

Q43:

Have there been any other changes in your family or your house since 1999 that might have decreased your energy consumption? IF YES: Such as?

N =			1000	100%
Yes (SPECIFY):	01	O	0	0%
No	02		787	79%
Family member moved out/fewer residents	03	N	53	5%
Conserve more (general)	05	N	22	2%
Turn off lights	06	N	21	2%
Turn down heat	07	N	8	1%
Use less air conditioning/use fans more	08	N	12	1%
Running appliances at night instead of during peak hours, during the day	10	N	4	0%
Got rid of non-energy efficient appliance	11	N	2	0%
Miscellaneous conservation measures (turn off TV, filter, shut doors, use dishwasher less, others)	12	N	39	4%
Disconnecting appliances when not in use	13	N	4	0%
Energy saving appliances/additions	20	N	10	1%
Weather stripping	21	N	5	1%
Refrigerator	22	N	16	2%
Cooler/swamp cooler/fans	23	N	6	1%
CFLs/bulbs	24	N	11	1%
New windows	25	N	3	0%
New appliances	26	N	2	0%
Got gas appliance	27	N	3	0%
Low flow faucet aerators	28	N	1	0%
People not at home as much/go to work/school	30	N	18	2%
Don't know	98		11	1%
Refused	99		0	0%

Q44:

DO NOT READ! ENTER ALL THAT APPLY. CLARIFY IF UNCLEAR

Now I have a few questions regarding your participation. How did you hear about the<PROGRAM NAME>?

N =			1000	100%
Someone knocked on my door	01		291	29%
Someone left a flyer on my doorstep/door knob	02		59	6%
Utility bill insert/mailer	03		156	16%
Neighbor/friend/family member	04		232	23%
I called the Utility	05		47	5%
The utility called me	06		56	6%
TV/radio	07	N	12	1%
Newspaper	08	N	20	2%
Manager/apartment office/landlord	09	N	28	3%
Was in the program before	10	N	3	0%
Clubhouse/ homeowners association	11	N	6	1%
Gas company/gasman	12	N	4	0%
Senior Center	13	N	6	1%
Other (SPECIFY):	97	O	21	2%
Don't know	98	X	103	10%
Refused	99	X	2	0%

RECED:

Number of measures received non-CFL

N =		1000	100%
	0	124	12%
	1	190	19%
	2	303	30%
	3	218	22%
	4	112	11%
	5	33	3%
	6	13	1%
	7	5	1%
	8	2	0%
	9	0	0%

Q45A:

Can you describe your satisfaction with the following elements of the program. First, the process to sign you up for the program, where you filled out forms and provided income documents? Were you completely satisfied, somewhat satisfied, not very satisfied or not at all satisfied?

N =		1000	100%
Completely satisfied	1	754	75%
Somewhat satisfied	2	144	14%
Not very satisfied	3	15	2%
Not at all satisfied	4	10	1%
Don't know/Not sure	5	72	7%
Refused	6	5	1%

Q45B:

What about your experience with the outreach workers who collected the forms? IF NEEDED: Were you completely satisfied, somewhat satisfied, not very satisfied, or not at all satisfied?

N =		1000	100%
Completely satisfied	1	745	75%
Somewhat satisfied	2	115	12%
Not very satisfied	3	10	1%
Not at all satisfied	4	8	1%
Don't know/Not sure	5	120	12%
Refused	6	2	0%

Q45C:

And the amount of time it took from being first contacted to receiving measures? IF NEEDED: Were you completely satisfied, somewhat satisfied, not very satisfied, or not at all satisfied?

=> +1 IF RECED<1

N =		876	100%
Completely satisfied	1	619	71%
Somewhat satisfied	2	142	16%
Not very satisfied	3	27	3%
Not at all satisfied	4	10	1%
Don't know/Not sure	5	76	9%
Refused	6	2	0%

Q45D:

And your experience with the people who came to your home to install the measures? IF NEEDED: Were you completely satisfied, somewhat satisfied, not very satisfied, or not at all satisfied?

=> +1 IF RECED<1

N =		876	100%
Completely satisfied	1	719	82%
Somewhat satisfied	2	84	10%
Not very satisfied	3	24	3%
Not at all satisfied	4	21	2%
Don't know/Not sure	5	27	3%
Refused	6	1	0%

Q45E:

And the free measures that were installed in your home? IF NEEDED: Were you completely satisfied, somewhat satisfied, not very satisfied, or not at all satisfied?

N =		1000	100%
Completely satisfied	1	805	81%
Somewhat satisfied	2	127	13%
Not very satisfied	3	19	2%
Not at all satisfied	4	14	1%
Don't know/Not sure	5	33	3%
Refused	6	2	0%

Q46:

DO NOT READ! ONE RESPONSE ONLY!

Next, what do you feel was the MOST IMPORTANT benefit from participating in the<PROGRAM NAME>? IF MULTIPLE, CLARIFY: Which do you feel is the MOST

important benefit? IF EQUIPMENT/FREE EQUIPMENT, PROBE: How did you benefit from the equipment you received?

N =			1000	100%
Free equipment/home improvement/measures/free stuff	01		296	30%
Lower utility bill/save money	02		368	37%
Education on energy usage	03		44	4%
Goal-setting session on how to reduce energy usage	04		8	1%
More comfortable home/warmer/less drafty	05		110	11%
Safer home/secure	06		23	2%
Healthier home	07		4	0%
Weather stripping/caulking	08	N	6	1%
Insulation	09	N	3	0%
Saving energy/more energy efficient	10	N	18	2%
Save, use less electricity	11	N	4	0%
Save, use less gas	12	N	1	0%
Light bulbs/brighter light bulbs/free light bulbs	13	N	5	1%
Keep cooler/evaporative cooler	14	N	0	0%
New Refrigerator	15	N	2	0%
Fixed door	16	N	4	0%
Fixed window	17	N	0	0%
Clean furnace/filter/duct	18	N	3	0%
Showed concern/caring	19	N	7	1%
None/nothing/no benefit/same as before	20	N	6	1%
All of the benefits are important/everything	30	N	3	0%
Other (SPECIFY):	97	O	16	2%
Don't know	98		68	7%
Refused	99		1	0%

Q47:

DO NOT READ! PROBE AND ENTER ALL THAT APPLY.

How else did you benefit?

=> +1 IF Q46=98-99

N =			931	100%
Free equipment/home improvement/measures/free stuff	01		190	20%
Lower utility bill/save money	02		154	17%
Education on energy usage	03		38	4%
Goal-setting session on how to reduce energy usage	04		18	2%
More comfortable home/warmer/less drafty	05		141	15%
Safer home/secure	06		27	3%
Healthier home	07		19	2%
Weather stripping/caulking	08	N	4	0%
Insulation	09	N	1	0%
Saving energy/more energy efficient	10	N	7	1%
Save, use less electricity	11	N	1	0%
Save, use less gas	12	N	0	0%
Light bulbs/brighter light bulbs/free light bulbs	13	N	9	1%
Keep cooler/evaporative cooler	14	N	3	0%
New Refrigerator	15	N	2	0%
Fixed door	16	N	3	0%
Fixed window	17	N	3	0%
Clean furnace/filter duct	18	N	2	0%
showed concern/caring	19	N	3	0%
Nothing/no same/same as before	20	N	0	0%
Use less water/conserve water	21	N	2	0%
NONE/No other benefits	88	X	219	24%
Other (SPECIFY):	97	O	13	1%
Don't know	98	X	153	16%
Refused	99	X	5	1%

Q48:

Have you noticed any change in the comfort levels in your home as a result of the <PROGRAM NAME>home improvements? IF YES: Has your comfort increased or decreased?

N =		1000	100%
Yes, increased comfort	1	583	58%
Yes, decreased comfort	2	19	2%
No	3	362	36%
Don't know	4	36	4%
Refused	5	0	0%

Q50:

Have you noticed any change in your utility bill since participating in the program? IF YES: Has your bill gone up or gone down?

N =		1000	100%
Yes, bill has gone UP	1	100	10%
Yes, bill has gone DOWN	2	592	59%
No	3	244	24%
Don't know	4	64	6%
Refused	5	0	0%

Q51:

Do you feel that your home is safer as a result of the improvements you got through the program?

N =		1000	100%
Yes	1	740	74%
No	2	194	19%
Don't know	3	64	6%
Refused	4	2	0%

Q53:

READ 1-4

How informative did you find the energy education information, including the packet with brochures that you received? Was it...

N =		1000	100%
Very informative	1	634	63%
Somewhat informative	2	215	22%
Not very informative	3	15	2%
or, Not at all informative?	4	10	1%
Don't remember receiving education/packet-DO NOT READ	5	85	9%
Don't know-DO NOT READ	6	41	4%
Refused-DO NOT READ	7	0	0%

Q54:

READ 1-4

How knowledgeable do you feel the <UTILITY NAME> representative was about how you could save energy? Would you say. . .

N =		1000	100%
Very knowledgeable	1	715	72%
Somewhat knowledgeable	2	172	17%
Not very knowledgeable	3	13	1%
or, Not at all knowledgeable?	4	11	1%
Don't know - DO NOT READ	5	89	9%
Refused - DO NOT READ	6	0	0%

Q55:

Do you continue to use the information you received in the energy education portion of the program?

N =		1000	100%
Yes	1	770	77%
No	2	157	16%
Don't know	3	69	7%
Refused	4	4	0%

Q57:

Have you done anything else on your own to reduce your energy use since participating in the <PROGRAM NAME>?

N =		1000	100%
Yes	1	545	55%
No	2	441	44%
Don't know	3	11	1%
Refused	4	3	0%

Q58:

Please describe what you have done.

