

Report

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**Study ID: KEM0006**

# **Long Beach and Energy Efficiency Local Governments Business Energy Services Team Program Evaluation**

**Program Numbers: 1281-04; 1310-04; 1333-04**

**Funded with California Public Goods Charge  
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# Executive Summary

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## Program Overview

The Business Energy Services Team (B.E.S.T.) Program is designed to encourage the installation of energy-efficient equipment in small “hard-to-reach” commercial businesses (100 kW or less) in California. Since 2003, the B.E.S.T. Program (the Program) has been implemented by KEMA, Inc. (KEMA) with funding from California ratepayers under the auspices of the California Public Utilities Commission (CPUC), serving customers in Pacific Gas & Electric and Southern California Edison service territories.

Hard-to-reach customers are those that have particular barriers to participation in energy efficiency programs – in this case, customers that lease their space, have ten or fewer employees, or for whom English is not their primary language. The Program promotes energy efficiency in the small commercial market segment by offering a full range of services, including:

- Site-specific energy analyses
- Energy education
- Substantial financial incentives
- Equipment procurement
- Installation

Two distinct B.E.S.T. initiatives were offered: Long Beach and Energy Efficiency Local Governments (EEGOV). The EEGOV initiative included the following communities:

- Central Coast
- Half Moon Bay Coastside
- Pomona
- Ventura County – Thousand Oaks, Oxnard, Santa Paula, and Ventura

The EEGOV program covered two utility service areas – Pacific Gas and Electric (PG&E) and Southern California Edison (SCE). Central Coast and Half Moon Bay Coastside are served by PG&E; Pomona and Ventura County are served by SCE. Long Beach is also served by SCE, but the Long Beach B.E.S.T. program is implemented as a separate initiative.

The primary focus of the Program was the implementation of cost-effective high-efficiency lighting measures, refrigeration, HVAC, and customized measures. The Program utilized a network of local service providers (primarily lighting, HVAC, or refrigeration contractors) for Program delivery, which included marketing, energy education, site-specific energy assessments, proposals for equipment upgrades, and actual measure installation. The integrated marketing and implementation process was designed to move customers from initial awareness and interest to actual installation of measures. The incentives offered through B.E.S.T. are designed to cover a substantial portion (75% or more) of the project cost.

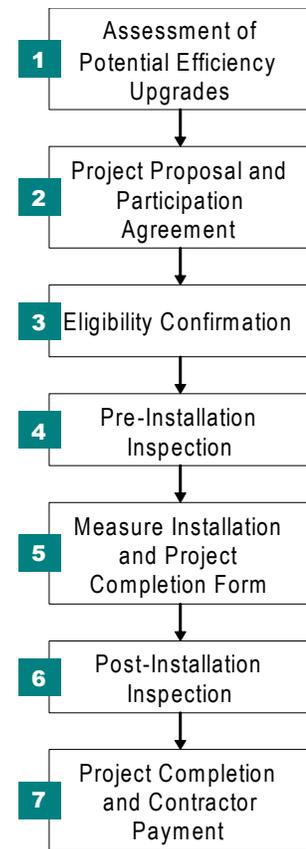
The B.E.S.T. program is marketed through local lighting, HVAC, and refrigeration contractors. Participating contractors either canvassed the neighborhoods where located or leveraged their existing relationships to engage customers. For the installation of cost-effective energy efficiency equipment for small business customers, the Program is also designed to provide substantial business opportunities for participating contractors.

Figure 1 provides an overview of the implementation process. An initial assessment was performed by a participating contractor in which appropriate upgrades were identified and proposed to the customer. Customers were asked to enter into a participation agreement and to sign a release of energy consumption history information. KEMA performed a pre-installation inspection to verify the applicability of the proposed efficiency upgrades. Once the project was approved, the contractor proceeded with the installation of measures. Once installed, the contractor notified KEMA and a post-installation inspection was performed. Upon successful completion of the post-installation inspection, contractor payments were made.

Projects were completed in 2,015 small business facilities in the City of Long Beach and in the various communities in the EEGOV initiatives.

This evaluation of the B.E.S.T. program was conducted at the request of the California Public Utilities Commission. The study was managed by PG&E. It was funded through the public goods charge (PGC) for energy efficiency and is available for download at [www.calmac.org](http://www.calmac.org).

**Figure ES-1: Implementation Process**



## Program Achievements

KEMA tracked savings achieved through an on-line program database. The database contained information on specific measures installed, incentives paid, projected demand savings, hours of operation and projected energy savings. Quantec verified savings through site visits to confirm installation of measures and logging of lighting data to assess hours of operation. A total of 121 site visits were conducted across the various communities served by the program. Realization rates for lighting impacts are shown in Table ES-1.

**Table ES-1. Realization Rates**

	Total
Energy Savings	101.5%
Demand Savings	97.3%

These realization rates and a net-to-gross factor were applied to savings reported through the program database to determine net realized savings as verified in the evaluation. The program

had the overall gross annual and lifetime energy and peak demand savings goals, lifetime savings achievements and net-to-gross ratios<sup>1</sup> as shown in Table ES-2.

**Table ES-2. B.E.S.T. Savings Goals and Achievements**

	Energy Savings (MWh)	Demand Savings (MW)	Therm Savings
Gross Projected Annual Savings	24,966	5.15	76,532
Net Evaluation Confirmed Annual Savings	15,962	4.76	113,418
<b>Annual Net-to-Gross Ratio</b>	<b>0.64</b>	<b>0.92</b>	<b>1.48</b>
Gross Projected Lifetime Savings	320,764	5.15	1,004,039
Net Evaluation Confirmed Lifetime Savings	232,147	4.76	1,331,075
<b>Lifetime Net-to-Gross Ratio</b>	<b>0.72</b>	<b>0.92</b>	<b>1.33</b>

In addition to the savings achieved, 98% of the participants in the Program met one or more of the criteria defining hard-to-reach customers.

## Process Assessment

Overall, the Program achieved high levels of satisfaction amongst participants, with 84% stating that they were very satisfied and 13% satisfied. The Program effectively addressed the barriers faced by these customers, particularly lack of available capital and knowledge about energy efficiency options, that have precluded their participation in energy-efficiency programs in the past. Likewise, participating contractors favorably rated the elements of the Program including: training; on-line tool; incentive levels; and the business opportunities created by the Program for them. KEMA faced some implementation challenges, particularly with the geographic disbursement of the program, but effectively managed to address those challenges.

While the B.E.S.T. Program fell short of its kWh savings goal (72% of the lifetime savings goal), it substantially met other goals and objectives. Specifically, the Program:

- Served 2,015 small business customers – including 1,978 businesses that were designated as hard-to-reach
- Recruited 8 local government partners to help market the program to local businesses
- Achieved 92% of the peak demand goal
- Exceeded the therm savings goal (148% of annual gross savings projected)
- Substantially increased the diversity of measures installed from the previous implementation of B.E.S.T (2003) with nearly 12% of electric energy savings coming from non-lighting measures
- Achieved high levels of participant and contractor satisfaction
- Increased the energy efficiency knowledge and awareness of small business customers

<sup>1</sup> A net-to-gross factor is used to adjust gross projected and confirmed savings to account for free-ridership.. The net-to-gross ratio compares the gross projected program savings to the net evaluation confirmed program savings.

- Increased the number of participating contractors

Based on our assessment, we offer the following recommendations to enhance the Program implementation.

- ***The Program served non-contiguous utility services areas (particularly the EEGOV program).*** This presented challenges for both contractors and implementation staff. The Program was more difficult to manage and staff. It limited the ability to leverage customer communication efforts across communities. A more concentrated geographic focus would decrease the administrative burden of the Program and possibly increase participation with the same marketing and communication efforts.
- ***Customer education and related materials were not as effective as hoped.*** Participants had very low recall of information provided either verbally or through written materials. This is consistent with education efforts in other small business energy efficiency programs. Effort should be made to find more effective education approaches.
- ***Program required significant administrative requirements for implementer and participants.*** A reduction in number of site visits required by program staff by instituting a sampling protocol for pre- and post-inspections would reduce administrative burden on the implementer and program participants.

# 1. Introduction

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## Program Overview

The Business Energy Services Team (B.E.S.T.) Program is designed to encourage the installation of energy-efficient equipment in small “hard-to-reach” commercial businesses (100 kW or less) in California. Since 2003, the B.E.S.T. Program (the Program) has been implemented by KEMA, Inc. (KEMA) with funding from California ratepayers under the auspices of the California Public Utilities Commission (CPUC), serving customers in Pacific Gas & Electric and Southern California Edison service territories.

Hard-to-reach customers are those that have particular barriers to participation in energy efficiency programs – in this case, customers that lease their space, have ten or fewer employees, or for whom English is not their primary language. The Program promotes energy efficiency in the small commercial market segment by offering a full range of services, including:

- Site-specific energy analyses
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- Substantial financial incentives
- Equipment procurement
- Installation

Two distinct B.E.S.T. initiatives were offered: Long Beach and Energy Efficiency Local Governments (EEGOV). The EEGOV initiative included the following communities:

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The primary focus of the Program was the implementation of cost-effective high-efficiency lighting measures, refrigeration, HVAC, and customized measures. The Program utilized a network of local service providers (primarily lighting, HVAC, or refrigeration contractors) for Program delivery, which included marketing, energy education, site-specific energy assessments,

proposals for equipment upgrades, and actual measure installation. The integrated marketing and implementation process was designed to move customers from initial awareness and interest to actual installation of measures. The incentives offered through B.E.S.T., as shown in Table 1, are designed to cover a substantial portion (75% or more) of the project cost.

**Table 1. B.E.S.T. Incentive Levels**

Measure Type	Maximum Rebate Amount
Screw-In CFL	\$200/kW*
Hardwired CFL	\$650/kW*
All Other Lighting Retrofits and Delamping	\$650/kW*
Custom Lighting	\$650/kW
Occupancy Sensors/Photocells	\$250/controlled kW
Programmable Thermostat	\$75/ unit
Window Film	\$2.50/sq ft of film
Refrigeration Measures	
Humidistat Controls	\$35/door
Miscellaneous Ref.	\$0.20/annual kWh saved
Vending Controls	\$90/unit
Custom Electric	\$0.20/annual kWh saved
Custom Gas	\$1/annual therm saved

\* Connected kW

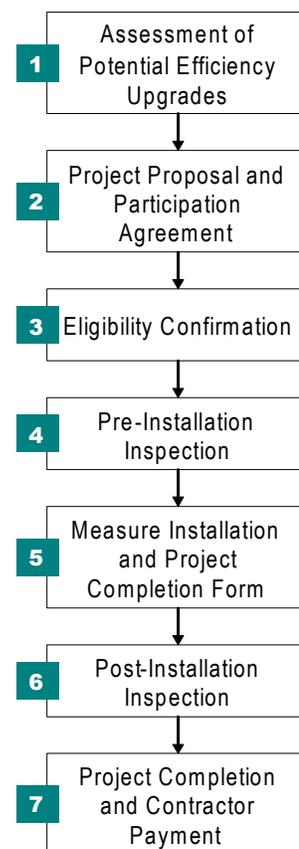
## Program Implementation Process

The B.E.S.T. program is marketed through local lighting, HVAC, and refrigeration contractors. Participating contractors either canvassed the neighborhoods where target customers were located or leveraged their existing relationships to engage customers. In addition to promoting installation of cost-effective energy efficiency equipment for small business customers, the Program is also designed to provide substantial business opportunities for participating contractors.

The Program provided an on-line tool to assist contractors in assessing efficiency upgrades, determining incentives available, developing project proposals, and guiding them through the project installation process. The tool also provides a comprehensive database of Program activity, which includes participant contact information, project costs and impacts, project status, and dates of key milestones.

Figure 1 provides an overview of the implementation process. An initial assessment was performed in which appropriate upgrades were identified and proposed to the customer. Customers were asked to enter into a participation agreement and to sign a release that allowed KEMA to obtain energy consumption history. KEMA performed a pre-

**Figure 1: Implementation Process**



installation inspection to verify the applicability of the proposed efficiency upgrades.

The contractors performed the installation of the approved measures. In addition to installing the measures, contractors were to provide customers with information about equipment maintenance and warranties, as well as basic energy education.

Once the installation was complete, a project completion form is signed by customer and contractor and submitted to KEMA and a post-installation inspection was performed. KEMA paid the incentives directly to the contractor, while the customer was responsible for paying any balance of the total project cost.

## Program Accomplishments

Projects were completed in 2,015 small business facilities in the City of Long Beach and in the various communities in the EEGOV initiative (Table 2).

**Table 2. Projects Completed**

Program/Community	No. Projects Completed	Total
Long Beach	505	505
<b>EEGOV PG&amp;E</b>		
Central Coast	728	
Half Moon Bay Coastside	22	750
<b>EEGOV SCE</b>		
Pomona	213	
VCREA	547	760
<b>Total</b>		<b>2,015</b>

A total of \$3,472,039 in incentives was distributed, ranging from a low of \$36 to a high of \$30,350, with an average incentive of \$1,723. The breakdown incentives by Program component is shown in Table 3.

**Table 3. Distribution of Incentives**

Incentive	Long Beach	EEGOV PG&E		EEGOV SCE	
		Central Coast	Half Moon Bay	Ventura County	Pomona
<b>Total Incentives</b>	<b>\$997,583</b>	<b>\$1,120,143</b>	<b>\$33,518</b>	<b>\$1,034,907</b>	<b>\$286,633</b>
Minimum Incentive	\$104	\$65	\$262	\$65	\$36
Maximum Incentive	\$21,087	\$11,968	\$7,355	\$3,611	\$19,284
Average Incentive	\$1,975	\$1,539	\$1,524	\$1,891	\$1,346

The B.E.S.T. Program served several types of small businesses, as illustrated in Table 4.