=> +1 IF NOT Q57=1

N =			545	100%
Close/fix/seal doors	19	N	11	2%
Turn off lights	02	NO	212	39%
Replace light bulbs	03	NO	43	8%
Turn off/unplug electrical appliances/use less (non-specific)	04	NO	42	8%
Turn off/unplug appliance/use less (misc.)	05	NO	26	5%
Turn off TV	06	NO	22	4%
Change/fix/close/seal/cover windows	07	NO	47	9%
Turn down heat/turn off heat at night	08	NO	53	10%
Turn down air conditioning/use fans instead	09	NO	25	5%
Turn down fridge/freezer	10	NO	3	1%
Do Laundry/use appliances in early morning, late night	11	NO	37	7%
Use more energy efficient refrigerator, other appliance	12	NO	18	3%
Hang clothes out to dry	13	NO	9	2%
Wear more clothes/use extra blankets	14	NO	13	2%
Use less water/install efficient fixtures	20	NO	8	1%
Use less hot water/turn down water heater	15	NO	17	3%
Careful/watch/save energy consumption (general)	16	NO	56	10%
Convert to gas/propane	17	NO	2	0%
Cook less	18	NO	19	3%
Other	97	NO	59	11%
Don't know	98	X	8	1%
Refused	99	X	5	1%

Q59A:

We're nearly done... I'd like you to rate the following services that you may have received through participating in the<PROGRAM NAME>. Please rate each service in terms of value on a scale from one to five, with one meaning "of little value" and five meaning "very high value". If you didn't receive the service, just let me know. The first service is . . . The information about other utility and state assistance programs? IF RESPONDENT CAN'T REMEMBER IF THEY RECEIVED SERVICE, RECORD AS "DON'T KNOW".

N =		1000	100%
1-Little value	1	33	3%
2	2	30	3%
3	3	91	9%
4	4	133	13%
5-Very high value	5	377	38%
Didn't receive	6	229	23%
Don't know/Not sure	7	107	11%
Refused	8	0	0%

Q59B:

(Please rate the following services that you may have received through participating in the<PROGRAM NAME>.) And how would you rate the brochures on general ways to save energy in your home? IF RESPONDENT CAN'T REMEMBER IF THEY RECEIVED SERVICE, RECORD AS "DON'T KNOW".

N =		1000	100%
1-Little value	1	22	2%
2	2	16	2%
3	3	86	9%
4	4	204	20%
5-Very high value	5	553	55%
Didn't receive	6	64	6%
Don't know/Not sure	7	54	5%
Refused	8	1	0%

Q59C:

(I'd like you to rate the following services that you may have received through participating in the<PROGRAM NAME>.) And how would you rate the discussion with the <UTILITY NAME> representative on specific things you can do to save energy in your home? IF RESPONDENT CAN'T REMEMBER IF THEY RECEIVED SERVICE, RECORD AS "DON'T KNOW".

=> +1 IF NOT UTILY=1 3

N =		500	100%
1-Little value	1	15	3%
2	2	8	2%
3	3	37	7%
4	4	95	19%
5-Very high value	5	279	56%
Didn't receive	6	34	7%
Don't know/Not sure	7	31	6%
Refused	8	1	0%

Q59D:

(I'd like you to rate the following services that you may have received through participating in the<PROGRAM NAME>.) And how would you rate your enrollment in CARE? IF NEEDED: The CARE program gives a special rate for low income residents on their energy bills. IF RESPONDENT CAN'T REMEMBER IF THEY RECEIVED SERVICE, RECORD AS "DON'T KNOW".

N =		1000	100%
1-Little value	1	11	1%
2	2	19	2%
3	3	64	6%
4	4	149	15%
5-Very high value	5	587	59%
Didn't receive	6	109	11%
Don't know/Not sure	7	61	6%
Refused	8	0	0%

Q59E:

(Please rate the following services that you may have received through participating in the<PROGRAM NAME>.) And how would you rate the energy survey report containing recommendations that you received in the mail one to two weeks after the initial visit? IF RESPONDENT CAN'T REMEMBER IF THEY RECEIVED SERVICE, RECORD AS "DON'T KNOW".

=> +1 IF NOT UTILY=1

N =		250	100%
1-Little value	1	6	2%
2	2	4	2%
3	3	15	6%
4	4	38	15%
5-Very high value	5	122	49%
Didn't receive	6	29	12%
Don't know/Not sure	7	36	14%
Refused	8	0	0%

Q59F:

(Please rate the following services that you may have received through participating in the<PROGRAM NAME>.) Finally, how would you rate the installation of energy saving measures. IF RESPONDENT CAN'T REMEMBER IF THEY RECEIVED SERVICE, RECORD AS "DON'T KNOW".

N =		1000	100%
1-Little value	1	27	3%
2	2	28	3%
3	3	63	6%
4	4	158	16%
5-Very high value	5	689	69%
Didn't receive	6	9	1%
Don't know/Not sure	7	26	3%
Refused	8	0	0%

GENDR:

DO NOT ASK!

RECORD GENDER

N =		1000	100%
Male	1	279	28%
Female	2	721	72%

LANG:

THE INTERVIEWER WAS DONE IN:

N =		1000	100%
English	1	771	77%
Spanish	2	229	23%

B

M&E PROTOCOLS TABLES 6 AND 7

This appendix contains M&E Protocols Tables 6 and 7.

B.1 TABLE 6

M&E PROTOCOLS TABLE 6

Low Income Energy Efficiency Program

ENDUSE: Whole building
Designated Unit of Measurement: Dwelling

1. Average Participant Group and Average Comaprison Group		Participant	Comparison	5. A. 90% CONFIDENCE LEVEL				5. B. 80% CONFIDENCE LEVEL			
A. Pre-install usage:	Pre-install kW	na	na								
	Pre-install kWh	na	na								
	Pre-install Therms	na	na								
	Base kW	na	na								
	Base kWh	na	na								
	Base Therms	na	na								
	Base kW/ designated unit of measurement	na	na								
	Base kWh/ designated unit of measurement	na	na								
	Base Therms/ designated unit of measurement	na	na								
B. Impact year usage:	Impact Yr kW	na	na								
	Impact Yr kWh	na	na								
	Impact Yr Therms	na	na								
	Impact Yr kW/designated unit	na	na								
	Impact Yr kWh/designated unit	na	na								
	Impact Yr Therms/designated unit	na	na	LOW BND	UP BND	LOW BND	UP BND	LOW BND	UP BND	LOW BND	UP BND
2. Average Net and Gross End Use Load Impacts		**AVG GROSS**	**AVG NET**	AVG GROSS	AVG GROSS	AVG NET	AVG NET	AVG GROSS	AVG GROSS	AVG NET	AVG NET
	A. i. Load Impacts - kW	na	na	na	na	na	na	na	na	na	na
	A. ii. Load Impacts - kWh	17,588,871	17,588,871	na	na	na	na	na	na	na	na
	A. iii. Load Impacts - Therms	1,812,894	1,812,894	na	na	na	na	na	na	na	na
	B. i. Load Impacts/designated unit - kW	na	na	na	na	na	na	na	na	na	na
	B. ii. Load Impacts/designated unit - kWh	175	175	na	na	na	na	na	na	na	na
	B. iii. Load Impacts/designated unit - Therms	24	24	na	na	na	na	na	na	na	na
	C. i. a. % change in usage - Part Grp - kW	na	na	na	na	na	na	na	na	na	na
	C. i. b. % change in usage - Part Grp - kWh	na	na	na	na	na	na	na	na	na	na
	C. i. c. % change in usage - Part Grp - Therms	na	na	na	na	na	na	na	na	na	na
	C. ii. a. % change in usage - Comp Grp - kW	na	na	na	na	na	na	na	na	na	na
	C. ii. b. % change in usage - Comp Grp - kWh	na	na	na	na	na	na	na	na	na	na
	C. ii. c. % change in usage - Comp Grp - Therms	na	na	na	na	na	na	na	na	na	na
D. Realization Rate:	D.A. i. Load Impacts - kW, realization rate	na	na	na	na	na	na	na	na	na	na
	D.A. ii. Load Impacts - kWh, realization rate	na	na	na	na	na	na	na	na	na	na
	D.A. iii. Load Impacts - Therms, realization rate	na	na	na	na	na	na	na	na	na	na
	D.B. i. Load Impacts/designated unit - kW, real rate	na	na	na	na	na	na	na	na	na	na
	D.B. ii. Load Impacts/designated unit - kWh, real rate	na	na	na	na	na	na	na	na	na	na
	D.B. iii. Load Impacts/designated unit - Therms, real rate	na	na	na	na	na	na	na	na	na	na
3. Net-to-Gross Ratios		**RATIO**		**RATIO**	**RATIO**			**RATIO**	**RATIO**		
	A. i. Average Load Impacts - kW	na		na	na			na	na		
	A. ii. Average Load Impacts - kWh	1.00		na	na			na	na		
	A. iii. Average Load Impacts - Therms	1.00		na	na			na	na		
	B. i. Avg Load Impacts/designated unit of measurement - kW	na		na	na			na	na		
	B. ii. Avg Load Impacts/designated unit of measurement - kWh	1.00		na	na			na	na		
	B. iii. Avg Load Impacts/designated unit of measurement - Therms	1.00		na	na			na	na		
	C. i. Avg Load Impacts based on % chg in usage in Impact year relative to Base usage in Impact year - kW	na		na	na			na	na		
	C. ii. Avg Load Impacts based on % chg in usage in Impact year relative to Base usage in Impact year - kWh	1.00		na	na			na	na		
	C. iii. Avg Load Impacts based on % chg in usage in Impact year relative to Base usage in Impact year - Thms	1.00		na	na			na	na		
4. Designated Unit Intermediate Data		**PART GRP**	**NP GRP**					**PART GRP**	**PART GRP**		
	A. Pre-install average value	na	na					na	na		
	B. Post-install average value	na	na					na	na		
6. Measure Count Data		**NUMBER**									
	A. Number of Electric measures installed by participants	100,417	(Total number of dwellings)								
	B. Number of Gas measures installed by participants	75,711	(Total number of dwellings)								
	C. Number of measures installed by Comp Group	na									
7. Market Segment Data											
	B. Distribution of participants by CEC Climate zone	See next page									

Notes:
Analysis method did not provide comparable estimates of pre- and post-retrofit energy usage.
Confidence intervals were calculated at the measure level and are reported in Section 3 of the report, Tables 3-10 through 3-13.
Realization rates are not provided because there were not ex ante impact estimates for all program measures.

Table 6 - Whole Building, Page 1

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M&E PROTOCOLS TABLE 6

Low Income Energy Efficiency Program

ENDUSE: Lighting
Designated Unit of Measurement: Bulb

1. Average Participant Group and Average Comaprison Group		Participant	Comparison	Notes: Analysis method did not provide comparable estimates of pre- and post-retrofit energy usage. Realization rates are not provided at the end use level because ex ante unit impacts were developed separately for interior and exterior lighting, but measure counts were not provided separately. Unit realization rates by interior and exterior lighting are provided in Table 3-14 of the report.							
A. Pre-install usage:	Pre-install kW	na	na								
	Pre-install kWh	na	na								
	Pre-install Therms	na	na								
	Base kW	na	na								
	Base kWh	na	na								
	Base Therms	na	na								
	Base kW/ designated unit of measurement	na	na								
	Base kWh/ designated unit of measurement	na	na								
	Base Therms/ designated unit of measurement	na	na								
B. Impact year usage:	Impact Yr kW	na	na								
	Impact Yr kWh	na	na								
	Impact Yr Therms	na	na								
	Impact Yr kW/designated unit	na	na								
	Impact Yr kWh/designated unit	na	na	5. A. 90% CONFIDENCE LEVEL				5. B. 80% CONFIDENCE LEVEL			
	Impact Yr Therms/designated unit	na	na	LOW BND AVG GROSS	UP BND AVG GROSS	LOW BND AVG NET	UP BND AVG NET	LOW BND AVG GROSS	UP BND AVG GROSS	LOW BND AVG NET	UP BND AVG NET
2. Average Net and Gross End Use Load Impacts		**AVG GROSS**	**AVG NET**								
	A. i. Load Impacts - kW	na	na	na	na	na	na	na	na	na	na
	A. ii. Load Impacts - kWh	8,443,748	8,443,748	6,268,088	10,619,408	6,268,088	10,619,408	6,729,816	10,157,680	6,729,816	10,157,680
	A. iii. Load Impacts - Therms	na	na	na	na	na	na	na	na	na	na
	B. i. Load Impacts/designated unit - kW	na	na	na	na	na	na	na	na	na	na
	B. ii. Load Impacts/designated unit - kWh	23	23	17	29	17	29	18	27	18	27
	B. iii. Load Impacts/designated unit - Therms	na	na	na	na	na	na	na	na	na	na
	C. i. a. % change in usage - Part Grp - kW	na	na	na	na	na	na	na	na	na	na
	C. i. b. % change in usage - Part Grp - kWh	na	na	na	na	na	na	na	na	na	na
	C. i. c. % change in usage - Part Grp - Therms	na	na	na	na	na	na	na	na	na	na
	C. ii. a. % change in usage - Comp Grp - kW	na	na	na	na	na	na	na	na	na	na
	C. ii. b. % change in usage - Comp Grp - kWh	na	na	na	na	na	na	na	na	na	na
	C. ii. c. % change in usage - Comp Grp - Therms	na	na	na	na	na	na	na	na	na	na
D. Realization Rate:	D.A. i. Load Impacts - kW, realization rate	na	na	na	na	na	na	na	na	na	na
	D.A. ii. Load Impacts - kWh, realization rate	na	na	na	na	na	na	na	na	na	na
	D.A. iii. Load Impacts - Therms, realization rate	na	na	na	na	na	na	na	na	na	na
	D.B. i. Load Impacts/designated unit - kW, real rate	na	na	na	na	na	na	na	na	na	na
	D.B. ii. Load Impacts/designated unit - kWh, real rate	na	na	na	na	na	na	na	na	na	na
	D.B. iii. Load Impacts/designated unit - Therms, real rate	na	na	na	na	na	na	na	na	na	na
3. Net-to-Gross Ratios		**RATIO**		**RATIO**	**RATIO**			**RATIO**	**RATIO**		
	A. i. Average Load Impacts - kW	na		na	na			na	na		
	A. ii. Average Load Impacts - kWh	1.00		na	na			na	na		
	A. iii. Average Load Impacts - Therms	na		na	na			na	na		
	B. i. Avg Load Impacts/designated unit of measurement - kW	na		na	na			na	na		
	B. ii. Avg Load Impacts/designated unit of measurement - kWh	1.00		na	na			na	na		
	B. iii. Avg Load Impacts/designated unit of measurement - Therms	na		na	na			na	na		
	C. i. Avg Load Impacts based on % chg in usage in Impact year relative to Base usage in Impact year - kW	na		na	na			na	na		
	C. ii. Avg Load Impacts based on % chg in usage in Impact year relative to Base usage in Impact year - kWh	1.00		na	na			na	na		
	C. iii. Avg Load Impacts based on % chg in usage in Impact year relative to Base usage in Impact year - Thms	na		na	na			na	na		
4. Designated Unit Intermediate Data		**PART GRP**	**NP GRP**					**PART GRP**	**PART GRP**		
	A. Pre-install average value	na	na					na	na		
	B. Post-install average value	na	na					na	na		
6. Measure Count Data		**NUMBER**									
	A. Number of Electric measures installed by participants	369,382	(Total number of bulbs)								
	A. Number of Gas measures installed by participants	na									
	C. Number of measures installed by Comp Group	na									
7. Market Segment Data											
	B. Distribution of participants by CEC Climate zone	See next page									

Table 6 - Lighting, Page 1

XENERGY

M&E PROTOCOLS TABLE 6

Low Income Energy Efficiency Program

ENDUSE: Refrigeration
Designated Unit of Measurement: Dwelling

1. Average Participant Group and Average Comaprison Group		Participant	Comparison	Notes:
A. Pre-install usage:	Pre-install kW	na	na	Analysis method did not provide comparable estimates of pre- and post-retrofit energy usage.
	Pre-install kWh	na	na	
	Pre-install Therms	na	na	
	Base kW	na	na	
	Base kWh	na	na	
	Base Therms	na	na	
	Base kW/ designated unit of measurement	na	na	
	Base kWh/ designated unit of measurement	na	na	
	Base Therms/ designated unit of measurement	na	na	
B. Impact year usage:	Impact Yr kW	na	na	
	Impact Yr kWh	na	na	
	Impact Yr Therms	na	na	
	Impact Yr kW/designated unit	na	na	
	Impact Yr kWh/designated unit	na	na	
	Impact Yr Therms/designated unit	na	na	

				5. A. 90% CONFIDENCE LEVEL				5. B. 80% CONFIDENCE LEVEL			
				LOW BND	UP BND	LOW BND	UP BND	LOW BND	UP BND	LOW BND	UP BND
2. Average Net and Gross End Use Load Impacts		**AVG GROSS**	**AVG NET**	**AVG GROSS**	**AVG GROSS**	**AVG NET**	**AVG NET**	**AVG GROSS**	**AVG GROSS**	**AVG NET**	**AVG NET**
	A. i. Load Impacts - kW	na	na	na	na	na	na	na	na	na	na
	A. ii. Load Impacts - kWh	5,113,284	5,113,284	4,968,623	5,257,944	4,968,623	5,257,944	4,999,490	5,227,077	4,999,490	5,227,077
	A. iii. Load Impacts - Therms	na	na	na	na	na	na	na	na	na	na
	B. i. Load Impacts/designated unit - kW	na	na	na	na	na	na	na	na	na	na
	B. ii. Load Impacts/designated unit - kWh	664	664	645	683	645	683	649	679	649	679
	B. iii. Load Impacts/designated unit - Therms	na	na	na	na	na	na	na	na	na	na
	C. i. a. % change in usage - Part Grp - kW	na	na	na	na	na	na	na	na	na	na
	C. i. b. % change in usage - Part Grp - kWh	na	na	na	na	na	na	na	na	na	na
	C. i. c. % change in usage - Part Grp - Therms	na	na	na	na	na	na	na	na	na	na
	C. ii. a. % change in usage - Comp Grp - kW	na	na	na	na	na	na	na	na	na	na
	C. ii. b. % change in usage - Comp Grp - kWh	na	na	na	na	na	na	na	na	na	na
	C. ii. c. % change in usage - Comp Grp - Therms	na	na	na	na	na	na	na	na	na	na
D. Realization Rate:	D.A. i. Load Impacts - kW, realization rate	na	na	na	na	na	na	na	na	na	na
	D.A. ii. Load Impacts - kWh, realization rate	0.701	0.701	0.681	0.720	0.681	0.720	0.685	0.716	0.685	0.716
	D.A. iii. Load Impacts - Therms, realization rate	na	na	na	na	na	na	na	na	na	na
	D.B. i. Load Impacts/designated unit - kW, real rate	na	na	na	na	na	na	na	na	na	na
	D.B. ii. Load Impacts/designated unit - kWh, real rate	0.701	0.701	0.681	0.720	0.681	0.720	0.685	0.716	0.685	0.716
	D.B. iii. Load Impacts/designated unit - Therms, real rate	na	na	na	na	na	na	na	na	na	na
3. Net-to-Gross Ratios		**RATIO**		**RATIO**	**RATIO**			**RATIO**	**RATIO**		
	A. i. Average Load Impacts - kW	na		na	na			na	na		
	A. ii. Average Load Impacts - kWh	1.00		na	na			na	na		
	A. iii. Average Load Impacts - Therms	na		na	na			na	na		
	B. i. Avg Load Impacts/designated unit of measurement - kW	na		na	na			na	na		
	B. ii. Avg Load Impacts/designated unit of measurement - kWh	1.00		na	na			na	na		
	B. iii. Avg Load Impacts/designated unit of measurement - Therms	na		na	na			na	na		
	C. i. Avg Load Impacts based on % chg in usage in Impact year relative to Base usage in Impact year - kW	na		na	na			na	na		
	C. ii. Avg Load Impacts based on % chg in usage in Impact year relative to Base usage in Impact year - kWh	1.00		na	na			na	na		
	C. iii. Avg Load Impacts based on % chg in usage in Impact year relative to Base usage in Impact year - Thms	na		na	na			na	na		
4. Designated Unit Intermediate Data		**PART GRP**	**NP GRP**					**PART GRP**	**PART GRP**		
	A. Pre-install average value	na	na					na	na		
	B. Post-install average value	na	na					na	na		
6. Measure Count Data		**NUMBER**									
	A. Number of Electric measures installed by participants	7,702		(Total number of refrigerators)							
	A. Number of Gas measures installed by participants	na									
	C. Number of measures installed by Comp Group	na									
7. Market Segment Data											
	B. Distribution of participants by CEC Climate zone	See next page									