**Table 4. Types of Business Served**

Business Type	Number of Business Served			
	Total	Long Beach	EEGOV PG&E	EEGOV SCE
Bank	6		6	
College/University	2			2
Hospital	13	1	9	3
Office/Warehouse	9	5		4
Office, medium	62	11	29	22
Office, small	488	113	217	158
Other	731	100	276	355
Parking Structure	2		1	1
Restaurant	131	27	55	49
Retail, large	22	8	11	3
Retail, small	459	194	112	153
School	28	27		1
Supermarket, mini-market	62	19	34	9
<b>Total</b>	<b>2,015</b>	<b>505</b>	<b>750</b>	<b>760</b>

More than 56,000 energy-efficient measures were installed through the Program as shown in Table 5, including a mix of lighting, HVAC, refrigeration, and other measures.

**Table 5. Measures Installed**

Description	Total	Long Beach	EEGOV PG&E	EEGOV SCE
<b>Lighting Measures</b>				
T8 Fixtures	48,008	14,069	16,371	17,568
T5 Fixtures	38	38		
CFL Fixtures	242	230		12
High pressure sodium	5	5		
LED, Other	391	367	22	2
Metal halide	21	11		10
Occupancy Sensor/Ceiling Mounted	1	1		
CFL Bulbs	4,328	2,448	615	1,265
Custom Lighting	2,322	1,033	426	863
<b>Refrigeration Measures</b>				
Door Heater Controls	33	13	20	
Vendor cooler controls	4	4		
Evaporator Fan Replacement	33	13	20	
<b>HVAC Measures</b>				
AC Diagnostics and Service	217	27	27	163
Duct Test and Seal	221	25	32	164
Programmable Thermostat	163	17	19	127
<b>Other</b>				
Front Windows	300	300		
Pre-Rinse Nozzle	5		1	4
<b>Totals</b>	<b>56,332</b>	<b>18,601</b>	<b>17,553</b>	<b>20,178</b>

The Program had the following gross annual and lifetime savings goals.

**Table 6. B.E.S.T. Savings Goals**

	Energy Savings (MWh)	Demand Savings (MW)	Therm Savings
Gross Projected Annual Savings	24,966	5.15	76,532
Gross Projected Lifetime Savings	320,764	5.15	1,004,039

Table 7 shows the energy (kWh and therms) and peak demand savings goals by program component with the application of the deemed net-to-gross factor of 0.96.

**Table 7. B.E.S.T. Savings Goals**

	Energy Savings (Annual kWh)	Demand Savings (kW)	Annual Therm Savings
Long Beach	6,545,232	1,350	20,064
EEGOV PG&E	8,711,058	1,797	26,703
EEGOV SCE	8,711,058	1,797	26,703
<b>Total</b>	<b>23,967,348</b>	<b>4,944</b>	<b>73,470</b>

Table 8 shows the estimated savings of the Program calculated using two sources:

- The CPUC Program Report Workbook for which deemed savings values are used to calculate impacts based on number of measures installed
- The Program database, which calculates project level savings based on specific measure (light fixture wattages based on lamp and ballast types) and customer (hours of operation) characteristics

**Table 8. B.E.S.T. Savings Comparison**

	CPUC Workbook (Includes Application of Net-to-Gross Ratio)*			B.E.S.T. Program Database (Projected Actual Gross Savings)		
	Energy Savings (Annual kWh)	Demand Savings (kW)	Annual Therm Savings	Energy Savings (Annual kWh)	Demand Savings (kW)	Annual Therm Savings
Long Beach	5,589,912	1,341	11,425	5,181,227	1,549	2,128
EEGOV PG&E	6,024,720	1,453	13,150	5,147,825	1,685	14,020
EEGOV SCE	7,153,499	1,753	112,338	6,078,049	1,859	101,996
<b>Total</b>	<b>18,768,131</b>	<b>4,547</b>	<b>136,913</b>	<b>16,407,101</b>	<b>5,093</b>	<b>118,144</b>

\* Includes application of the deemed net-to-gross factor of 0.96. That factor is not applied to the estimates from the program database.

Finally, Table 9 shows the savings derived from the Program database broken down by lighting and non-lighting measures.

**Table 9. Lighting and Non-Lighting Measure Savings  
(Program Database)**

	Lighting Savings		Non-Lighting Savings		
	Energy Savings (Annual kWh)	Demand Savings (kW)	Energy Savings (Annual kWh)	Demand Savings (kW)	Annual Therm Savings
Long Beach	5,019,620	1,490	235,789	18	2,128
EEGOV PG&E	4,733,123	1,597	484,650	44	14,020
EEGOV SCE	5,140,522	1,784	1,013,495	25	101,996
<b>Total</b>	<b>14,893,265</b>	<b>4,871</b>	<b>1,733,934</b>	<b>87</b>	<b>118,144</b>

Realization rates derived based on measure installation verification and field monitoring of actual hours of operation were applied to the savings reported in the Program database to determine the evaluation verified savings as shown in Table 10.

**Table 10. Lighting and Non-Lighting Measure Savings  
(Evaluation Verified)**

	Lighting Savings		Non-Lighting Savings			Total		
	Energy Savings (Annual kWh)	Demand Savings (kW)	Energy Savings (Annual kWh)	Demand Savings (kW)	Annual Therm Savings	Energy Savings (Annual kWh)	Demand Savings (kW)	Annual Therm Savings
Long Beach	5,019,620	1,490	235,789	18	2,128	5,255,409	1,508	2,128
EEGOV PG&E	4,733,123	1,597	484,650	44	14,020	5,217,773	1,641	14,020
EEGOV SCE	5,140,522	1,784	1,013,495	25	101,996	6,154,017	1,809	101,996
<b>Total</b>	<b>14,893,265</b>	<b>4,871</b>	<b>1,733,934</b>	<b>87</b>	<b>118,144</b>	<b>16,627,199</b>	<b>4,958</b>	<b>118,144</b>

Finally, the net-to-gross factor of 0.96 was applied to determine net confirmed savings achieved as shown in Table 11..

**Table 11. Lighting and Non-Lighting Measure Savings  
(Net Evaluation Verified)**

	Lighting Savings		Non-Lighting Savings			Total		
	Energy Savings (Annual kWh)	Demand Savings (kW)	Energy Savings (Annual kWh)	Demand Savings (kW)	Annual Therm Savings	Energy Savings (Annual kWh)	Demand Savings (kW)	Annual Therm Savings
Long Beach	4,818,835	1,430	226,357	17	2,043	5,045,192	1,447	2,043
EEGOV PG&E	4,543,798	1,533	465,264	42	13,459	5,009,062	1,575	13,459
EEGOV SCE	4,934,901	1,713	972,955	24	97,916	5,907,857	1,737	97,916
<b>Total</b>	<b>14,297,534</b>	<b>4,676</b>	<b>1,664,577</b>	<b>84</b>	<b>113,418</b>	<b>15,962,111</b>	<b>4,760</b>	<b>113,418</b>

## 2. Evaluation Methodology

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The evaluation for the B.E.S.T. Program consisted of both impact and process components. Impact evaluation activities focused on verifying installation of the measures for which incentives were provided, estimating hours of operation for lighting measures using lighting loggers, and verification of energy savings. The process evaluation aimed to measure both participant and contractor satisfaction with the Program experience and participant awareness of energy efficiency options both before and after participation, as well as to identify any barriers to participation. The findings from the process evaluation activities were used to inform relevant recommendations for improving Program implementation.

### Impact Evaluation

The impact evaluation focused on quantifying actual energy savings achieved as a result of lighting and non-lighting measure installation, using the following two distinct approaches:

- *For lighting measures, ex post* savings estimates were determined by visually verifying measure counts and using lighting loggers to verify hours of operation of the efficient lighting. Measures were verified at 115 sites, and logging of lighting hours was conducted at 71 sites. Realization rates based on the verified measures and the hours of operation were calculated and applied to *ex ante* estimates of savings.
- *For non-lighting measures*, a review of the project-specific *ex ante* savings estimates was conducted, along with verification of measure installations. Measure installation and operating characteristics were verified at seven sites at which non-lighting measures were installed.

### Process Evaluation

The cornerstone of the process evaluation was a series of interviews and surveys with B.E.S.T. Program staff, stakeholders, and trade ally partners, as well as Program participants and non-participants. A summary of process evaluation data collection activities is presented in Table 12, followed by a discussion of the role each played in this evaluation.

**Table 12. Summary of Process Evaluation Data Collection Activities**

Data Collection Activity	Completed Interviews	Long Beach	EEGOV
Activity 1: Staff & Stakeholder Interviews	4	2	2
Activity 2: Participant Surveys	119	52	67
Activity 3: Non-Participant Surveys	20	2	18
Activity 4: Participating Contractor Interviews	6	3	6
Activity 5: Non-Participating Contractor Interviews	10	6	4
Activity 6: Inspector Interviews and Observation	3		

## **Activity 1: Staff and Stakeholder Interviews**

In-depth interviews were conducted with KEMA Program staff and inspectors. The main objectives of these interviews were to:

- Determine whether the Program is meeting its goals and objectives
- Identify any challenges that may have arisen in Program implementation
- Identify lessons learned

## **Activity 2: Participant Surveys**

Program participants from both Long Beach (n=52) and EEGOV (n=67) were surveyed to assess their awareness and understanding of energy efficiency and the requirements of the Program; their satisfaction with the pre-installation, installation, and post-installation processes; and overall Program satisfaction. In addition, the survey was designed to identify any barriers that may exist to making energy efficiency investments. Finally, the survey sought to determine whether there have been any Program spillover effects (i.e., whether participants have made additional energy efficiency upgrades after the Program).

## **Activity 3: Non-Participant Surveys**

For the purposes of this evaluation, Program non-participants are defined as customers who were approached by a Program contractor but declined to participate or those who began the process but dropped out of the Program prior to completion. Although this was a relatively small (n=49), these were a key group to talk to in order to obtain descriptions of Program features and attributes that would be important to them, as well as insight into barriers to participation. Being a typically difficult group to obtain survey feedback from, only 18 non-participants in Long Beach and two in EEGOV were interviewed.

## **Activity 4: Participating Contractor Interviews**

Data were collected on contractor experiences with the Program through phone interviews that were designed to assess overall Program satisfaction, Program awareness and understanding, effectiveness of energy efficiency training, and whether the Program has provided expanded business opportunities. Contractors were also asked to comment on their perceptions of the Program implementation requirements and standards. Phone interviews were conducted with six of the ten participating contractors. All six completed projects in the EEGOV Program and three did projects in both Long Beach and EEGOV.

## **Activity 5: Non-Participating Contractor Interviews**

Interviews were conducted with non-participating businesses that offer Program-related services such as lighting and HVAC retrofits. These interviews were designed to determine non-participating contractors' awareness of the Program, interest in future participation, and any

barriers to participation. Ten contractors were interviewed from ten unique non-participating companies.

### **Activity 6: Inspection Interviews and Process Review**

Quantec accompanied a KEMA inspector on several post-installation inspections in Pomona, California. During these site visits, the inspector was observed and the processes and procedures used during the inspections were documented. We conducted phone surveys with two additional inspectors and the Warren Energy contractor reviewed inspector notes and compiled a summary review of typical inspector procedures, common findings, and examples of any problems or difficulties encountered during the inspection process.



### 3. Impact Evaluation Results

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Quantec, in conjunction with Warren Engineering, conducted 122 site visits with Program participants, including 115 sites with lighting-only projects and seven non-lighting measure installations. As part of these site visits, our team verified the presence of qualified technologies and installed data loggers at 71 sites to assess hours of operation of the lighting.

The lighting loggers were installed for approximately four weeks at each location visited. One to three loggers were installed depending on the size of the area and the presence of different zones, in which qualified lighting was installed. The loggers were used to determine hours of usage based on recorded lumen levels. Usage during the logging period was extrapolated to estimate annual hours of usage.

Savings were calculated for each of type of fixture in each distinct area using the following formula:

$$\text{Annual kWh Savings} = \left[ \begin{array}{c} \textit{kW demand} \\ \textit{of fixtures} \\ \textit{replaced} \end{array} - \begin{array}{c} \textit{kW demand} \\ \textit{of efficient} \\ \textit{fixtures} \end{array} \right] \times \begin{array}{c} \textit{Annual} \\ \textit{hours of} \\ \textit{operation} \end{array}$$

To calculate the savings, we used the same kW demand estimates for the various fixture configurations as was used in the on-line assessment tool. Any differences in installed equipment or hours of operation noted through the on-site visits were used to calculate revised savings.

Our evaluation compares various estimates/sources of savings figures, including:

- Those derived from the project database using the lighting fixture characteristics and contractor inputs
- Our calculations – verifying the contractor inputs (hours of usage, number of fixtures) for the sample and extrapolating to all participants
- Savings calculated using the CPUC work book for reporting impacts and assessing cost effectiveness
- Projected Program impacts based on the expected activity and measure installation

#### Site Visits

Quantec conducted on-site visits of 122 of the 2,015 B.E.S.T. participants. The sites were chosen as a random sample from a participant list provided by KEMA. The sample was stratified by:

- Program (Long Beach and EEGOV)
- Community (across EEGOV in proportion to the number of business served within the communities)
- Business type

- Contractor
- Type of measure installed (lighting and non-lighting)

Following is a description of site-visit process we employed.