Table 6 - Refrigeration, Page 1

XENERGY

M&E PROTOCOLS TABLE 6

Low Income Energy Efficiency Program

ENDUSE: Air Conditioning
Designated Unit of Measurement: Dwelling

1. Average Participant Group and Average Comaprison Group		Participant	Comparison	Notes:
A. Pre-install usage:	Pre-install kW	na	na	Analysis method did not provide comparable estimates of pre- and post-retrofit energy usage.
	Pre-install kWh	na	na	Confidence intervals were calculated at the measure level and are reported in Section 3
	Pre-install Therms	na	na	of the report, Tables 3-10 through 3-13.
	Base kW	na	na	Realization rates are not provided because there were not ex ante impact estimates
	Base kWh	na	na	for all program measures.
	Base Therms	na	na	
	Base kW/ designated unit of measurement	na	na	
	Base kWh/ designated unit of measurement	na	na	
	Base Therms/ designated unit of measurement	na	na	
B. Impact year usage:	Impact Yr kW	na	na	
	Impact Yr kWh	na	na	
	Impact Yr Therms	na	na	
	Impact Yr kW/designated unit	na	na	
	Impact Yr kWh/designated unit	na	na	
	Impact Yr Therms/designated unit	na	na	

				5. A. 90% CONFIDENCE LEVEL				5. B. 80% CONFIDENCE LEVEL			
				LOW BND	UP BND	LOW BND	UP BND	LOW BND	UP BND	LOW BND	UP BND
2. Average Net and Gross End Use Load Impacts		**AVG GROSS**	**AVG NET**	**AVG GROSS**	**AVG GROSS**	**AVG NET**	**AVG NET**	**AVG GROSS**	**AVG GROSS**	**AVG NET**	**AVG NET**
	A. i. Load Impacts - kW	na	na	na	na	na	na	na	na	na	na
	A. ii. Load Impacts - kWh	2,525,426	2,525,426	na	na	na	na	na	na	na	na
	A. iii. Load Impacts - Therms	na	na	na	na	na	na	na	na	na	na
	B. i. Load Impacts/designated unit - kW	na	na	na	na	na	na	na	na	na	na
	B. ii. Load Impacts/designated unit - kWh	153	153	na	na	na	na	na	na	na	na
	B. iii. Load Impacts/designated unit - Therms	na	na	na	na	na	na	na	na	na	na
	C. i. a. % change in usage - Part Grp - kW	na	na	na	na	na	na	na	na	na	na
	C. i. b. % change in usage - Part Grp - kWh	na	na	na	na	na	na	na	na	na	na
	C. i. c. % change in usage - Part Grp - Therms	na	na	na	na	na	na	na	na	na	na
	C. ii. a. % change in usage - Comp Grp - kW	na	na	na	na	na	na	na	na	na	na
	C. ii. b. % change in usage - Comp Grp - kWh	na	na	na	na	na	na	na	na	na	na
	C. ii. c. % change in usage - Comp Grp - Therms	na	na	na	na	na	na	na	na	na	na
D. Realization Rate:	D.A. i. Load Impacts - kW, realization rate	na	na	na	na	na	na	na	na	na	na
	D.A. ii. Load Impacts - kWh, realization rate	na	na	na	na	na	na	na	na	na	na
	D.A. iii. Load Impacts - Therms, realization rate	na	na	na	na	na	na	na	na	na	na
	D.B. i. Load Impacts/designated unit - kW, real rate	na	na	na	na	na	na	na	na	na	na
	D.B. ii. Load Impacts/designated unit - kWh, real rate	na	na	na	na	na	na	na	na	na	na
	D.B. iii. Load Impacts/designated unit - Therms, real rate	na	na	na	na	na	na	na	na	na	na
3. Net-to-Gross Ratios		**RATIO**		**RATIO**	**RATIO**			**RATIO**	**RATIO**		
	A. i. Average Load Impacts - kW	na		na	na			na	na		
	A. ii. Average Load Impacts - kWh	1.00		na	na			na	na		
	A. iii. Average Load Impacts - Therms	na		na	na			na	na		
	B. i. Avg Load Impacts/designated unit of measurement - kW	na		na	na			na	na		
	B. ii. Avg Load Impacts/designated unit of measurement - kWh	1.00		na	na			na	na		
	B. iii. Avg Load Impacts/designated unit of measurement - Therms	na		na	na			na	na		
	C. i. Avg Load Impacts based on % chg in usage in Impact year relative to Base usage in Impact year - kW	na		na	na			na	na		
	C. ii. Avg Load Impacts based on % chg in usage in Impact year relative to Base usage in Impact year - kWh	1.00		na	na			na	na		
	C. iii. Avg Load Impacts based on % chg in usage in Impact year relative to Base usage in Impact year - Thms	na		na	na			na	na		
4. Designated Unit Intermediate Data		**PART GRP**	**NP GRP**					**PART GRP**	**PART GRP**		
	A. Pre-install average value	na	na					na	na		
	B. Post-install average value	na	na					na	na		
6. Measure Count Data		**NUMBER**									
	A. Number of Electric measures installed by participants	16,488									
	A. Number of Gas measures installed by participants	na									
	C. Number of measures installed by Comp Group	na									
7. Market Segment Data											
	B. Distribution of participants by CEC Climate zone	See next page									

(Total dwelling receiving measures affecting air conditioning)

Table 6 - Air Conditioning, Page 1

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M&E PROTOCOLS TABLE 6

Low Income Energy Efficiency Program

ENDUSE: Water Heating
Designated Unit of Measurement: Dwelling

1. Average Participant Group and Average Comaprison Group		Participant	Comparison	Notes:
A. Pre-install usage:	Pre-install kW	na	na	Analysis method did not provide comparable estimates of pre- and post-retrofit energy usage.
	Pre-install kWh	na	na	Confidence intervals were calculated at the measure level and are reported in Section 3
	Pre-install Therms	na	na	of the report, Tables 3-10 through 3-13.
	Base kW	na	na	Realization rates are not provided because there were not ex ante impact estimates
	Base kWh	na	na	for all program measures.
	Base Therms	na	na	
	Base kW/ designated unit of measurement	na	na	
	Base kWh/ designated unit of measurement	na	na	
	Base Therms/ designated unit of measurement	na	na	
B. Impact year usage:	Impact Yr kW	na	na	
	Impact Yr kWh	na	na	
	Impact Yr Therms	na	na	
	Impact Yr kW/designated unit	na	na	
	Impact Yr kWh/designated unit	na	na	
	Impact Yr Therms/designated unit	na	na	

				5. A. 90% CONFIDENCE LEVEL				5. B. 80% CONFIDENCE LEVEL			
				LOW BND	UP BND	LOW BND	UP BND	LOW BND	UP BND	LOW BND	UP BND
2. Average Net and Gross End Use Load Impacts		AVG GROSS	AVG NET	AVG GROSS	AVG GROSS	AVG NET	AVG NET	AVG GROSS	AVG GROSS	AVG NET	AVG NET
	A. i. Load Impacts - kW	na	na	na	na	na	na	na	na	na	na
	A. ii. Load Impacts - kWh	1,324,574	1,324,574	na	na	na	na	na	na	na	na
	A. iii. Load Impacts - Therms	620,370	620,370	na	na	na	na	na	na	na	na
	B. i. Load Impacts/designated unit - kW	na	na	na	na	na	na	na	na	na	na
	B. ii. Load Impacts/designated unit - kWh	350	350	na	na	na	na	na	na	na	na
	B. iii. Load Impacts/designated unit - Therms	11	11	na	na	na	na	na	na	na	na
	C. i. a. % change in usage - Part Grp - kW	na	na	na	na	na	na	na	na	na	na
	C. i. b. % change in usage - Part Grp - kWh	na	na	na	na	na	na	na	na	na	na
	C. i. c. % change in usage - Part Grp - Therms	na	na	na	na	na	na	na	na	na	na
	C. ii. a. % change in usage - Comp Grp - kW	na	na	na	na	na	na	na	na	na	na
	C. ii. b. % change in usage - Comp Grp - kWh	na	na	na	na	na	na	na	na	na	na
	C. ii. c. % change in usage - Comp Grp - Therms	na	na	na	na	na	na	na	na	na	na
D. Realization Rate:	D.A. i. Load Impacts - kW, realization rate	na	na	na	na	na	na	na	na	na	na
	D.A. ii. Load Impacts - kWh, realization rate	na	na	na	na	na	na	na	na	na	na
	D.A. iii. Load Impacts - Therms, realization rate	na	na	na	na	na	na	na	na	na	na
	D.B. i. Load Impacts/designated unit - kW, real rate	na	na	na	na	na	na	na	na	na	na
	D.B. ii. Load Impacts/designated unit - kWh, real rate	na	na	na	na	na	na	na	na	na	na
	D.B. iii. Load Impacts/designated unit - Therms, real rate	na	na	na	na	na	na	na	na	na	na
3. Net-to-Gross Ratios		RATIO		RATIO	RATIO			RATIO	RATIO		
	A. i. Average Load Impacts - kW	na		na	na			na	na		
	A. ii. Average Load Impacts - kWh	1.00		na	na			na	na		
	A. iii. Average Load Impacts - Therms	1.00		na	na			na	na		
	B. i. Avg Load Impacts/designated unit of measurement - kW	na		na	na			na	na		
	B. ii. Avg Load Impacts/designated unit of measurement - kWh	1.00		na	na			na	na		
	B. iii. Avg Load Impacts/designated unit of measurement - Therms	1.00		na	na			na	na		
	C. i. Avg Load Impacts based on % chg in usage in Impact year relative to Base usage in Impact year - kW	na		na	na			na	na		
	C. ii. Avg Load Impacts based on % chg in usage in Impact year relative to Base usage in Impact year - kWh	1.00		na	na			na	na		
	C. iii. Avg Load Impacts based on % chg in usage in Impact year relative to Base usage in Impact year - Thms	1.00		na	na			na	na		
4. Designated Unit Intermediate Data		PART GRP	NP GRP					PART GRP	PART GRP		
	A. Pre-install average value	na	na					na	na		
	B. Post-install average value	na	na					na	na		
6. Measure Count Data		NUMBER									
	A. Number of Electric measures installed by participants	3,785		(Total dwellings with electric water heating receiving water heating measures)							
	A. Number of Gas measures installed by participants	57,959		(Total dwellings with gas water heating receiving water heating measures)							
	C. Number of measures installed by Comp Group	na									
7. Market Segment Data											
	B. Distribution of participants by CEC Climate zone	See next page									

Table 6 - Water Heating, Page 1

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M&E PROTOCOLS TABLE 6

Low Income Energy Efficiency Program

ENDUSE: Space Heating
Designated Unit of Measurement: Dwelling

1. Average Participant Group and Average Comaprison Group		Participant	Comparison	Notes:
A. Pre-install usage:	Pre-install kW	na	na	Analysis method did not provide comparable estimates of pre- and post-retrofit energy usage.
	Pre-install kWh	na	na	Confidence intervals were calculated at the measure level and are reported in Section 3
	Pre-install Therms	na	na	of the report, Tables 3-10 through 3-13.
	Base kW	na	na	Realization rates are not provided because there were not ex ante impact estimates
	Base kWh	na	na	for all program measures.
	Base Therms	na	na	
	Base kW/ designated unit of measurement	na	na	
	Base kWh/ designated unit of measurement	na	na	
	Base Therms/ designated unit of measurement	na	na	
B. Impact year usage:	Impact Yr kW	na	na	
	Impact Yr kWh	na	na	
	Impact Yr Therms	na	na	
	Impact Yr kW/designated unit	na	na	
	Impact Yr kWh/designated unit	na	na	
	Impact Yr Therms/designated unit	na	na	

				5. A. 90% CONFIDENCE LEVEL				5. B. 80% CONFIDENCE LEVEL			
				LOW BND	UP BND	LOW BND	UP BND	LOW BND	UP BND	LOW BND	UP BND
2. Average Net and Gross End Use Load Impacts		AVG GROSS	AVG NET	AVG GROSS	AVG GROSS	AVG NET	AVG NET	AVG GROSS	AVG GROSS	AVG NET	AVG NET
	A. i. Load Impacts - kW	na	na	na	na	na	na	na	na	na	na
	A. ii. Load Impacts - kWh	181,839	181,839	na	na	na	na	na	na	na	na
	A. iii. Load Impacts - Therms	1,192,524	1,192,524	na	na	na	na	na	na	na	na
	B. i. Load Impacts/designated unit - kW	na	na	na	na	na	na	na	na	na	na
	B. ii. Load Impacts/designated unit - kWh	25	25	na	na	na	na	na	na	na	na
	B. iii. Load Impacts/designated unit - Therms	20	20	na	na	na	na	na	na	na	na
	C. i. a. % change in usage - Part Grp - kW	na	na	na	na	na	na	na	na	na	na
	C. i. b. % change in usage - Part Grp - kWh	na	na	na	na	na	na	na	na	na	na
	C. i. c. % change in usage - Part Grp - Therms	na	na	na	na	na	na	na	na	na	na
	C. ii. a. % change in usage - Comp Grp - kW	na	na	na	na	na	na	na	na	na	na
	C. ii. b. % change in usage - Comp Grp - kWh	na	na	na	na	na	na	na	na	na	na
	C. ii. c. % change in usage - Comp Grp - Therms	na	na	na	na	na	na	na	na	na	na
D. Realization Rate:	D.A. i. Load Impacts - kW, realization rate	na		na	na	na	na	na	na	na	na
	D.A. ii. Load Impacts - kWh, realization rate			na	na	na	na	na	na	na	na
	D.A. iii. Load Impacts - Therms, realization rate			na	na	na	na	na	na	na	na
	D.B. i. Load Impacts/designated unit - kW, real rate	na		na	na	na	na	na	na	na	na
	D.B. ii. Load Impacts/designated unit - kWh, real rate			na	na	na	na	na	na	na	na
	D.B. iii. Load Impacts/designated unit - Therms, real rate			na	na	na	na	na	na	na	na
3. Net-to-Gross Ratios		RATIO		RATIO	RATIO			RATIO	RATIO		
	A. i. Average Load Impacts - kW	na		na	na			na	na		
	A. ii. Average Load Impacts - kWh	1.00		na	na			na	na		
	A. iii. Average Load Impacts - Therms	1.00		na	na			na	na		
	B. i. Avg Load Impacts/designated unit of measurement - kW	na		na	na			na	na		
	B. ii. Avg Load Impacts/designated unit of measurement - kWh	1.00		na	na			na	na		
	B. iii. Avg Load Impacts/designated unit of measurement - Therms	1.00		na	na			na	na		
	C. i. Avg Load Impacts based on % chg in usage in Impact year relative to Base usage in Impact year - kW	na		na	na			na	na		
	C. ii. Avg Load Impacts based on % chg in usage in Impact year relative to Base usage in Impact year - kWh	1.00		na	na			na	na		
	C. iii. Avg Load Impacts based on % chg in usage in Impact year relative to Base usage in Impact year - Thms	1.00		na	na			na	na		
4. Designated Unit Intermediate Data		PART GRP	NP GRP					PART GRP	PART GRP		
	A. Pre-install average value	na	na					na	na		
	B. Post-install average value	na	na					na	na		

6. Measure Count Data		NUMBER	
	A. Number of Electric measures installed by participants	7,397	(Total dwellings with electric space heating receiving space heating measures)
	A. Number of Gas measures installed by participants	61,133	(Total dwellings with gas space heating receiving space heating measures)
	C. Number of measures installed by Comp Group	na	
7. Market Segment Data			
	B. Distribution of participants by CEC Climate zone	See next page	

Table 6 - Space Heating, Page 1

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B.2 TABLE 7

B.2.1 Overview Information

a. Study Title and Study ID Number

Study Title: *Impact Evaluation of the 2000 Statewide Low Income Energy Efficiency (LIEE) Program*

Study ID No: 576

b. Program, Program Year and Program Description

Program: Statewide LIEE Program

Program year: 2000

Program description: The Statewide LIEE Program provides assistance to low-income customer groups throughout the state. The assistance consists of free installation of energy-efficiency measures, energy education, and repair and/or replacement of space heating and evaporative cooling equipment. The program serves an important equity objective in assisting customers who are highly unlikely or unable to participate in other residential conservation programs because of income constraints. This program allows income-eligible customers to receive the benefits of energy conservation without the hardship of making cash investments.

c. End Uses Covered

Space cooling, space heating, water heating, lighting, refrigeration

d. Methods and Models Used

Billing analysis utilizing a pooled time-series/cross-sectional load impact regression model.

e. Participant and Comparison Group Definition

- Participant group: qualified low income customers who received program services during calendar year 2000 and had adequate billing data to support a billing analysis.
- Nonparticipant comparison group: customers who participated in the PY1998 LIEE program and who had adequate data to support a billing analysis.

f. Analysis Sample Size

Electric Model	Participants	Nonparticipants
Number of Customers	35,776	35,316
Number of Installations	35,776	0
Number of Measures	177,883	0
Number of Observations	1,175,175	1,182,343

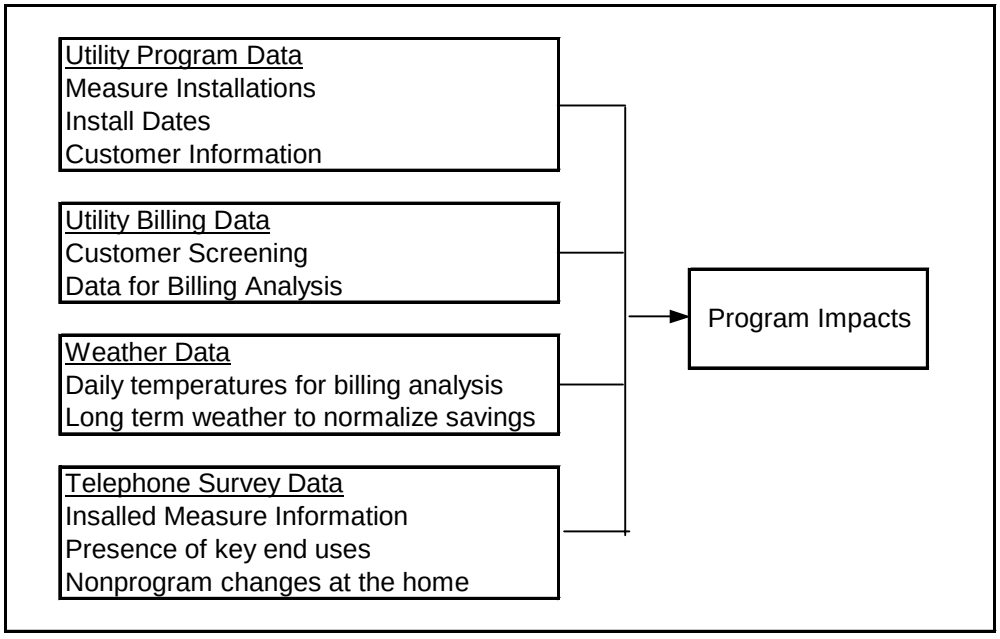
Gas Model	Participants	Nonparticipants
Number of Customers	28,261	20,566
Number of Installations	28,261	0
Number of Measures	141,236	0
Number of Observations	923,152	683,707

B.3 DATABASE MANAGEMENT

a. Flow Chart

The flow chart is presented in the following figure.