**Collected Site-Specific Reports from KEMA.** First, we collected the site-specific reports on installed measures from KEMA. These data included the quantity, existing fixture description, and post-installation fixture description for each type of fixture at the site and the hours of operation.

**Conducted the On-Site Visits.** The process for each site-visit included:

1. *Verification of installed measures.* We reviewed the reported installed measures and verified that each had actually occurred. The results of the verification survey were used to estimate the proportion of measures in the tracking system that remained installed after the departure of the installation team.

For a selected sub-set of sites visited, we also did the following:

2. *Installation of lighting loggers.* One to three loggers were installed during the on-site visits. The loggers were placed in each major area within the customers' facilities and were left in place for an average of two weeks.
3. *Establishment of an understanding of the operation in order to properly annualize the lighting energy savings calculations.* We gained an understanding of the business operating characteristics to ensure that we accurately assessed the annual operating hours based on the lighting logger data.

## **Analysis**

We conducted data analysis of energy savings for all of the sample sites. The analysis complied with IPMVP Option A, "Partially Measured Retrofit Isolation." According to the IPMVP manual, when using Option A, "savings are determined by partial field measurement of the energy use of the system(s) to which an ECM was applied, separate from the energy use of the rest of the facility. Some but not all parameter(s) may be stipulated."

For our analysis of lighting savings, we used the following approach:

- Lighting fixture demand was stipulated using the same stipulated values as were used in the KEMA on-line tool
- Fixture counts were field verified for 115 of the 1,712 lighting projects
- Lighting hours of operation were field measured for 71 of the visited sites

By measuring lighting hours of operation, we eliminate the most significant source of uncertainty in the savings estimates. We used lighting loggers to measure hours of operation and collected on-site operating information to assist us in extrapolating the logger data to annual hours of operation.

For non-lighting sites, we verified installation of measures and operating characteristics that would impact achievement of energy savings. The reasonableness of *ex ante* savings estimates was assessed. Site visits were conducted at seven of 303 non-lighting installations.

## Verification of Measures

Following measure installation, KEMA conducted inspections at each Program site to verify that the planned measures were installed. Data from these post-installation inspections were used in this evaluation as “reported savings.” The evaluation team then visited a sample of Program sites from each community to verify the presence of the reported measures. The evaluation team’s inspector compared the list of measures contained in the B.E.S.T. Program database to what was observed on site.

Our site visits revealed that most of the equipment reported as installed by the contractors was indeed installed and remained in place in good, operating order. In 23 of the 115 lighting sites, there were some discrepancies, with fewer measures found during inspection than reported in the database. In most cases, the discrepancies amounted to fewer T8 lamps and CFLs being installed than claimed, but also included some limited “spillover” measures at three sites – additional Program-installed measures where incentives were not provided.

No discrepancies were identified in the seven non-lighting sites visited.

## Hours of Operation

Lighting hours of operation were obtained via data logging for 71 sites. In 43 of these, the actual hours of operation as determined from lighting loggers were higher than initially projected. In total, field-measured hours of operation were 105% of the *ex ante* estimates of operating hours in the on-line data base tool.

## Realization Rates

Based on the verification of lighting installations and the hours of operation, Quantec calculated realization rates for the reported savings. Table 13 shows the realization rates for energy and peak demand savings for the Programs overall and for the specific Program areas.

**Table 13. Lighting Realization Rates**

	Total	Long Beach	EEGOV PG&E	EEGOV SCE
n	115	51	26	38
Energy Savings	101.5%	94.3 %	115.1%	106.8%
Demand Savings	97.3%	96.4%	98.9%	97.8%

Based on the site visits to the seven non-lighting sites, realization rates for non-lighting projects is determined to be 100% for both energy and demand savings impacts. Though we calculated the realization rate from multiple perspectives (by building type, by community, by utility, etc.),

for statistical significance, we apply the total Program realization rates to calculate realized savings in all of the Program areas (Table 10).

Appendix A lists the reported savings values and verified kW demand reduction, hours of operation, and kWh savings for each of the 115 lighting sites and the seven non-lighting sites.

The total energy savings achieved through the B.E.S.T. Program in 2004-'05 can be stratified by several different criteria to paint a picture of overall Program impacts across the service territory. The following sections describe energy savings achieved through lighting retrofits, stratified by building type, community, contractor, and service territory.

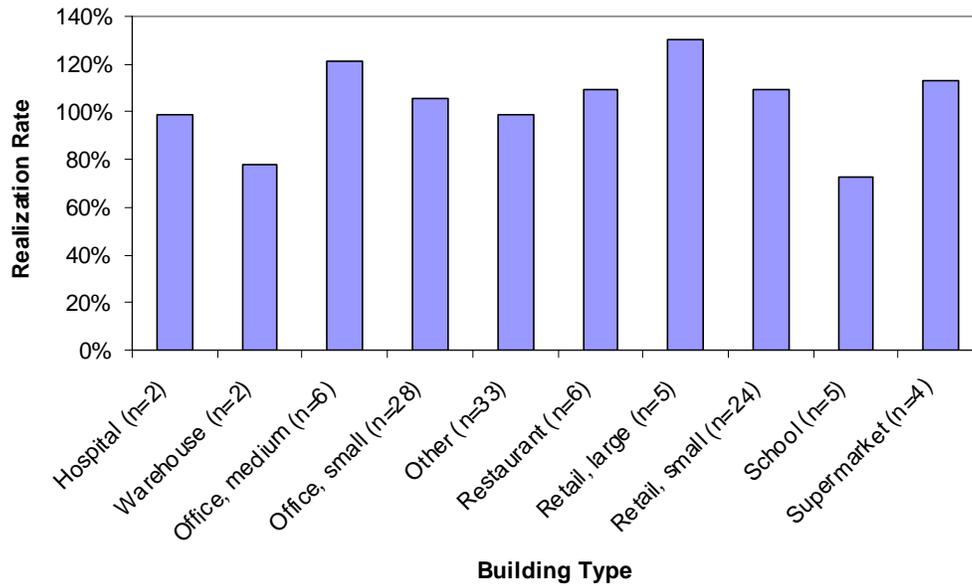
### Lighting Realization Rates by Building Type

For the purposes of this evaluation, the building types sampled were separated into 11 categories. These categories, with the number of each type visited, are displayed in Table 14. Realization rates by building type are shown in Figure 1. Overall, offices and large retail buildings had higher realization rates (driven primarily by greater hours of use than projected), while warehouses and schools had lower realization rates.

**Table 14. Lighting Sample by Building Type**

Building Type	Sample Size (n)
Hospital	2
Office/warehouse	2
Office, medium	6
Office, small	28
Restaurant	6
Retail, large	5
Retail, small	24
School	5
Supermarket, mini-market	4
Other	33
<b>Total</b>	<b>115</b>

**Figure 1. Lighting Realization Rate by Building Type**



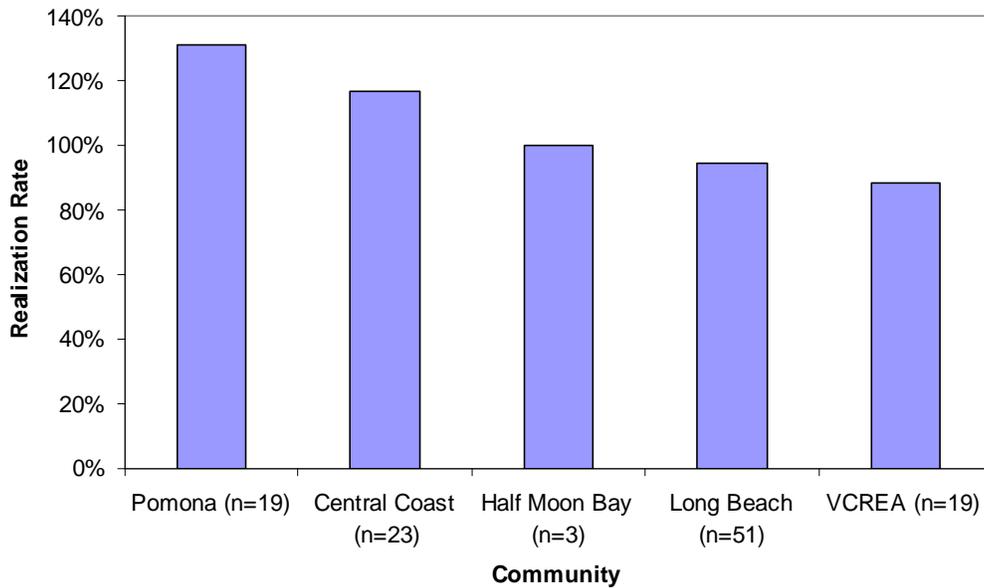
**Lighting Savings by Community**

Program activities occurred in Long Beach and the four communities in the EEGOV service territory. Table 15 shows site visit sample sizes; realization rate by community is displayed in Figure 2.

**Table 15. Lighting Sample by Community**

Community	Sample Size (n)
Long Beach	51
Pomona	19
VCREA	19
Central Coast	23
Half Moon Bay Coastside	3
<b>Total</b>	<b>115</b>

**Figure 2. Lighting Realization Rate by Community**



Reasons for differences in realization rates between communities include mix of business types, contractors, and measure types.

## Goal Achievement

### Program Savings

Table 16 shows the Program accomplishments and the percent of goal achieved. Overall, when considering the net realized savings to the stated program goals, the Program achieved 67% of its energy savings goal, 96% of the demand savings goal, and 173% of the therm savings targets.

**Table 16: Program Goal Achievement**

	Program Savings Goal (Net)			Net Realized Savings			Percent of Goal Achieved		
	Energy Savings (Annual kWh)	Demand Savings (kW)	Annual Therm Savings	Energy Savings (Annual kWh)	Demand Savings (kW)	Annual Therm Savings	Energy Savings (Annual kWh)	Demand Savings (kW)	Annual Therm Savings
Long Beach	6,545,232	1,350	20,064	5,045,192	1,447	2,043	77%	107%	10%
EEGOV PG&E	8,711,058	1,797	26,703	5,009,062	1,575	13,459	58%	88%	50%
EEGOV SCE	8,711,058	1,797	26,703	5,907,857	1,737	97,916	68%	97%	367%
<b>Total</b>	<b>23,967,348</b>	<b>4,944</b>	<b>73,470</b>	<b>15,962,111</b>	<b>4,760</b>	<b>113,418</b>	<b>67%</b>	<b>96%</b>	<b>154%</b>

Table 17 shows the gross projected savings goals and the net realized savings confirmed in the evaluation, and the resulting net-to-gross ratio<sup>2</sup> annually and over the lifetime of measures installed. The annual and lifetime net-to-gross ratios achieved are different based on the mix of measures projected and installed. Annual gross projected savings and net savings confirmed by the evaluation are shown in Appendix B.

**Table 17: Lifetime Goal Achievement**

	Energy Savings (MWh)	Demand Savings (MW)	Therm Savings
Gross Projected Annual Savings	24,966	5.15	76,532
Net Evaluation Confirmed Annual Savings	15,962	4.76	113,418
<b>Annual Net-to-Gross Ratio</b>	<b>0.64</b>	<b>0.92</b>	<b>1.48</b>
Gross Projected Lifetime Savings	320,764	5.15	1,004,039
Net Evaluation Confirmed Lifetime Savings	232,147	4.76	1,331,075
<b>Lifetime Net-to-Gross Ratio</b>	<b>0.72</b>	<b>0.92</b>	<b>1.33</b>

## Local Government Partnerships

A partnership was formed between KEMA and the City of Long Beach to promote the B.E.S.T. Program in that location. The EGOV Program had a goal of forging four local partnerships to help promote the Program, but exceeded that goal by establishing eight such partnerships. The partnerships in the respective service territories included:

- PG&E
  - Half Moon Bay
  - Morro Bay and Arroyo Grande (Central Coast)
- SCE
  - Pomona
  - Ventura, Thousand Oaks, Oxnard and Santa Paula (Ventura County Regional Energy Alliance or VCREA)

## Hard-to-Reach Customers

The Program set a goal that two-thirds of the projects completed would be for customers classified as hard-to-reach; i.e., meeting at least one of the following criteria:

- Ten or fewer employees
- Operating in leased space
- English is not a the primary language spoken

The Program exceeded this goal in all three service areas as shown in Table 18.

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<sup>2</sup> A net-to-gross factor is used to adjust gross projected and confirmed savings to account for free-ridership.. The net-to-gross ratio compares the gross projected program savings to the net evaluation confirmed program savings.