Data Flow Chart



b. Specific Data Sources

Program data: extracts from the program tacking system for PY2000 from SCE, PG&E, SDG&E, and SoCalGas.

Billing data: billing system data for the period January 1999 through October 2001 from SCE, PG&E, SDG&E, and SoCalGas.

Weather data: daily temperature data from 1990 on for multiple weather stations in the SCE, PG&E, SDG&E, and SoCalGas service areas, as provided by the utilities.

Telephone survey data: customer-reported data collected on a subset of 1,000 PY2000 program participants in a telephone survey implemented during November and December 2001.

c. Data Attrition

Data attrition is summarized in the following table.

Utility		Total Dwellings	Screened Dwellings
SCE	Starting # of Participants	48,977	
SCE	Not Individually Metered	41,098	7,879
SCE	Insufficient Pre Usage	26,034	15,064
SCE	Insufficient Post Usage	22,070	3,964
SCE	Extreme Billing Days	20,249	1,821
SCE	Early Stop Date	19,533	716
PG&E	Starting # of Participants	36,467	
PG&E	Not Resclass 1 or 2	21,816	14,651
PG&E	Insufficient Pre Usage	19,689	2,127
PG&E	Insufficient Post Usage	19,678	11
PG&E	Extreme Billing Days	19,364	314
PG&E	Early Stop Date	19,332	32
SDG&E	Starting # of Participants	14,973	
SDG&E	Not Individually Metered	7,787	7,186
SDG&E	Insufficient Pre Usage	5,756	2,031
SDG&E	Insufficient Post Usage	4,473	1,283
SDG&E	Extreme Billing Days	3,643	830
SDG&E	Early Stop Date	3,349	294
SCG	Starting # of Participants	24,271	
SCG	Not Individually Metered	21,151	3,120
SCG	Insufficient Pre Usage	16,836	4,315
SCG	Insufficient Post Usage	16,155	681
SCG	Extreme Billing Days	14,891	1,264
SCG	Early Stop Date	13,446	1,445
Total	Participants	124,688	
Total	Not Individually Metered	91,852	32,836
Total	Insufficient Pre Usage	68,315	23,537
Total	Insufficient Post Usage	62,376	5,939
Total	Extreme Billing Days	58,147	4,229
Total	Early Stop Date	55,660	2,487

d. Data Quality

Utility tracking data contained information for Application Number and Account Number. Billing data were matched to the tracking data using the Account Number. Billing data also contained a weather station ID variable that was used to merge of the appropriate weather data. Samples for the surveys included the Application Number in order to merge survey data on to the tracking data. Telephone surveys were tracked electronically using a CATI system.

e. Data Collected Specifically for the Analysis but not Used

For the electric analysis, telephone survey data was collected and analyzed. However, it was determined that the models developed using the survey data did not perform as well as models developed using the entire program population, but with no survey data. Thus, the models that included survey were not used to develop electric impacts.

B.4 SAMPLING

a. Sampling Procedures and Protocols

- Sampling frame - Participating homes with active accounts and adequate billing data; thus, for billing analyses master meter customers and customers without sufficient billing histories were excluded.
- Sampling strategy for the telephone survey: stratified random sampling
- Sampling basis: the customer
- Stratification criteria:
  Geographical area (utility service area)
  Dwelling type (Single family, multifamily)
  Types of measures installed (Weatherization, CFLs, refrigerators, etc.)

b. Survey Information

Survey instruments are presented in Appendix A of the report. See the following table for response rates. Non-response bias was not addressed.

Telephone Survey Disposition Report	Total	SCE	PG&E	SDG&E	SoCal Gas
Total	3530	1190	826	766	748
C%	100%	100%	100%	100%	100%
01 Completed Interview	**1000**	**250**	**250**	**250**	**250**
C%	28%	21%	30%	33%	33%
02 ARRANGE CALL-BACK - OUT OF HOME	**409**	**154**	**66**	**79**	**110**
C%	12%	13%	8%	10%	15%
03 RESPONDENT NOT AVAILABLE/TOO BUSY	**32**	**18**	**3**	**3**	**8**
C%	1%	2%	0%	0%	1%
04 NO ANSWER	**174**	**75**	**38**	**29**	**32**
C%	5%	6%	5%	4%	4%
05 ANSWERING MACHINE	**154**	**39**	**34**	**61**	**20**
C%	4%	3%	4%	8%	3%
06 BUSY	**24**	**7**	**3**	**11**	**3**
C%	1%	1%	0%	1%	0%
07 INCOMPLETE SURVEY/SCHEDULE CALLBACK	**83**	**23**	**23**	**19**	**18**
C%	2%	2%	3%	2%	2%
10 INITIAL REFUSAL - SOFT	**25**	**1**	**5**	**9**	**10**
C%	1%	0%	1%	1%	1%
13 INITIAL REFUSAL - HARD	**15**	**3**	**8**	**3**	**1**
C%	0%	0%	1%	0%	0%
14 Final refusal	**1**	**0**	**1**	**0**	**0**
C%	0%	0%	0%	0%	0%
15 BLOCKED NUMBER	**75**	**18**	**39**	**4**	**14**
C%	2%	2%	5%	1%	2%
17 DUPLICATED NUMBER	**37**	**0**	**27**	**4**	**6**
C%	1%	0%	3%	1%	1%
19 WRONG NUMBER	**261**	**111**	**56**	**46**	**48**
C%	7%	9%	7%	6%	6%
21 BUSINESS	**26**	**8**	**11**	**6**	**1**
C%	1%	1%	1%	1%	0%
22 FAX MODEM LINE	**38**	**6**	**18**	**5**	**9**
C%	1%	1%	2%	1%	1%
23 LANGUAGE BARRIER (NON-SPANISH)	**67**	**10**	**35**	**4**	**18**
C%	2%	1%	4%	1%	2%
24 HEARING PROBLEM/OTHER PROBLEM	**30**	**5**	**12**	**8**	**5**
C%	1%	0%	1%	1%	1%
25 RESPONDENT GONE	**61**	**22**	**12**	**4**	**23**
C%	2%	2%	1%	1%	3%
26 TERMINATED SURVEY	**24**	**5**	**4**	**8**	**7**
C%	1%	0%	0%	1%	1%
30 SPANISH LANGUAGE	**223**	**185**	**9**	**17**	**12**
C%	6%	16%	1%	2%	2%
32 SPANISH - ARRANGE CALLBACK	**23**	**4**	**6**	**4**	**9**
C%	1%	0%	1%	1%	1%
33 SPANISH - NOT AVAILABLE/TOO BUSY	**3**	**0**	**1**	**0**	**2**
C%	0%	0%	0%	0%	0%
35 SPANISH - ANSWERING MACHINE	**9**	**1**	**1**	**4**	**3**
C%	0%	0%	0%	1%	0%
36 SPANISH - BUSY	**3**	**0**	**0**	**0**	**3**
C%	0%	0%	0%	0%	0%
39 SPANISH - INITIAL REFUSAL - HARD	**8**	**2**	**0**	**0**	**6**
C%	0%	0%	0%	0%	1%
41 NQ - MISCELLANEOUS	**26**	**11**	**4**	**2**	**9**
C%	1%	1%	0%	0%	1%
43 NQ - DK PROGRAM PARTICIPATION	**72**	**22**	**13**	**24**	**13**
C%	2%	2%	2%	3%	2%
44 NQ - REFUSED PARTICIPATION QUESTION	**19**	**5**	**4**	**6**	**4**
C%	1%	0%	0%	1%	1%
46 NQ - DK/REFUSED ADDRESS	**5**	**1**	**1**	**1**	**2**
C%	0%	0%	0%	0%	0%
42 NQ - DID NOT PARTICIPATE IN PROGRAM	**96**	**30**	**22**	**27**	**17**
C%	3%	3%	3%	4%	2%
20 DISCONNECT	**491**	**173**	**116**	**126**	**76**
C%	14%	15%	14%	16%	10%
34 SPANISH - NO ANSWER	**16**	**1**	**4**	**2**	**9**
C%	0%	0%	0%	0%	1%

c. Statistical Descriptions

Descriptive statistics for key model variables are provided in the following tables.