**Table 18: Hard to Reach Participants**

<b>Program</b>	<b>Number of Hard to Reach Participants</b>	<b>Percentage of Total Participants Hard to Reach</b>
EEGOV PG&E	747	100%
EEGOV SCE	748	98%
Long Beach	483	96%

## 4. Process Assessment Findings

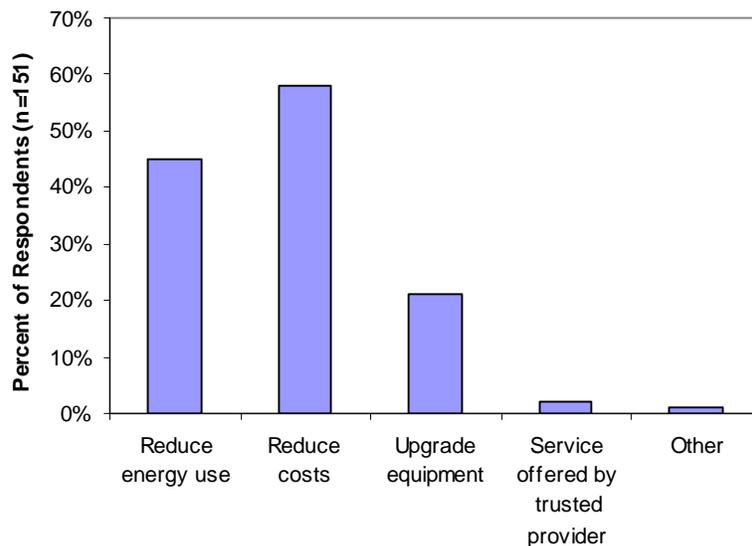
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### Participant Feedback

A total of 119 Program participants were surveyed to assess participant satisfaction with the installed measures, the installation contractors, and the Program overall. Participants also rated their general level of awareness of energy efficiency options for their businesses and how the Program affected this awareness, if at all. In addition, participants were asked to identify whether barriers exist in making energy efficiency investments at their facility and, if so, to describe the barriers.

Most survey respondents (88%) heard about the B.E.S.T. Program through direct contact with a contractor who walked into their facility. The remaining respondents heard of it through various channels such as their local utility, the City, and word-of-mouth (through a friend or a business colleague). When asked to describe the primary reason for participating, survey respondents most commonly cited reduce costs (58%) and reduce energy use (45%). The complete distribution of participant's reasons for participating in the Program are presented in Figure 3.

**Figure 3. Primary Reason for Program Participation**

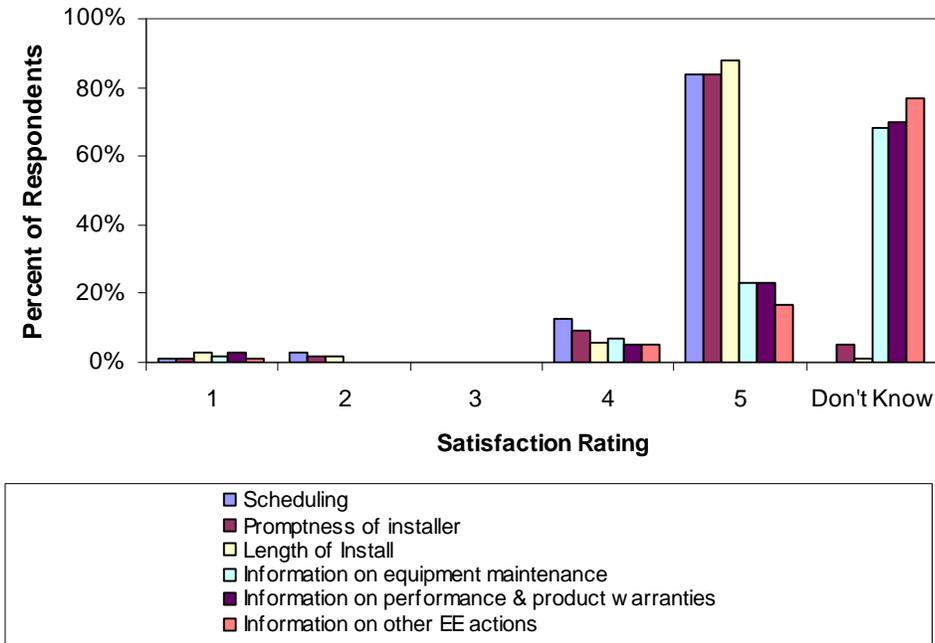


### Program Satisfaction

Participants rated their satisfaction with various aspects of the equipment installation process on a scale of 1 (not at all satisfied) to 5 (very satisfied). The vast majority of respondents gave a 5 or 4 rating to scheduling, contractor promptness, and length of the installation. When participants were asked to rate their satisfaction with information provided to them by the installation contractors on equipment maintenance, product warranties, and other energy efficiency actions they could take at their facilities, most respondents stated that they did not recall receiving these pieces of information. Many respondents indicated that this lack of knowledge could have been

due to the fact that they had not been present at the time of installation or that the installation had occurred several months prior and they did not recall the exact nature of the information they received.

**Figure 4. Satisfaction with Installation Processes**



In the few cases where respondents gave a 1 or 2 rating, they were asked to elaborate. Comments included:

*“I had to call [the contractor] repeatedly.”*

*“They said they were going to change all the light bulbs, but only changed four.”*

*“There was a long lag time between salesman and installation.”*

### ***Equipment Satisfaction***

With regard to the equipment itself, participants overwhelmingly expressed high levels of satisfaction, with 106 of 113 (94%) stating that they were either very (78%) or somewhat satisfied (16%). Only six survey respondents indicated that they were not very (2%) or not at all satisfied (4%).<sup>3</sup>

<sup>3</sup> When asked to elaborate on their dissatisfaction, these customers indicated dissatisfaction with the type or performance of lighting. Disposal of older lighting was also mentioned as source of concern.

### ***Satisfaction with Level of Incentive***

Program participants rated their satisfaction with the level of the incentive as “more than enough,” “just enough,” or “not enough.” The question was framed to the survey participants in the context of how effective the incentive amount was in encouraging their individual participation. Of the 114 survey respondents who answered the question, 76 (67%) felt that the incentive was just enough to get them to take part in the Program, while a quarter of respondents felt that the amount was more than enough. Only three customers felt that the incentive amount was not enough. These were the same customers expressing some dissatisfaction with the lighting installed, and it is not clear how they would have reacted to the incentive had they been more satisfied with the technologies installed.

### ***Perception of Energy Savings***

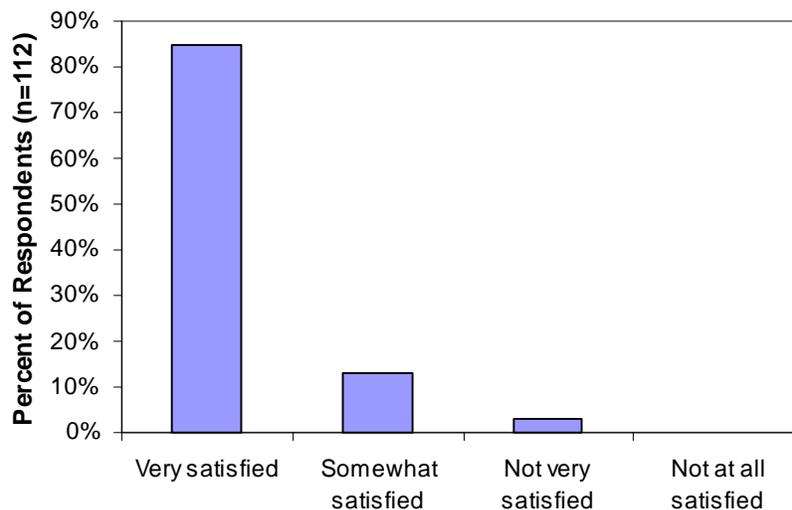
Participants were also asked whether they had noticed savings on their energy bills since installing the new equipment. Of the 119 survey respondents, 35 (29%) could not answer because they were not the person in charge of paying bills or because not enough time had elapsed since the installation to make a determination. Of the 84 participants who did respond, 59 (70%) said that they had noticed a reduction in their energy bills.

### ***Overall Program Satisfaction***

On the whole, participants were extremely satisfied with the B.E.S.T. Program. When asked to rate their overall Program satisfaction, the vast majority (95 of 112 respondents) stated that they were very satisfied. Of the remaining 17, all but three said they were somewhat satisfied. None of the participants were not at all satisfied. Reasons given by the three less satisfied customers revolved around issues of fewer bulbs being changed than anticipated and concerns related to the portion of the project cost they were required to pay.

The complete distribution of overall participant satisfaction is presented in Figure 5.

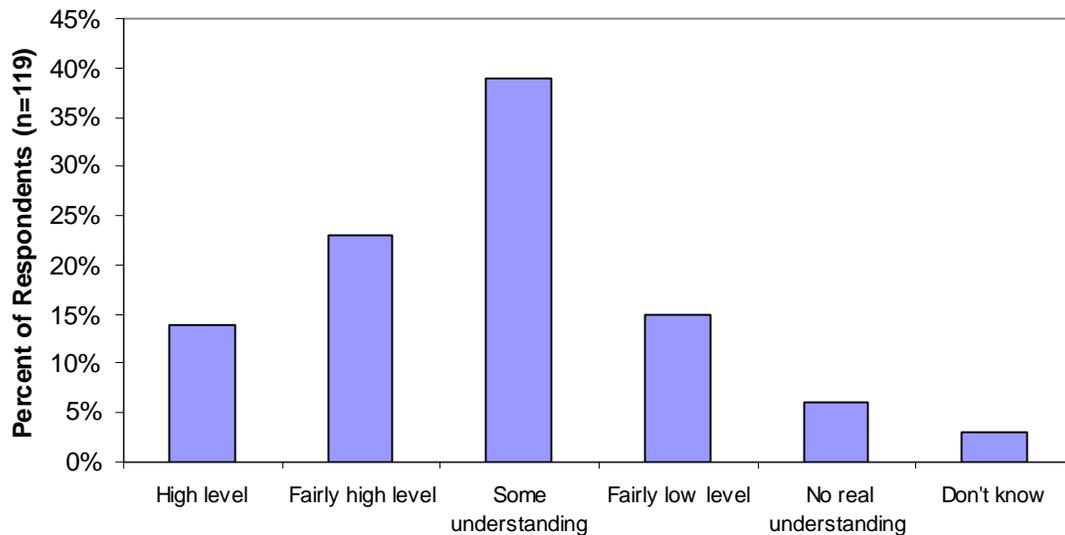
**Figure 5. Overall Program Satisfaction**



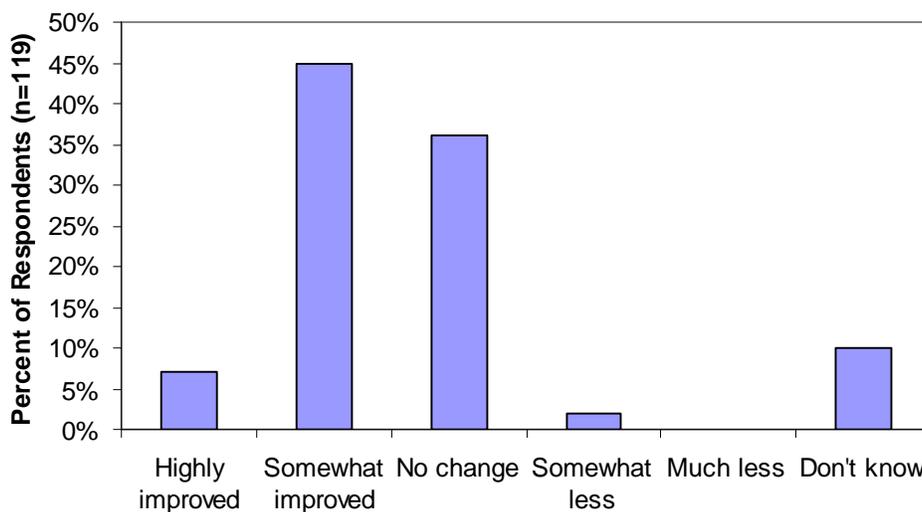
## Awareness of Energy Efficiency Options

In order to assess the Program’s impact on general energy efficiency awareness, participants were asked to rate their understanding of how to improve energy efficiency at their business *before* they participated in the Program and then to describe how their understanding had changed *since* participating in the Program.

**Figure 6. Level of Understanding of Energy Efficiency before Program Participation**



**Figure 7. Change in Understanding of Energy Efficiency since Program Participation**



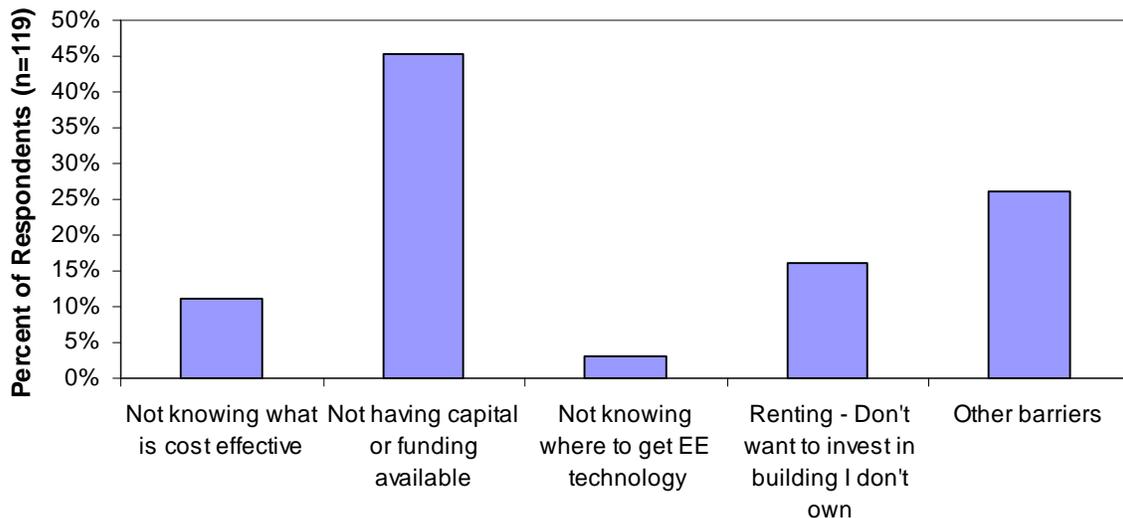
Program participants most commonly stated that they had “some understanding” of energy efficiency with regard to their business prior to taking part in the Program (39%). Following the Program, participants most commonly (45%) felt that their understanding of energy efficiency

was “somewhat improved.” Five participants (7%) felt that their understanding was “highly improved” while 43 (36%) felt that there had been no change in their awareness after the Program.

## Barriers to Energy Efficiency

One of the objectives of the B.E.S.T. Program evaluation was to identify the most salient barriers facing the small commercial sector in attempting to make energy efficiency upgrades at their facilities. When survey respondents were asked to describe the types of barriers that have prevented them from investing in energy-efficient equipment in the past, 54 of 119 (45%) cited a lack of capital or funding and 16% stated that they were reluctant to invest capital in a building they rent and do not own. The distribution of responses to the question of barriers is presented in Figure 8.

**Figure 8. Barriers to Energy Efficiency Improvements Facing Small Commercial Business Owners**



Of the 31 respondents who described “other” barriers to investing in energy efficiency equipment at their facility, ten (21%) stated that they lacked sufficient information on equipment options, costs, and performance. Nine (19%) mentioned a lack of time, while others gave reasons such as “need proof it’s going to work” (10%), “[I have] other priorities” (6%), and “I thought my lights already were energy efficient” (2%).

## Contractor Feedback

Twelve lighting and electrical contractors participated in the Program, completing a total of 2,015 projects, with the number of projects completed by each individual contractor ranging from one to 1,285. Six contractors were interviewed by phone to assess overall contractor satisfaction with the Program, awareness and understanding of the Program, the effectiveness of energy efficiency training and online resources, and whether the Program has provided expanded business opportunities for local lighting and electrical contractors. The respondents included a

mix of contractors that completed both large and small numbers of projects. The contractors interviewed completed 83% of the projects completed through the Program.

It should be noted that, due to the small size of the sample and the wide range of Program activity experienced by each contractor, the information contained in this section is anecdotal, and not necessarily representative of contractor experiences as a whole.

## **Background**

Of the six contractors interviewed, three had learned of the Program directly from KEMA. The other three did not remember how they first heard of the Program. When asked to describe the process used to identify customers eligible for the Program, four of the six said that they send sales staff door to door to approach customers directly, where they ask to see copies of customer utility bills and subsequently determine their eligibility for participation.<sup>4</sup>

The participating contractors were asked to describe the process by which they targeted Program participants that fit the hard-to-reach category. Four of the six contractors queried the customer, two pre-screened the facility by assessing each business' employee count and the size of their energy consumption,<sup>5</sup> and whether or not English was their primary language.

## **Satisfaction with Training and Online Resources**

Five of the six contractors received initial training and educational materials from KEMA, which occurred either in a workshop setting with other contractors or in one-on-one sessions with KEMA. All five of the contractors who received training stated that they were either very (3) or somewhat (2) satisfied with the process. Specific feedback from the contractors included:

*“Training was very good and very detailed.”*

*“Turned out that we learned something by going.” (by one of the most experienced and active contractors)*

*“Gave us a good understanding of Program requirements and how to use the on-line system.”*

When asked what was less useful or could be improved, participants indicated that additional hands-on training with the on-line data entry/database tool (i.e., actually entering customer data) would be useful.

When queried about the on-line data entry/database tool, there was a mix of feelings among the contractors, with some feeling it was easier to use and more useful than others.

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<sup>4</sup> Located within each of the geographical boundaries established and have a maximum annual electricity demand of 100 kW or less.

<sup>5</sup> KEMA provided rules of thumb to estimate demand based on business type and building size. These were presented as maximum square footages likely to meet the energy consumption requirements at <http://www.californiabestprogram.com/ProjectCenter/Default.aspx?tabid=105>.

With respect to “identifying potential upgrades for a client,” one contractor felt it was very useful, one felt it was somewhat useful, one rated it as not at all useful, and one did not use the online tool for this purpose. In terms of tracking project progress, three of four felt that the tool was somewhat useful; one thought it was very useful. Two of the respondents rated the tool as very useful in assessing cost-effective upgrades for the client, with the other two rating it somewhat useful.<sup>6</sup>

Ratings of overall satisfaction with the online database tool included two contractors who were very satisfied, two who were somewhat satisfied, one who was not very satisfied, and one who was not at all satisfied. There was a general sense by the evaluation team and the Program staff that overall satisfaction with the on-line tool was somewhat related to the level and frequency of use – that there was a learning curve associated it with, and if the contractor had sufficient experience with it, they gained comfort and satisfaction.

### **Satisfaction With Program Standards and Procedures**

Program contractors were asked to comment on the Program’s *processes and procedures*, as well as how “reasonable” they felt these issues were for the participants. Examples of Program processes include the initial facility audit, filling out the participation agreement, and the pre- and post-installation inspections. Of the six surveyed contractors, two each responded with very, somewhat, and not very reasonable. The latter expressed concern that the requirements were cumbersome and required too much paperwork for the customers.

Similarly non-uniform responses were heard when the contractors were asked to comment on the reasonableness of the Program’s *standards* that participants must meet in order to qualify and receive the incentive. One thought the standards were very reasonable, while two said somewhat and one said not at all reasonable. Two did not recall the standards well enough to comment.

The adequacy of the incentives in encouraging Program participation was rated as either more than adequate, (1 respondent) or adequate (5) by all the contractors, and they were either very (3.5)<sup>7</sup> or somewhat satisfied (2.5) with the payment process through KEMA.

When asked to rate KEMA’s responsiveness to questions or concerns, all six of the contractors said that KEMA was either very (2) or somewhat responsive (4).

### **Contractor Practices**

In addition to querying the contractors about Program perceptions and satisfaction, the evaluation team asked contractors to describe their typical practices in implementing the B.E.S.T. Program. The objective of this task was to assess the level to which contractors educated customers on energy efficiency options, both through the Program and beyond; explained equipment maintenance procedures and warranty information; and their method of disposal of old equipment.

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<sup>6</sup> Four of six respondents answered the questions about specific aspects of the on-line tool.

<sup>7</sup> One of the respondents elected to split his rating between “very” and “somewhat satisfied.”

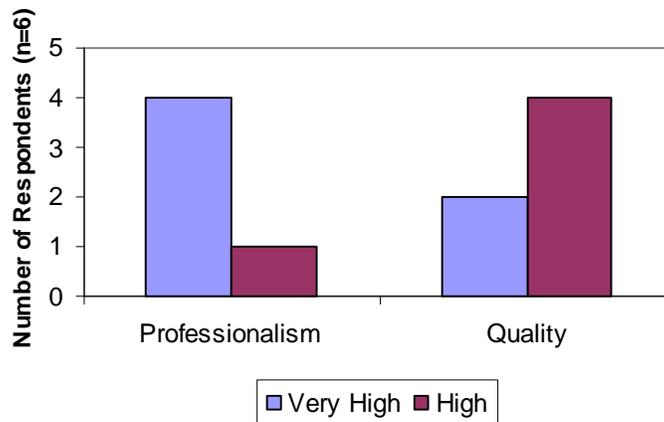
Of the six contractors interviewed, five said that they provided on-site energy education to customers (one did so through their sales representatives), as well as informing them of equipment maintenance and warranty information. Customer education included “telling them how much money they can save,” “giving them flyers and brochures,” and “talking to them about their energy efficiency options.”

Old equipment was most commonly disposed of through recycling (4), although one contractor left the equipment at the facility at the customer’s request<sup>8</sup> and one disposed of the equipment as hazardous waste.

### Inspection Practices

The contractors interacted with the Program inspectors frequently through the course of projects. When asked how they would rate the professionalism of the inspectors and the quality of their assessments, contractors offered the feedback as shown in Figure 9.

**Figure 9 : Contractor Assessment of Inspectors**



### Program Effect on Contractor Business Opportunities

Contractors were asked to explain the extent, if any, to which the B.E.S.T. Program has expanded business opportunities for them. Once again, due to the wide range in business size and level of Program participation, contractors had varying experiences with the Program’s effect on overall business opportunities. One contractor felt that the business opportunities had expanded significantly, one said they had expanded somewhat, one thought they had expanded very little, while three felt business opportunities were not expanded at all.

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<sup>8</sup> This practice would be in contrast to Program requirements.

The three contractors who did experience an increase in business were asked how, if at all, they had changed staffing to meet the increased workload. Two indicated that they hired temporary workers; the other hired permanent workers.

Finally, contractors were asked to comment on the role local city co-sponsorship played in affecting potential customers' interest in participating in the Program. Three of six explained that city involvement lent credibility to the Program, two felt that they helped to market the Program, and one "did not know."

On the whole, the six contractors interviewed were satisfied with KEMA's training procedures, their responsiveness to questions or concerns, and the adequacy of incentive levels in encouraging Program participation.

In general, participation in this and other utility-sponsored energy efficiency retrofit programs often entails a fairly significant learning curve. Those contractors who performed very few projects seemed to perceive the Program requirements as being more cumbersome, both for themselves and for their customers, than those contractors who had heavy involvement in the Program. Contractors who performed the bulk of the Program's projects learned to streamline their approach, and for the most part, perceived the requirements, processes and procedures as reasonable.

#### **Additional Contractor Perspectives**

##### ***Program strengths:***

"The KEMA staff people are great."

"Reaches a lot of customers who otherwise wouldn't be able to afford it."

##### ***Barriers or challenges:***

"The larger retrofit groups swoop down on your community and pick off all the low-hanging fruit and then it's really hard to make the program cost effective to run."

"Finding customers that qualify can be challenging."

##### ***Suggestions for improvement:***

"I hope it will continue, streamline database."

"Raise kW limit to 500."

"Raise kW limit to 200."

"Need more support from KEMA when learning database."

## **Non-Participant Surveys**

A total of 20 interviews were conducted with representatives from businesses that had been approached but that ultimately did not participate in the Program. These interviews focused on barriers to participation and Program features and attributes that would be of importance to these non-participants.

The interviews clearly indicated that cost was the biggest barrier to investing in energy-efficient equipment and participating in the Program. Of the respondents, six cited a lack of funding and an additional four stated that they were unsure of the kinds of changes that would be cost effective as key barriers to making an investment in energy-efficient technologies. With regard to barriers to participating in the B.E.S.T. Program in particular, five cited a lack of capital funding. An additional four said "past difficulties with contractors" prevented them from participating, and two each said that they were not qualified, there was a lack of need, and that they were leaving their current location. One participant cited a certain level of wariness of the Program, saying, he was skeptical about "getting something for nothing."

Seventeen respondents indicated that they would be interested in future participation in the B.E.S.T. Program. The three that indicated they would not be interested reiterated concerns that they had mentioned as barriers to participating in the past (distrust of contractors, skepticism about costs).

## **Non-Participating Contractor Surveys**

A total of ten non-participating contractors were interviewed regarding Program awareness, interest levels, and barriers to participation in the Program. The group of contractors interviewed were based in a range of locations around central and southern California. When asked about the B.E.S.T. Program, three of the respondents were aware of it without any prompting, while an additional four recalled hearing of the Program after hearing a description. Those who had heard of the Program indicated that they had primarily learned of it through word-of-mouth (from a colleague). Two contractors had participated in other energy efficiency programs in the past.

When asked about their perception of the key barriers preventing small businesses from investing in energy efficiency equipment<sup>9</sup> most (six of ten) cited a lack of capital or available funding. Three contractors believed that customers often don't know what is cost effective (i.e., if the investments will pay for themselves and length of payoff period). In addition, two respondents felt that there is a general lack of awareness, both about energy efficiency in general and relevant programs like B.E.S.T. Interestingly, two of the contractors noted that current energy regulations force a certain level of efficiency and viewed that as a barrier to changes by small businesses.

Overwhelmingly, contractors believe that the Program provides sufficient incentives to help small business customers overcome barriers to investing in energy-efficient equipment. In addition, nine of ten respondents believe that the Program creates a business opportunity for local contractors. Although eight of ten contractors indicated that they would be interested in participating in the future, most of these individuals could not provide an answer to the question about barriers preventing them from moving forward; they weren't sure what was holding them back. Only two contractors made a comment here, one cited a lack of time, and one said that it was simply administrative laziness on his part. The two contractors who were not interested in Program participation stated that they are not looking to grow their business.

## **Program Implementation Staff**

In-depth interviews were conducted with the key KEMA staff who had primary responsibility for implementing the Long Beach and EEGOV B.E.S.T. initiatives.

## **Program Goals and Objectives**

Implementers viewed the Program as creating energy savings, creating high levels of participation and realization rates, and increasing business capital through equipment

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<sup>9</sup> Multiple responses were accepted.

improvements. Overall, implementers believed that the Program was successful in meeting those goals. Implementers, however, expressed a desire for less restrictive geographic areas and better data in order to improve goals achievement.

## **Implementation Challenges**

Recruiting was a primary challenge for implementers, particularly in outlying areas, since there was no pre-existing groundwork. Recruiting of community partners and inspectors was a key difficulty. Location played a role in recruiting as well as creating a barrier for contractors who wanted to participate but were not in the right areas. An additional challenge was meeting the needs of non-English-speaking customers that were targeted by the Program. In Pomona, where many of the participants spoke Spanish, the Program employed a Spanish-speaking inspector.