Electric Model

Variable	N	Mean	Std Dev	Minimum	Maximum
kWh Per Day	2,357,518	12.70471	9.09967	1.63330	176.63636
Dummy variable, 1/1999	2,357,518	0.02228	0.14758	0.00000	1.00000
Dummy variable, 2/1999	2,357,518	0.02609	0.15939	0.00000	1.00000
Dummy variable, 3/1999	2,357,518	0.03130	0.17411	0.00000	1.00000
Dummy variable, 4/1999	2,357,518	0.03012	0.17093	0.00000	1.00000
Dummy variable, 5/1999	2,357,518	0.02843	0.16619	0.00000	1.00000
Dummy variable, 6/1999	2,357,518	0.03055	0.17211	0.00000	1.00000
Dummy variable, 7/1999	2,357,518	0.02935	0.16878	0.00000	1.00000
Dummy variable, 8/1999	2,357,518	0.03043	0.17176	0.00000	1.00000
Dummy variable, 9/1999	2,357,518	0.02961	0.16951	0.00000	1.00000
Dummy variable, 10/1999	2,357,518	0.02973	0.16985	0.00000	1.00000
Dummy variable, 11/1999	2,357,518	0.02908	0.16803	0.00000	1.00000
Dummy variable, 12/1999	2,357,518	0.03146	0.17455	0.00000	1.00000
Dummy variable, 1/2000	2,357,518	0.02946	0.16909	0.00000	1.00000
Dummy variable, 2/2000	2,357,518	0.02855	0.16653	0.00000	1.00000
Dummy variable, 3/2000	2,357,518	0.03245	0.17720	0.00000	1.00000
Dummy variable, 4/2000	2,357,518	0.02915	0.16824	0.00000	1.00000
Dummy variable, 5/2000	2,357,518	0.03068	0.17245	0.00000	1.00000
Dummy variable, 6/2000	2,357,518	0.03128	0.17406	0.00000	1.00000
Dummy variable, 7/2000	2,357,518	0.02852	0.16645	0.00000	1.00000
Dummy variable, 8/2000	2,357,518	0.03244	0.17717	0.00000	1.00000
Dummy variable, 9/2000	2,357,518	0.02930	0.16865	0.00000	1.00000
Dummy variable, 10/2000	2,357,518	0.02977	0.16996	0.00000	1.00000
Dummy variable, 11/2000	2,357,518	0.02946	0.16910	0.00000	1.00000
Dummy variable, 12/2000	2,357,518	0.02991	0.17033	0.00000	1.00000
Dummy variable, 1/2001	2,357,518	0.03047	0.17186	0.00000	1.00000
Dummy variable, 2/2001	2,357,518	0.02826	0.16572	0.00000	1.00000
Dummy variable, 3/2001	2,357,518	0.03145	0.17454	0.00000	1.00000
Dummy variable, 4/2001	2,357,518	0.03012	0.17091	0.00000	1.00000
Dummy variable, 5/2001	2,357,518	0.03021	0.17116	0.00000	1.00000
Dummy variable, 6/2001	2,357,518	0.03028	0.17135	0.00000	1.00000
Dummy variable, 7/2001	2,357,518	0.02998	0.17054	0.00000	1.00000
Dummy variable, 8/2001	2,357,518	0.03175	0.17534	0.00000	1.00000
Dummy variable, 9/2001	2,357,518	0.02826	0.16572	0.00000	1.00000
Evaporative cooling*SQFT*CDD	2,357,518	0.16292	1.30149	0.00000	25.55000
Evaporative cooling*SQFT*CDD*POST	2,357,518	0.12353	1.16371	0.00000	25.55000
Electric heating*HDD	2,357,518	1.22188	3.46493	0.00000	31.58753
Electric heating*HDD*multifamily	2,357,518	0.70975	2.60725	0.00000	29.39655
Electric heating*HDD*POST*weatherization savings	2,357,518	62.99386	408.15484	0.00000	8839.53000
AC*CDD	2,357,518	0.78804	2.68277	0.00000	25.55000
AC*CDD*multifamily	2,357,518	0.29533	1.54265	0.00000	25.55000
AC*HDD*POST*weatherization savings	2,357,518	24.97340	188.07823	0.00000	2982.86000
POST*refrigerator savings (PG&E, SDG&E)	2,357,518	0.00928	0.11790	0.00000	1.50685
POST*refrigerator savings (SCE)	2,357,518	0.02386	0.29673	0.00000	5.66027
POST*number of CFLs distributed	2,357,518	2.00063	2.12289	0.00000	7.00000
POST*number of CFLs distributed, if less than 4	2,357,518	0.37644	0.95135	0.00000	3.00000
Electric water heat*POST*water heating savings	2,357,518	7.84597	58.46216	0.00000	635.00000
Control Group Indicator	2,357,518	0.50152	0.50000	0.00000	1.00000
Multiple Family Indicator	2,357,518	0.51626	0.49974	0.00000	1.00000
Air Conditioner Indicator	2,357,518	0.29806	0.45741	0.00000	1.00000
Evaporative Cooler Indicator	2,357,518	0.04481	0.20688	0.00000	1.00000
Electric Heat Indicator	2,357,518	0.23238	0.42235	0.00000	1.00000
Electric Water Heat Indicator	2,357,518	0.08562	0.27980	0.00000	1.00000
Refrigerator Replacement Indicator	2,357,518	0.02768	0.16407	0.00000	1.00000
Relamping Indicator	2,357,518	0.75788	0.42837	0.00000	1.00000
Low Flow Showerhead Indicator	2,357,518	0.35245	0.47773	0.00000	1.00000
Water Heater Blanket Indicator	2,357,518	0.15531	0.36220	0.00000	1.00000
Pipe Insulation Indicator	2,357,518	0.12307	0.32851	0.00000	1.00000
Faucet Aerator Indicator	2,357,518	0.22140	0.41519	0.00000	1.00000
Ceiling Insulation Indicator	2,357,518	0.09251	0.28975	0.00000	1.00000
Caulking Indicator	2,357,518	0.39916	0.48973	0.00000	1.00000
Weather Stripping Indicator	2,357,518	0.37379	0.48381	0.00000	1.00000
Minor Building Repair Indicator	2,357,518	0.31634	0.46505	0.00000	1.00000
Duct Sealing Indicator	2,357,518	0.00693	0.08295	0.00000	1.00000
Evaporative Cooler Cover Indicator	2,357,518	0.06832	0.25229	0.00000	1.00000

Gas Model

Variable	N	Mean	Std Dev	Minimum	Maximum
Therms per day	1,606,859	1.24552	0.99729	0.03226	35.20690
Gas heat*(1-furnace replace/repair)*HDD	1,606,859	4.31840	5.24382	0.00000	30.11290
Gas heat*(1-furnace replace/repair)*HDD*multifamily	1,606,859	0.99738	3.06548	0.00000	30.11290
Gas heat*HDD*POST*weatherization savings*multifamily	1,606,859	8.24737	41.68552	0.00000	940.13636
Gas heat*HDD*POST*weatherization savings	1,606,859	48.43615	111.59700	0.00000	1,021.97000
Gas water heat*POST*water heating savings	1,606,859	8.03161	8.25738	0.00000	22.50000
Gas water heat*POST*water heating savings*multifamily	1,606,859	1.64047	4.86472	0.00000	22.50000
Gas heat*furnace repair*HDD	1,606,859	0.04572	0.66539	0.00000	22.28333
Gas heat*furnace repair*HDD*POST	1,606,859	0.08013	0.89083	0.00000	23.78788
Gas heat*furnace replace*HDD	1,606,859	0.16516	1.22031	0.00000	30.20000
Gas heat*furnace replace*HDD*POST	1,606,859	0.08036	0.86353	0.00000	30.20000
Control Group Indicator	1,606,859	0.42549	0.49442	0.00000	1.00000
Multiple Family Indicator	1,606,859	0.24101	0.42770	0.00000	1.00000
Gas Space Heat Indicator	1,606,859	0.93877	0.23976	0.00000	1.00000
Gas Water Heat Indicator	1,606,859	0.89366	0.30827	0.00000	1.00000
Furnace Repair Indicator	1,606,859	0.01748	0.13104	0.00000	1.00000
Furnace Replace Indicator	1,606,859	0.04137	0.19914	0.00000	1.00000
Low Flow Showerhead Indicator	1,606,859	0.80695	0.39469	0.00000	1.00000
Water Heater Blanket Indicator	1,606,859	0.35523	0.47858	0.00000	1.00000
Pipe Insulation Indicator	1,606,859	0.25915	0.43817	0.00000	1.00000
Faucet Aerator Indicator	1,606,859	0.72483	0.44660	0.00000	1.00000
Ceiling Insulation Indicator	1,606,859	0.21038	0.40758	0.00000	1.00000
Caulking Indicator	1,606,859	0.81644	0.38713	0.00000	1.00000
Weather Stripping Indicator	1,606,859	0.92802	0.25845	0.00000	1.00000
Minor Building Repair Indicator	1,606,859	0.85001	0.35706	0.00000	1.00000
Duct Sealing Indicator	1,606,859	0.00960	0.09748	0.00000	1.00000
Evaporative Cooler Cover Indicator	1,606,859	0.10765	0.30994	0.00000	1.00000
Furnace Filter Indicator	1,606,859	0.20426	0.40316	0.00000	1.00000

B.5 DATA SCREENING AND ANALYSIS

A. Outliers: customers with very large bills (>50,000 kWh/year for evaporative coolers and >30,000 kWh/year for weatherization) not included in the sample frame; no other outliers were eliminated.
   Missing data: not a problem.
   Weather adjustment: weather variables were included in regression models; savings were based on average weather.
B. Background variables: variables explaining nonprogram changes at the home were included in the regression models.
C. Data screening: See Item B3 above for the sample attrition; all sites with adequate billing data were included in models.
D. Regression statistics: statistics are provided in Tables D-1 (Evaporative cooler model) and D-2 (Weatherization model)

Electric Model – All Available Participants
Dependent Variable – Monthly kWh per Day