Funding was initially allocated across communities, some of which utilized their funding more quickly than others, resulting in waiting lists; other communities had surplus funds. Limited ability of the implementer to reallocate that funding in the short term was believed to have reduced the participation level of some contractors and impeded customer participation.

## **Lessons Learned**

Paperwork and inspections requirements were repeatedly cited as problematic for contractors. The majority of contractors who participated were perceived to be those who have integrated energy efficiency programs into their business strategy or were larger contractors who have the resources to satisfy the requirements of participation in the Program. Suggestions for paperwork improvements included clarifying who can sign forms and relaxing the requirements of an original signature. Implementers found the requirements for post-inspection cumbersome, but recommendations on inspections were mixed. One implementer recommended requiring post-installation inspections on a sample of projects rather than on all projects, which ran into the thousands. In contrast, another implementer found these inspections necessary to achieve realization rates, but observed that pre inspections prevented contractors from participating.

## **Inspector Feedback**

The inspection process is an important component of the B.E.S.T. Program. Pre-installation inspections are conducted to assess the applicability of proposed efficiency upgrades. Post inspections verify that proposed measures are installed and ensure the quality of workmanship in the measure retrofit. Incentives are not paid to the contractor until the installation successfully passes the post-installation inspection.

Because of the importance of this Program aspect in facilitating Program progress, ensuring customer satisfaction, and achieving Program impacts, we examined the process in detail as described below.

## **Program Process**

1. The contractor's salesperson performs an audit, identifies retrofits, and enters the opportunities as line items in the on-line data entry/database system. The salesperson is

typically paid on commission. The inspectors seemed to disagree on how much input the salespeople solicited from the customer at this phase. One felt that customers were typically involved upfront to determine which fixtures should be replaced; another felt that salesmen were often proposing to retrofit every possible fixture, perhaps in an effort to maximize the incentive and, therefore, their commission. In these cases, the customer may later reject some of the proposed retrofits (e.g., if the copay was higher than they anticipated or because they were using some specialty lighting that they did not want to replace).

2. After the audit is completed, an agreement is prepared.
  - a. If the standard retrofits and standard costs are used, the contractor can print a participation agreement immediately.
  - b. If the contractor needs to enter custom measures or does not accept the standard pricing, the participation agreement cannot be printed until KEMA approves the custom data. Because of the nature of the projects, KEMA conducted reviews at this stage frequently and either approved the participation agreement to go to the customer or worked with contractor to refine.
  - c. The contractor then takes the participation agreement to the customer for signature. If the customer does not want to do all of the proposed items or otherwise wants changes to the proposed work, the contractor enters the changes in the system and prints a new agreement. Because of the contractors interactions with customer, changes were seldom made at this stage.
3. Upon receipt of a signed participation agreement, KEMA schedules a pre-installation inspection.
4. In the pre inspection, the pre-installation fixture types and quantities are verified. In addition, one inspector said that he would also give the customer a business card and a Program flyer and explain both the Program and the features of energy efficient technologies (e.g., difference between magnetic and electronic ballasts), as well as answer other questions. Customers were often under the impression that the lights would be free, and the inspector had to educate them about the incentives and how the Program worked.

At times, a difference in fixture quantity was uncovered at the inspection. This was not necessarily a cause for a rejection, though the inspector would note the information and contact the contractor. There may have been a reason the customer or contractor did not want to retrofit certain fixtures. In that case the inspector would have found more pre-fixtures than were stated in the agreement, but there would be no error and the inspection would be passed.

5. When the pre inspection is passed, the contractor printed, signed, and sent a work order to KEMA. By doing so they agree to install the stated equipment.
6. Contractor then installs the project. Depending on the size of the project and the contractor, installation could be done by a single installer or a crew. If a crew was present, typically the lead installer would complete necessary paperwork with the customer. Contractors were reportedly good about scheduling installation when it was

convenient for the customers. According to one inspector, it is often at this phase that the customer decides not to install portions of the proposed retrofit.

7. Once the project is complete, the contractor sends KEMA the project completion form. This form is also signed by the customer and should note any variations from the work order.
8. The KEMA post-installation inspection occurs after receipt of the project completion form. The inspection is meant to verify that what was recommended was actually installed. Fixture types and quantities are recorded. The customer is also asked if they are satisfied with the performance of the contractor and with the equipment installed. If there are discrepancies, the inspector decides if it was just missed by the installer or if there is another explanation.
  - a. If the count is wrong because the installer missed a few fixtures, the contractor is asked to return and complete the job. This would sometimes happen due to a locked door preventing access to some of the fixtures.
  - b. If the count is slightly wrong, the contractor is contacted, the amount is changed in the system, and the inspection passes. This could be because a fixture was not done at the customer's request or it was physically incapable of being retrofitted.
  - c. When additional on-site work is required by the contractor, KEMA conducts a second post inspection once it is completed.

## **Common Inspection Issues**

### ***Pre-Installation Inspections***

The most common issue in pre-installation inspections were miscounted fixtures. Frequently this was a result of access issues. At one site, for example, the salesman recorded 14 fixtures, the inspector saw 12, but the installer was able to install all 14. This was due to two of fixtures being within a locked storage area that could only be accessed from outside, and the owner was not available to tell the inspector about it.

### ***Post-Installation Inspections***

There are not very many post-installation inspection incorrect fixture quantities since these are mostly caught in the pre inspection. One inspector felt the most common issue in post inspections was defective lamps. This was more of an issue with linear fluorescent lamps than with CFLs. Another inspector mentioned that sometimes, though the fixture quantity was correct, the number of lamps had changed from what was proposed. One example is a retrofit of a 2-lamp 8-foot T12 fixture. The contractor may have planned to delamp and install two 4-foot T8s but instead installed a four 4-foot T8 fixture. In some cases, the contractor planned to use a retrofit kit to change from 8-foot T12s to 4-foot T8s but was forced to use 8-foot T8s instead. In some cases, the installers found more fixtures because the auditor missed fixtures in a locked room, for example.

## **Hours of Use**

Hours of use were entered by the contractor and were not verified at every inspection. KEMA scanned for high values. If high hours of use were noted, the inspector would confirm hours with the customer or by looking at the posted hours of business. One inspector mentioned that contractors were probably inflating hours somewhat at first, but KEMA noticed the high values, and the contractor estimates got better as time went on. It should be noted that the light logging done by the evaluation team revealed higher hours of use on average than estimated by the contractors.

## **Recommendations for Training**

The inspectors noted two areas that were the most common source of problems in inspections that could be addressed in Program training: 1) navigating the process and paperwork of the Program and 2) making accurate initial proposals.

1. One inspector noted that “there is a significant amount of paperwork involved in the Program, and this [is] sometimes not completed properly.” Similarly, the other inspector said that “some contractors had difficulty navigating the system properly, and KEMA had to then reenter their data.”
2. “The importance of accurate initial counts prior to pre inspection could also be emphasized more. There was a learning curve initially with some contractors, particularly with the quantities in the initial proposals. Contractors felt they should be able to estimate quantities but KEMA holds them to precise counts in the pre-inspections.” Both inspectors felt that miscounts were the most common discrepancies identified in the pre-installation inspections.

The inspectors felt that these areas could be improved if further emphasized in training.

## **Installation Issues Follow-Up**

Inspectors felt that this was a critical aspect of their role. One felt that they are there “as the customer’s advocate.”

Inspectors contact the contractor after the post-installation visit if any discrepancies or installation issues are noted. Inspectors do not reject the inspection immediately, the project moves to a “project resolution” state. The contractor notifies the inspector when the issues are resolved and a re-inspection is scheduled to confirm.

Inspectors consistently stated that contractors were required to replace any defective (burned out) lamps found during the post-installation inspection. Both also said that if old lamps were left with the customer, contractors were always required to return and remove them (even if the customers wanted them). Our evaluation inspectors discovered, however, that lamps had been left at several sites, so the KEMA inspections were not uncovering all of the times that this occurred. It may be that KEMA’s temporary inspectors were not as thorough on this point as were the inspectors we interviewed.

Some contractors felt that they should not be responsible for lenses accidentally broken during installation, although they all eventually complied with the requirement to replace the lenses. As one inspector said, “Installers sometimes forget that they are working in operating businesses and weren’t as good about cleaning up their messes (dust from tiles, wire strippings) as they could have been.” This was always remedied if brought to contractors’ attention.

## **Modifications to the Inspection Process**

One inspector felt that, over the duration of the Program, they had become more efficient. The inspectors began to understand some of the customer issues (e.g., disinterest in CFLs). The inspectors got better at lighting design issues, as opposed to just identifying savings opportunities, so they could see that there were sometimes good reasons not to retrofit some fixtures.

## **Reasons for Incomplete Retrofits**

A significant number of installations did not retrofit every fixture in the facility. Several reasons for this were mentioned in the course of the interviews.

1. ***The incentives are not equally generous for all fixture types.*** For example, 2x2 fixtures were reportedly not incented as favorably and were thus frequently rejected by customers. In some cases, customers would agree to only those fixtures that required a very low co-pay. Our evaluation inspections revealed a large number of 2x2 U-tube T12 fixtures were not retrofitted, consistent with this opinion.
2. ***In one inspector’s experience, there is a significant dissatisfaction with CFLs among many customers.*** In areas such as displays or accent lighting, customers were not happy with the CFL color rendering, or sometimes just felt they were too dim. In some cases, the CFLs were installed but had to be removed at the customer’s request. It is not clear if this is a result of a true difference in light quality or one of perception by the customer.
3. ***It is possible that contractors felt that some fixtures were not profitable (or as profitable) to retrofit.*** Our evaluation inspections revealed a large number of 8-foot T12 fixtures were not retrofitted. This could have been a result of customers refusing the co-pay, or contractors may have felt they were not profitable. In at least two of our evaluation inspections, the customer mentioned frustration that certain fixtures had not been retrofitted even though they were used extensively. In both cases, they were 8-foot T12s. This leads us to believe that, in at least some cases, contractors were not proposing the retrofit to the customers.

## **Customer Satisfaction**

One inspector volunteered that he had a customer give him a hug because she was so happy with the new lights. Retail customers were particularly excited because of better lighting in their shops to highlight their merchandise.

One inspector noted that several customers with office space complained that the new lights were too bright. In these cases, he'd give them a card and ask that they call him back if they hadn't gotten used to them in a week or two. He was never called back.

## **Overall Impression**

Both inspectors felt that the Program was structured well and was successful. One mentioned that the inspectors and the contractors had a good relationship despite being strict about replacing defective lamps and cleaning up the work area.

## **Summary of Process Findings**

Following is a summary of the key findings from the two key Program stakeholders:

### **Participants**

- Most commonly heard about the Program through contractors walking in and selling it.
- Most participated to reduce costs, and to a slightly lesser extent to save energy.
- Overall, participants were very satisfied with the installation process, including scheduling, promptness of the installer, and the length of the install.
- Participants for the most part did not recall receiving information from the contractors on equipment maintenance and product warranties, or additional EE actions they can take at their business. This may have been due in part to different people in the business being involved at different stages, however we have noted this lack of recall in other similar programs. On-site education and leave behind materials appear to have a low level of effectiveness.
- High levels of satisfaction with the equipment, the level of the incentive, and the Program overall.
- Most felt that they came into the Program with some understanding of energy efficiency, and half said the Program improved their overall understanding of energy efficiency options.
- Barriers most often cited were “lack of funding” or “renting building and don't want to invest.” These barriers were effectively addressed through the Program.

### **Contractors**

- City involvement in Program helped lend credibility.
- A wide range of contractors participated with different experiences and different capacities. As KEMA's program manager said, “some rely on these programs for a large portion of their business, while some smaller outfits find that it's more trouble and paperwork than it's worth, especially if they're traveling across the state.” This was supported by both contractor interviews and staff interviews.

- Contractors were most satisfied with training, KEMA responsiveness to questions, and the adequacy of incentive levels in encouraging Program participation.
- Contractors were least satisfied with the ease-of-use of the online database and the level of paperwork required.
- The anecdotal comments are those of individual contractors whose level of Program participation varied greatly. Due to the inherent learning curve involved in beginning to participate in any new Program, those completing very few projects found the requirements more difficult to manage than those who performed many projects and were able to streamline their own processes over time.



## 5. Conclusions and Recommendations

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While the B.E.S.T. Program fell short of its kWh savings goal (72% of the lifetime savings goal), it substantially met other goals and objectives. Specifically, the Program:

- Served 2,015 small business customers – including 1,978 businesses that were designated as hard-to-reach
- Recruited 8 local government partners to help market the program to local businesses
- Achieved 92% of the peak demand goal
- Exceeded the therm savings goal (148% of annual gross savings projected)
- Substantially increased the diversity of measures installed from the previous implementation of B.E.S.T (2003) with nearly 12% of electric energy savings coming from non-lighting measures
- Achieved high levels of participant and contractor satisfaction
- Increased the energy efficiency knowledge and awareness of small business customers
- Increased the number of participating contractors

The Program faced several implementation challenges that could be addressed with minor Program modifications. The challenges and suggested modifications include:

- ***The Program served non-contiguous utility services areas (particularly the EEGOV program).*** This presented challenges for both contractors and implementation staff. The Program was more difficult to manage and staff. It limited the ability to leverage customer communication efforts across communities. A more concentrated geographic focus would decrease the administrative burden of the Program and possibly increase participation with the same marketing and communication efforts.
- ***Customer education and related materials were ineffective.*** Participants had very low recall of information provided either verbally or through written materials. This is consistent with education efforts in other small business energy efficiency programs. Effort should be made to find more effective education approaches.
- ***Program required significant administrative requirements for implementer and participants.*** A reduction in number of site visits required by program staff by instituting a sampling protocol for pre- and post-inspections would reduce administrative burden on the implementer and program participants.