Variable	Parameter estimate	t-statistic
Evaporative cooling*CDD	1.353468	257.5
Evaporative cooling*CDD*POST	-0.367483	-66.2
Electric heating*HDD	0.330591	98.0
Electric heating*HDD*multifamily	-0.141309	-41.7
Electric heating*HDD*POST*weatherization savings	-0.000181	-14.7
AC*CDD	1.107636	585.2
AC*CDD*multifamily	-0.146625	-50.9
AC*HDD*POST*weatherization savings	-0.000743	-35.5
POST*refrigerator savings (PG&E, SDG&E)	-1.172125	-37.6
POST*refrigerator savings (SCE)	-0.536269	-41.31
POST*number of CFLs distributed	-0.060641	-27.0
POST*number of CFLs distributed, if less than 4	-0.022665	-2.3
Electric water heat*POST*water heating savings	-0.002654	-28.7
Customer fixed effects		F=120.48
Dummy variable, 1/1999	0.733822	27.6
Dummy variable, 2/1999	0.301450	11.7
Dummy variable, 3/1999	-0.327710	-13.2
Dummy variable, 4/1999	-0.596162	-23.9
Dummy variable, 5/1999	-1.030812	-41.0
Dummy variable, 6/1999	-0.879010	-35.6
Dummy variable, 7/1999	0.025598	1.0
Dummy variable, 8/1999	0.265937	10.8
Dummy variable, 9/1999	0.259386	10.4
Dummy variable, 10/1999	-0.107967	-4.4
Dummy variable, 11/1999	-0.237341	-9.5
Dummy variable, 12/1999	0.670521	27.1
Dummy variable, 1/2000	1.077954	43.0
Dummy variable, 2/2000	0.357828	14.2
Dummy variable, 3/2000	0.200100	8.2
Dummy variable, 4/2000	-0.521873	-21.0
Dummy variable, 5/2000	-0.474759	-19.4
Dummy variable, 6/2000	0.139309	5.7
Dummy variable, 7/2000	0.785356	31.7
Dummy variable, 8/2000	1.121171	46.3
Dummy variable, 9/2000	0.633093	25.8
Dummy variable, 10/2000	0.281459	11.5
Dummy variable, 11/2000	0.126072	5.1
Dummy variable, 12/2000	1.012342	41.1
Dummy variable, 1/2001	1.008697	41.0
Dummy variable, 2/2001	0.457201	18.3
Dummy variable, 3/2001	-0.009095	-0.4
Dummy variable, 4/2001	-0.965259	-39.4
Dummy variable, 5/2001	-1.154924	-47.3
Dummy variable, 6/2001	-0.811812	-33.3
Dummy variable, 7/2001	-0.185445	-7.6
Dummy variable, 8/2001	0.126028	5.2
Dummy variable, 9/2001	0.200620	8.1
R^2	0.8051	
Number of observations	2,357,518	

Electric Model – Surveyed Participants
Dependent Variable – Monthly kWh per Day

Variable	Parameter estimate	t-statistic
Evaporative cooling*SQFT*CDD*unit working pre-program	0.0007552	31.5
Evaporative cooling*SQFT*CDD*unit working pre-program*POST	-0.0000485	-1.9
Evaporative cooling*SQFT*CDD*unit not working pre-program*POST	0.0006007	20.5
Electric heating*SQFT*HDD	0.0004634	16.6
Electric heating*SQFT*HDD*home weekdays	-0.0000296	-1.0
Electric heating*SQFT*HDD*POST*weatherization savings	-0.0000004	-4.7
AC*SQFT*CDD	0.0008314	21.0
AC*SQFT*CDD*home weekdays	0.0000772	1.9
AC*SQFT*HDD*POST*weatherization savings	-0.0000014	-5.3
POST*refrigerator savings (PG&E, SDG&E)	-1.5248400	-10.6
POST*refrigerator savings (SCE)	-0.6223041	-9.0
POST*number of CFLs distributed	-0.0266227	-1.0
POST*number of CFLs distributed, if less than 4	-0.0720449	-1.5
Electric water heat*number in home*POST*water heating savings	-0.0010489	-6.1
Customer fixed effects		F=99.91
Dummy variable, 1/1999	1.2294257	4.0
Dummy variable, 2/1999	0.6021315	2.0
Dummy variable, 3/1999	0.0731665	0.3
Dummy variable, 4/1999	-0.1852259	-0.7
Dummy variable, 5/1999	-0.5899779	-2.0
Dummy variable, 6/1999	-0.3693372	-1.3
Dummy variable, 7/1999	1.8322234	6.3
Dummy variable, 8/1999	1.9256572	6.8
Dummy variable, 9/1999	1.7324586	6.0
Dummy variable, 10/1999	1.0087383	3.5
Dummy variable, 11/1999	0.4227751	1.5
Dummy variable, 12/1999	1.0638226	3.7
Dummy variable, 1/2000	1.4223451	4.9
Dummy variable, 2/2000	0.6409565	2.2
Dummy variable, 3/2000	0.4254450	1.5
Dummy variable, 4/2000	-0.2938213	-1.0
Dummy variable, 5/2000	-0.3523537	-1.3
Dummy variable, 6/2000	0.6848551	2.5
Dummy variable, 7/2000	1.5739229	5.6
Dummy variable, 8/2000	2.4856074	9.1
Dummy variable, 9/2000	1.5482457	5.6
Dummy variable, 10/2000	0.4487281	1.6
Dummy variable, 11/2000	0.2867508	1.0
Dummy variable, 12/2000	1.0959126	4.0
Dummy variable, 1/2001	1.1032554	4.1
Dummy variable, 2/2001	0.5736616	2.0
Dummy variable, 3/2001	-0.1168601	-0.4
Dummy variable, 4/2001	-0.9588538	-3.5
Dummy variable, 5/2001	-1.3736654	-5.1
Dummy variable, 6/2001	-0.8200818	-3.0
Dummy variable, 7/2001	0.0026905	0.0
Dummy variable, 8/2001	0.3297577	1.2
Dummy variable, 9/2001	0.6375137	2.3
R^2	0.7877	
Number of observations	23,152	

Natural Gas Model – All Available Participants
Dependent Variable – Monthly Therms per Day

Variable	Parameter estimate	t-statistic
Gas heating×(1-furnace replace/repair)×HDD	0.147798	551.1
Gas heating×(1-furnace replace/repair)×HDD×multifamily	-0.075331	-116.5
Gas heating×HDD×POST×weatherization savings	-0.000609	-75.1
Gas heating×HDD×multifamily×POST×weatherization savings	0.000283	14.0
Gas heating×furnace replace×HDD	0.132115	225.1
Gas heatiing×furnace replace×HDD×POST	0.003963	5.7
Gas heating×furnace repair×HDD	-0.010944	-11.0
Gas heating×furnace repair×HDD×POST	0.116123	136.6
Gas water heat×POST×water heating savings	-0.002485	-24.1
Gas water heat×multifamily×POST×water heating savings	0.000818	3.8
Customer fixed effects		F=48.22
R^2	0.7380	
Number of observations	1,606,859	

Natural Gas Model – Surveyed Participants
Dependent Variable – Monthly Therms per Day

Variable	Parameter estimate	t-statistic
Gas heating×(1-furnace replace/repair)×SQFT×HDD	0.0001036	54.4
Gas heating×(1-furnace replace/repair)×SQFT×HDD×home weekdays	0.0000162	8.2
Gas heating×(1-furnace replace/repair)×SQFT×HDD×multifamily	-0.0000497	-18.6
Gas heating×SQFT×HDD×POST×weatherization savings	-0.0000006	-11.6
Gas heating×SQFT×HDD×multifamily×POST×weatherization savings	0.0000003	1.7
Gas heating×furnace replace×SQFT×HDD×unit working pre-program	0.0001245	23.1
Gas heating×furnace replace×SQFT×HDD×unit working pre-program×POST	-0.0000469	-7.0
Gas heating×furnace replace×SQFT×HDD×unit not working pre-program×POST	0.0000626	21.8
Gas heating×furnace repair×SQFT×HDD×unit working pre-program	0.0000791	17.5
Gas heating×furnace repair×SQFT×HDD×unit working pre-program×POST	-0.0000132	-2.3
Gas heating×furnace repair×SQFT×HDD×unit not working pre-program×POST	0.0000549	25.6
Gas water heat×number in home×POST×water heating savings	-0.0016148	-7.3
Gas water heat×number in home×multifamily×POST×water heating savings	0.0013278	3.1
Customer fixed effects		F=36.59
R^2	0.6986	
Number of observations	21,567	

E. Specification: Regression models are discussed fully in Section 2.4.2 of the Report.
   a. Customer-specific intercept terms were used to account for cross-sectional variation.
   b. Monthly dummy variables and site-specific nonprogram variables were included to account for time series variation.
   c. na
   d. na
   e. na - model provides gross impacts; net impacts were assumed to equal gross impacts.

F. Error in measuring variables: na

G. Autocorrelation: monthly dummy variables were included in the electric model to minimize autocorrelation.

H. Heteroskedasticity: customer-specific intercept terms were included to mitigate heteroskedasticity.

I. Collinerarity: correlations among variables were reviewed; collinearity was not otherwise treated.

J. Influential data points: not considered a problem with the large numbers of observations in the studies; no outliers were removed.

K. Missing data: na

L. Precision: The standard error of the regression parameters were utilized.

M. Engineering analysis: na

N. Net-to-gross: na

B.6 DATA INTERPRETATION AND APPLICATION

a. Net Impacts

Using the default assumption, net impacts were set equal to gross impacts.

b. Rationale

The M&E Protocols do not require a comparison group or net-to-gross analysis for the low income programs. The default assumption is that the program net-to-gross ratio is 1.0 and net impacts are equal to gross impacts.