# Appendix A: Site Visit Results

**Table 19. Lighting Impacts – Long Beach**

Facility Name	Project #	Reported Savings			Verified Savings			Actual vs. Verified		
		kW	kWh	Hours of Operation	kW	kWh	Hours of Operation	kW	kWh	Hours of Operation
Bagel Barn	2246	1.1	2,855	2,600	1.1	2,855	2,600	99.8%	100.0%	100.0%
Bixby Elementary/LB Unified School District	1148	21.0	59,415	2,836	21.0	59,434	2,837	100.0%	100.0%	100.0%
City of Long Beach Dept of Parks & Recreation	1118	0.6	2,315	3,891	0.4	1,656	4,160	66.3%	71.5%	106.9%
City of Long Beach/Dept of Parks & Recreation	1254	0.5	1,030	2,080	0.4	2,427	5,992	81.0%	235.7%	288.1%
Curves	1001	1.0	2,637	2,080	0.9	2,816	3,219	89.3%	106.8%	154.7%
Daily Sandwich	2335	1.1	4,404	4,004	1.1	4,400	4,000	100.0%	99.9%	99.9%
Dywidag Systems	1154	8.6	31,450	3,640	8.6	42,846	4,959	100.0%	136.2%	136.2%
E-Print & Copy	2261	1.1	2,288	2,080	1.1	2,288	2,080	100.0%	100.0%	100.0%
Farmers Insurance Group	1104	0.4	958	2,496	0.4	782	2,037	101.1%	81.6%	81.6%
FrameXpress	2252	0.9	2,214	2,444	0.9	2,211	2,440	99.6%	99.8%	99.8%
Genesis-Motorsport	2296	1.2	2,391	1,976	1.2	2,396	1,980	100.0%	100.2%	100.2%
Hair Headquarters	2317	1.9	5,397	2,808	1.9	5,401	2,810	100.1%	100.1%	100.1%
Kirirrom Jewelry	2448	1.3	2,399	1,820	1.3	2,399	1,820	99.8%	100.0%	100.0%
Naples Elementary/LB Unified School District	1146	5.2	15,333	2,975	5.2	15,341	2,976	100.1%	100.0%	100.0%
New Hope Pain Clinic	2260	1.2	2,513	2,080	1.2	2,513	2,080	99.8%	100.0%	100.0%
Park Ocean Condo Association	1211	11.1	96,987	8,736	11.1	58,438	5,264	100.0%	60.3%	60.3%
PC Club	2676	5.6	15,573	2,808	5.5	15,584	2,810	99.9%	100.1%	100.1%
Pich Kiri Jewellery	2377	1.5	3,839	2,496	1.5	3,845	2,500	99.9%	100.2%	100.2%
Quality Cleaners	2318	2.1	6,546	3,120	2.1	6,546	3,120	99.9%	100.0%	100.0%
Rosita's	2321	1.2	4,628	3,744	1.2	4,623	3,740	99.7%	99.9%	99.9%
South West Group	1240	1.1	2,572	2,340	0.9	3,000	3,308	82.5%	116.7%	141.4%
Star View Adolescent	1088	16.3	50,984	3,120	12.4	31,442	2,534	75.9%	61.7%	81.2%
The UPS Store	2309	1.6	4,801	3,016	1.6	4,808	3,020	100.1%	100.1%	100.1%
Travel & Trade Career Institute/Transportation Training	1095	19.0	83,625	4,408	17.2	73,817	4,281	90.9%	88.3%	97.1%
Trudy Kalush DBA Pacific Coast Properties	1038	6.7	20,913	3,120	6.5	17,203	2,658	96.6%	82.3%	85.2%
Twain Elementary/LB Unified School District	1152	2.5	7,915	3,210	2.5	7,921	3,212	99.8%	100.1%	100.1%
Video Bixby	1156	2.9	9,098	3,063	3.0	9,088	3,060	101.7%	99.9%	99.9%
Village Dental Center/David Goren DDS	1113	9.3	24,279	2,600	9.3	30,423	3,258	100.0%	125.3%	125.3%
99 Cents Outlet & Pet Supply	1180	5.9	18,286	3,070	6.0	27,307	4,584	101.7%	149.3%	149.3%
A & S Tobacco	1257	1.2	3,707	3,073	1.2	7,404	6,139	101.3%	199.7%	199.7%
American Institute of Education	1157	3.0	6,315	2,049	3.1	7,055	2,289	101.4%	111.7%	111.7%
BJ Clothes	1292	4.1	10,670	2,600	4.1	14,688	3,579	100.1%	137.7%	137.7%
BJ Clothes	1293	4.5	11,783	2,572	3.5	12,315	3,543	76.7%	104.5%	137.8%
Chinese & Teriyaki	1163	1.5	4,983	3,381	1.5	4,982	3,380	101.7%	100.0%	100.0%
Continental 1HR Cleaners & Laundry	1161	3.0	9,472	3,073	2.9	11,907	4,039	97.0%	125.7%	131.4%
Ferrer, EC Custom Broker	1129	3.9	9,210	2,340	3.9	10,482	2,663	99.9%	113.8%	113.8%

### Lighting Impacts – Long Beach, cont.

Facility Name	Project #	Reported Savings			Verified Savings			Actual vs. Verified		
		kW	kWh	Hours of Operation	kW	kWh	Hours of Operation	kW	kWh	Hours of Operation
Gentle Care Pet Clinic	1280	2.0	4,736	2,340	2.0	4,736	2,340	100.2%	100.0%	100.0%
Grace Hope Health	1069	2.3	7,659	3,380	2.3	7,659	3,380	99.8%	100.0%	100.0%
Intercommunity Medical Group	1286	7.3	23,629	3,224	7.3	13,727	1,873	100.0%	58.1%	58.1%
Jumbo 99	1316	8.5	27,823	3,276	8.5	27,426	3,210	100.6%	98.6%	98.0%
K C Video	1158	1.2	3,089	2,553	1.2	3,324	2,747	101.7%	107.6%	107.6%
Karen Oil Co	1155	2.7	23,919	8,736	2.7	23,930	8,740	99.9%	100.0%	100.0%
La Bodeguita	1160	1.6	5,931	3,688	1.6	7,566	4,705	101.8%	127.6%	127.6%
Los Altos YMCA	1084	8.3	38,538	4,652	8.3	38,524	4,650	100.0%	100.0%	100.0%
Nanci's Beauty Supply	1172	1.7	5,889	3,381	1.7	5,684	3,263	101.3%	96.5%	96.5%
Petar Mitrevski MD	1012	1.2	1,888	1,560	1.4	1,438	998	119.1%	76.2%	64.0%
Sexual Assault Crisis Agency	1010	2.0	5,143	2,600	2.0	5,440	2,750	99.9%	105.8%	105.8%
Sophia Anh Tran MD	1015	0.9	2,471	2,860	0.9	1,681	1,946	100.5%	68.0%	68.0%
Steve P. Masari CPA	1234	1.4	2,885	2,080	1.4	2,885	2,080	99.8%	100.0%	100.0%
Tabacco Center	1171	1.7	5,889	3,381	1.7	6,719	3,857	101.3%	114.1%	114.1%
Thomas DiJulio MD	1029	1.3	2,716	2,080	1.3	2,312	1,770	99.7%	85.1%	85.1%
<b>Total</b>		<b>199.3</b>	<b>705,991</b>	<b>3,533</b>	<b>192.2</b>	<b>665,691</b>	<b>3,463</b>	<b>96.4%</b>	<b>94.3%</b>	<b>98.0%</b>

**Table 20. Lighting Impacts – Central Coast**

Project #	Reported Savings			Verified Savings			Actual vs. Verified		
	kW	kWh	Hours of Operation	kW	kWh	Hours of Operation	kW	kWh	Hours of Operation
4331	1.2	3,146	2,600	1.2	2,984	2,467	100.0%	94.9%	94.9%
3290	2.6	8,031	3,120	2.6	10,046	3,903	100.2%	125.1%	125.1%
3585	1.4	4,899	3,640	1.3	7,803	5,797	99.7%	159.3%	159.3%
4568	1.8	3,661	2,080	1.8	2,422	1,376	100.0%	66.2%	66.2%
3266	1.0	3,089	3,120	1.0	3,089	3,120	100.0%	100.0%	100.0%
4325	1.4	4,010	2,808	1.4	4,013	2,810	99.9%	100.1%	100.1%
3809	2.5	6,427	2,600	2.5	6,427	2,600	100.1%	100.0%	100.0%
3527	0.6	1,297	2,184	0.6	1,295	2,180	100.7%	99.8%	99.8%
3367	2.0	7,396	3,640	2.1	14,321	6,686	105.5%	193.6%	183.7%
3379	2.2	9,021	4,056	2.2	9,065	4,076	100.2%	100.5%	100.5%
3205	5.2	15,890	3,075	5.0	15,563	3,120	96.5%	97.9%	101.5%
4533	1.6	3,370	2,080	1.6	3,125	1,929	100.0%	92.7%	92.7%
4400	1.0	2,059	2,00	1.0	3,619	3,656	100.0%	175.8%	175.8%
3332	1.7	5,038	2,912	1.7	6,519	3,768	100.0%	129.4%	129.4%
4163	7.0	16,263	2,340	7.0	17,998	2,590	100.0%	110.7%	110.7%
3294	6.1	17,123	2,808	5.7	15,983	2,810	93.2%	93.3%	100.1%
3611	2.2	9,485	4,371	2.2	12,577	5,796	100.0%	132.6%	132.6%
4262	2.0	5,560	2,808	1.9	6,444	3,446	94.4%	115.9%	122.7%
4625	3.7	12,233	3,276	3.7	15,280	4,092	100.1%	124.9%	124.9%
3221	1.5	4,162	2,756	1.5	4,168	2,760	100.0%	100.1%	100.1%
4336	0.1	309	2,808	0.1	309	2,810	100.0%	100.1%	100.1%
4651	1.5	4,240	2,808	1.4	5,119	3,585	94.6%	120.7%	127.7%
4660	2.7	5,599	2,080	2.7	9,387	3,487	100.1%	167.6%	167.6%
<b>Total</b>	<b>52.9</b>	<b>152,307</b>	<b>2,879</b>	<b>52.2</b>	<b>177,555</b>	<b>3,400</b>	<b>98.8%</b>	<b>116.6%</b>	<b>118.1%</b>

**Table 21. Lighting Impacts – Half Moon Bay**

Project #	Reported Savings			Verified Savings			Actual vs. Verified		
	kW	kWh	Hours of Operation	kW	kWh	Hours of Operation	kW	kWh	Hours of Operation
2914	0.9	1,830	2,080	0.9	1,830	2,080	100.0%	100.0%	100.0%
3134	2.5	5,015	2,051	2.4	5,020	2,053	99.8%	100.1%	100.1%
3122	3.4	7,916	2,309	3.4	7,927	2,312	99.9%	100.1%	100.1%
<b>Total</b>	<b>6.8</b>	<b>14,761</b>	<b>2,186</b>	<b>6.8</b>	<b>14,777</b>	<b>2,188</b>	<b>99.9%</b>	<b>100.1%</b>	<b>100.1%</b>

**Table 22. Lighting Impacts – EEGOV PG&E**

Facility Name	Reported Savings			Verified Savings			Actual vs. Verified		
	kW	kWh	Hours of Operation	kW	kWh	Hours of Operation	kW	kWh	Hours of Operation
Central Coast	52.9	152,307	2,880	52.2	177,556	3,400	98.8%	116.6%	118.1%
Half Moon Bay	6.8	14,761	2,186	6.8	14,777	2,188	99.9%	100.1%	100.1%
<b>Total</b>	<b>59.6</b>	<b>167,068</b>	<b>2,801</b>	<b>59.0</b>	<b>192,333</b>	<b>3,261</b>	<b>98.9%</b>	<b>115.1%</b>	<b>116.4%</b>

**Table 23. Lighting Impacts – Pomona**

Project #	Reported Savings			Verified Savings			Actual vs. Verified		
	kW	kWh	Hours of Operation	kW	kWh	Hours of Operation	kW	kWh	Hours of Operation
2127	5.1	13,183	2,155	5.9	19,581	3,320	5.9	148.5%	154.1%
1940	0.6	1,214	2,041	0.6	2,704	4,544	0.6	222.7%	222.7%
1816	1.8	3,554	2,014	1.5	3,240	2,097	1.5	91.2%	104.2%
1687	1.8	3,661	2,080	1.7	3,432	2,080	1.7	93.8%	100.0%
2001	0.9	2,647	2,912	0.9	1,853	2,039	0.9	70.0%	70.0%
1701	5.7	11,939	2,080	5.4	19,372	3,598	5.4	162.3%	173.0%
2154	29.7	92,845	3,129	29.2	128,998	4,415	29.2	138.9%	141.1%
2189	0.7	5,612	8,146	0.6	1,896	3,176	0.6	33.8%	39.0%
1995	6.7	13,863	2,080	5.4	14,684	2,703	5.4	105.9%	130.0%
1958	4.5	16,336	3,640	4.6	27,628	6,064	4.6	169.1%	166.6%
1942	3.6	7,550	2,080	0.6	1,238	2,080	0.6	16.4%	100.0%
1781	4.1	10,764	2,600	4.1	10,764	2,600	4.1	100.0%	100.0%
2167	0.4	1,327	3,276	0.4	217	535	0.4	16.3%	16.3%
2024	2.0	5,661	2,808	2.0	8,096	4,016	2.0	143.0%	143.0%
1683	6.0	14,566	2,444	5.9	20,428	3,459	5.9	140.2%	141.5%
2028	3.5	9,930	2,860	3.5	17,409	5,014	3.5	175.3%	175.3%
1745	1.9	4,027	2,080	2.0	10,170	4,971	2.0	252.5%	239.0%
2097	1.3	5,008	3,873	1.3	4,136	3,199	1.3	82.6%	82.6%
2032	1.4	7,159	4,992	1.4	7,156	4,990	1.4	100.0%	100.0%
<b>Total</b>	<b>81.7</b>	<b>230,846</b>	<b>2,799.6</b>	<b>77.1</b>	<b>303,000</b>	<b>3,930.4</b>	<b>94.4%</b>	<b>131.3%</b>	<b>140.4%</b>

**Table 24. Lighting Impacts – Ventura County**

Project #	Reported Savings			Verified Savings			Actual vs. Verified		
	kW	kWh	Hours of Operation	kW	kWh	Hours of Operation	kW	kWh	Hours of Operation
2990	0.8	1,922	2,496	0.8	1,582	2,054	100.0%	82.3%	82.3%
2798	1.3	5,560	4,212	1.3	5,557	4,210	100.0%	100.0%	100.0%
2579	3.8	9,385	2,496	3.8	9,400	2,500	100.0%	100.2%	100.2%
2514	2.5	7,901	3,108	2.5	7,902	3,109	100.1%	100.0%	100.0%
2881	8.9	20,901	2,340	8.8	24,822	2,836	98.0%	118.8%	121.2%
2518	3.0	6,169	2,080	3.0	8,486	2,861	99.9%	137.6%	137.6%
2519	1.2	6,156	5,096	1.2	6,714	5,558	99.8%	109.1%	109.1%
3478	6.7	13,953	2,080	6.7	15,945	2,377	100.0%	114.3%	114.3%
2672	2.8	6,306	2,295	2.9	6,685	2,297	105.8%	106.0%	100.1%
2758	11.6	23,977	2,061	11.6	21,252	1,827	100.0%	88.6%	88.6%
2494	2.8	16,307	5,824	2.9	16,773	5,820	102.9%	102.9%	99.9%
3455	32.7	93,579	2,860	32.7	31,577	965	100.0%	33.7%	33.7%
2875	3.8	10,487	2,756	3.8	10,502	2,760	99.9%	100.1%	100.1%
2617	1.3	6,014	4,680	1.3	6,014	4,680	99.6%	100.0%	100.0%
2725	2.1	7,970	3,890	2.0	7,369	3,596	100.0%	92.5%	92.5%
2702	4.6	14,389	3,120	4.7	16,366	3,487	101.8%	113.7%	111.8%
2618	3.1	7,738	2,472	3.0	7,550	2,500	96.5%	97.6%	101.1%
3148	9.6	19,993	2,080	9.8	20,334	2,080	101.7%	101.7%	100.0%
2514	13.4	27,868	2,080	13.4	46,364	3,461	100.0%	166.4%	166.4%
<b>Total</b>	<b>116.0</b>	<b>306,574</b>	<b>2,643</b>	<b>116.2</b>	<b>271,193</b>	<b>2,333</b>	<b>100.2%</b>	<b>88.5%</b>	<b>88.3%</b>

**Table 25. Lighting Impacts – EEGOV SCE**

Facility Name	Reported Savings			Verified Savings			Actual vs. Verified		
	kW	kWh	Hours of Operation	kW	kWh	Hours of Operation	kW	kWh	Hours of Operation
Pomona	81.7	230,846	2,800	77.1	303,000	3,930	94.4%	131.3%	140.4%
Ventura County	116.0	306,575	2,643	116.2	271,194	2,334	100.2%	88.5%	88.3%
<b>Total</b>	<b>197.7</b>	<b>537,421</b>	<b>2,708</b>	<b>193.3</b>	<b>574,194</b>	<b>2,971</b>	<b>97.8%</b>	<b>106.8%</b>	<b>109.7%</b>



## Appendix B: CPUC Reporting Tables

**Table 26: SCE Program Energy Impact Reporting for 2004-2005 Programs  
Program ID 1310-04  
Long Beach B.E.S.T. Program**

Year	Calendar Year	MWh Savings		Peak MW Savings		Therm Savings	
		Gross, Program-Projected	Net, Evaluation Confirmed	Gross, Program-Projected	Net, Evaluation Confirmed	Gross, Program-Projected	Net, Evaluation Confirmed
1	2004	6,818.0	5,045.2	1.41	1.45	20,900.0	2,042.9
2	2005	6,818.0	5,045.2	1.41	1.45	20,900.0	2,042.9
3	2006	6,818.0	5,045.2	1.41	1.45	20,900.0	2,042.9
4	2007	5,925.4	4,590.4	1.19	1.31	20,900.0	2,042.9
5	2008	5,925.4	4,590.4	1.19	1.31	20,900.0	2,042.9
6	2009	5,675.4	4,365.4	1.16	1.29	20,900.0	2,042.9
7	2010	5,675.4	4,365.4	1.16	1.29	20,900.0	2,042.9
8	2011	5,675.4	4,365.4	1.16	1.29	20,900.0	2,042.9
9	2012	5,303.4	4,365.4	1.14	1.29	20,900.0	2,042.9
10	2013	5,303.4	4,365.4	1.14	1.29	20,900.0	2,042.9
11	2014	5,300.4	4,361.5	1.13	1.28	20,900.0	2,042.9
12	2015	5,260.4	4,333.8	1.13	1.28	10,000.0	388.5
13	2016	4,760.0	4,333.8	1.13	1.28	10,000.0	388.5
14	2017	4,760.0	4,333.8	1.13	1.28	10,000.0	388.5
15	2018	4,760.0	4,333.8	1.13	1.28	10,000.0	388.5
16	2019	4,680.6	4,333.8	1.13	1.28	10,000.0	388.5
17	2020	0.0	0.0	0.00	0.00	0.0	0.0
18	2021	0.0	0.0	0.00	0.00	0.0	0.0
19	2022	0.0	0.0	0.00	0.00	0.0	0.0
20	2023	0.0	0.0	0.00	0.00	0.0	0.0
<b>Total</b>	<b>2004-2023</b>	<b>89,459.1</b>	<b>72,174.1</b>			<b>279,900.0</b>	<b>22,371.5</b>

**Table 27: PG&E Program Energy Impact Reporting for 2004-2005 Programs  
Program ID 1281-04  
EEGOV B.E.S.T. Program**

Year	Calendar Year	MWh Savings		Peak MW Savings		Therm Savings	
		Gross, Program-Projected	Net, Evaluation Confirmed	Gross Program-Projected	Net, Evaluation Confirmed	Gross, Program-Projected	Net, Evaluation Confirmed
1	2004	0.0	0.0	0.00	0.00	0.0	0.0
2	2005	9,074.0	5,009.1	1.87	1.58	27,815.8	13,459.2
3	2006	9,074.0	5,009.1	1.87	1.58	27,815.8	13,459.2
4	2007	9,074.0	5,009.1	1.87	1.58	27,815.8	13,459.2
5	2008	7,886.1	4,917.1	1.58	1.54	27,815.8	13,459.2
6	2009	7,886.1	4,917.1	1.58	1.54	27,815.8	13,459.2
7	2010	7,553.4	4,552.3	1.55	1.50	27,815.8	13,459.2
8	2011	7,553.4	4,552.3	1.55	1.50	27,815.8	13,459.2
9	2012	7,553.4	4,552.3	1.55	1.50	27,815.8	13,459.2
10	2013	7,058.3	4,552.3	1.52	1.50	27,815.8	13,459.2
11	2014	7,058.3	4,552.3	1.52	1.50	27,815.8	13,459.2
12	2015	7,054.3	4,552.3	1.51	1.50	27,815.8	13,459.2
13	2016	7,001.1	4,519.6	1.51	1.50	13,309.0	2,472.0
14	2017	6,335.1	4,519.6	1.51	1.50	13,309.0	2,472.0
15	2018	6,335.1	4,519.6	1.51	1.50	13,309.0	2,472.0
16	2019	6,335.1	4,519.6	1.51	1.50	13,309.0	2,472.0
17	2020	6,229.4	4,519.6	1.51	1.50	13,309.0	2,472.0
18	2021	0.0	0.0	0.00	0.00	0.0	0.0
19	2022	0.0	0.0	0.00	0.00	0.0	0.0
20	2023	0.0	0.0	0.00	0.00	0.0	0.0
<b>Total</b>	<b>2004-2023</b>	<b>119,061.3</b>	<b>74,773.0</b>			<b>372,519.3</b>	<b>160,411.2</b>

**Table 28: SCE Program Energy Impact Reporting for 2004-2005 Programs  
Program ID 1333-04  
EEGOV B.E.S.T. Program**

Year	Calendar Year	MWh Savings		Peak MW Savings		Therm Savings	
		Gross, Program-Projected	Net, Evaluation Confirmed	Gross Program-Projected	Net, Evaluation Confirmed	Gross, Program-Projected	Net, Evaluation Confirmed
1	2004	0.0	0.0	0.00	0.00	0.0	0.0
2	2005	9,074.0	5,907.9	1.87	1.74	27,815.8	97,916.2
3	2006	9,074.0	5,907.9	1.87	1.74	27,815.8	97,916.2
4	2007	9,074.0	5,907.9	1.87	1.74	27,815.8	97,916.2
5	2008	7,886.1	5,690.5	1.58	1.68	27,815.8	97,916.2
6	2009	7,886.1	5,690.5	1.58	1.68	27,815.8	97,916.2
7	2010	7,553.4	5,690.5	1.55	1.68	27,815.8	97,916.2
8	2011	7,553.4	5,690.5	1.55	1.68	27,815.8	97,916.2
9	2012	7,553.4	5,690.5	1.55	1.68	27,815.8	97,916.2
10	2013	7,058.3	5,690.5	1.52	1.68	27,815.8	97,916.2
11	2014	7,058.3	5,690.5	1.52	1.68	27,815.8	97,916.2
12	2015	7,054.3	5,690.5	1.51	1.68	27,815.8	97,916.2
13	2016	7,001.1	5,399.5	1.51	1.68	13,309.0	14,243.0
14	2017	6,335.1	5,399.5	1.51	1.68	13,309.0	14,243.0
15	2018	6,335.1	5,399.5	1.51	1.68	13,309.0	14,243.0
16	2019	6,335.1	5,399.5	1.51	1.68	13,309.0	14,243.0
17	2020	6,229.4	5,399.5	1.51	1.68	13,309.0	14,243.0
18	2021	0.0	0.0	0.00	0.00	0.0	0.0
19	2022	0.0	0.0	0.00	0.00	0.0	0.0
20	2023	0.0	0.0	0.00	0.00	0.0	0.0
<b>Total</b>	<b>2004-2023</b>	<b>119,061.3</b>	<b>90,245.1</b>			<b>372,519.3</b>	<b>1,148,292.8</b>

**Table 30: SCE and PG&E Program Energy Impact Reporting for 2004-2005 Programs  
Program IDs 1281-04; 1310-04; 1333-04  
Long Beach and EEGOV B.E.S.T. Programs**

Year	Calendar Year	MWh Savings		Peak MW Savings		Therm Savings	
		Gross, Program-Projected	Net, Evaluation Confirmed	Gross Program-Projected	Net, Evaluation Confirmed	Gross, Program-Projected	Net, Evaluation Confirmed
1	2004	6818.0	5045.2	1.41	1.45	20,900.0	2,042.9
2	2005	24966.0	15962.1	5.15	4.76	76,531.7	113,418.2
3	2006	24966.0	15962.1	5.15	4.76	76,531.7	113,418.2
4	2007	24073.4	15507.3	4.93	4.63	76,531.7	113,418.2
5	2008	21697.7	15198.0	4.35	4.54	76,531.7	113,418.2
6	2009	21447.7	14973.0	4.33	4.51	76,531.7	113,418.2
7	2010	20782.2	14608.2	4.26	4.46	76,531.7	113,418.2
8	2011	20782.2	14608.2	4.26	4.46	76,531.7	113,418.2
9	2012	20410.2	14608.2	4.24	4.46	76,531.7	113,418.2
10	2013	19420.0	14608.2	4.17	4.46	76,531.7	113,418.2
11	2014	19417.0	14604.3	4.17	4.46	76,531.7	113,418.2
12	2015	19369.1	14576.6	4.15	4.46	65,631.7	111,763.9
13	2016	18762.2	14252.9	4.15	4.46	36,618.0	17,103.5
14	2017	17430.2	14252.9	4.15	4.46	36,618.0	17,103.5
15	2018	17430.2	14252.9	4.15	4.46	36,618.0	17,103.5
16	2019	17350.8	14252.9	4.15	4.46	36,618.0	17,103.5
17	2020	12458.7	9919.1	3.02	3.18	26,618.0	16,715.0
18	2021	0.0	0.0	0.00	0.00	0.0	0.0
19	2022	0.0	0.0	0.00	0.00	0.0	0.0
20	2023	0.0	0.0	0.00	0.00	0.0	0.0
<b>Total</b>	<b>2004-2023</b>	<b>320,763.7</b>	<b>232,147.1</b>			<b>1,004,038.6</b>	<b>1,331,075.5</b>